



Proceedings of the
Finance and Economics Conference 2012

Munich, Germany

August 1-3, 2012

The Lupcon Center for Business Research

www.lcbr-online.com

ISSN 2190-7927

All rights reserved. No part of this publication may be reprinted in any form (including electronically) without the explicit permission of the publisher and/or the respective authors. The publisher (LCBR) is in no way liable for the content of the contributions. The author(s) of the abstracts and/or papers are solely responsible for the texts submitted.

Procedural Notes about the Conference Proceedings

1) Selecting Abstracts and Papers for the Conference

The basis of the acceptance decisions for the conference is the evaluation of the abstracts submitted to us before the deadline of March 15, 2012. Upon an initial evaluation in terms of general quality and thematic fit, each abstract is sent to a reviewer who possesses competence in the field from which the abstract originates. The reviewers return their comments to the Lupcon Center for Business Research about the quality and relevance of the abstracts. The opinion of at least one peer reviewer per abstract is solicited. In some cases, the opinion of additional reviewers is necessary to make an adequate decision. If the peer reviewers disagree about an abstract, a final decision can be facilitated through an evaluation of the full paper, if it is already available at the time of the submission. If the reviewers determine that their comments are useful for the author to improve the quality of the paper, LCBR may forward the comments to the author. However, the review process remains completely anonymous at any given time. The reviewers will not be informed about the names or affiliations of the authors and vice versa. The pool of reviewers may include the LCBR Academic Advisory Board but also the larger pool of ad hoc reviewers because of a better match of appropriate reviewers. The pool of ad hoc reviewers includes mostly former conference presenters, with whom LCBR has had prior personal contact, essentially helping establish a pool of reviewers whose professionalism and trustworthiness has been ascertained by LCBR.

2) Submission Procedure to the Conference Proceedings

Authors who present their work at the conference are invited to submit their full papers to the conference proceedings for publication. Authors may choose to submit only an abstract. This is especially the case when their work has already been accepted or is under consideration for acceptance with scholarly journals which discourage prior publications because of commercial copyright concerns.

Session A

“Country Risk and Foreign Bank Entry: The Case of Turkey”

Dervis Kirikkaleli (Stirling Management School, Division of Economics, University of Stirling, United Kingdom)

In this paper, we purpose to examine two-way linkage between foreign bank penetration and country risk (namely, political risk, economic risk and financial risk) in Turkey using quarterly data from 1992Q4 to 2009Q4. Our finding indicates that one cointegrating vector is detected between foreign bank penetration and political risk in model 1 and between foreign bank penetration and economic risk in model 2 whereas we failed to find any long-run relationship between foreign bank penetration and financial risk using the Johansen co-integration test. We find one error correction term significant and positive in bivariate vector error correction in model 1 and 2, implying that in the long-run, foreign bank entry contributes to economic and political stability. Moreover, we investigate short-run causality based on VAR approach between foreign bank penetration and financial risk but we failed to find any significant causality in the bivariate VAR model, even at the 10% level. By analysing impulse response functions, our finding also reveals that; (i) there is no impact of foreign bank entry on political risk in Turkey at the end of 6 quarters while political risk has negative effect on foreign bank entry; (ii) in model 2, rising foreign bank penetration is associated with less economic risk and the reverse effect is close to zero throughout 12 quarters; (iii) finally, there is no relationship between foreign bank entry and financial risk is observed. The outcomes of Serial correlation LM, "*portmanteau*" test of *Ljung* and *Box*, VAR residual heteroskedasticity and the inverse roots of AR characteristic polynomial are found to be satisfactory for all models.

Keywords: Foreign Bank Entry; Country Risk; VAR; VECM

JEL Classification: F23, G21, C22

“Determination of Dividend Policy: The Evidence from Saudi Arabia”

Turki Alzomaia (King Saudi University, Saudi-Arabia)

Ahmed Al-Khadhiri (King Saudi University, Saudi-Arabia)

Abstract

The aim of this paper to examine the factors determining dividend represented by Dividends per share for companies in the Saudi Arabia stock exchanges (TASI). In this study we run a regression model and used a panel data covering the period from of 2004 to 2010 for 105 non- financial firms listed in the stock market. The model investigate the impact of Earnings per share (EPS), Previous Dividends represented by dividends per share for last year , Growth, Debt to Equity (D/E) ratio, Beta & Capital Size on Dividends per Share. The results consistently support that Saudi listed non-financial firms rely on current earnings per share and past dividend per share of the company to set their dividend payments.

Keywords

Dividends, Saudi Arabia, determinants, Previous dividends, Earning.

Introduction

Dividend policy has been one of the most significant topics in financial literature, which give it a considerable attention to solve the dividends vagueness. The decision of the firm regarding how much earnings could be paid out as dividend and how much could be retained, is the concern of dividend policy decision. This results a large number of conflicting theories. Starting from Dividends were irrelevant and had no influence on a firm's share price Miller and Modigliani (1961) when they believed in the world of efficient market, dividends policy does not affect the shareholders wealth, then The bird in hand theory by Myron Gordon (1963) and John Lintner (1962). After that, The tax preference theory introduced by Summer (Brennan, 1970; Elton and Gruber, 1970, Later on dividends signaling initiated and arguing that dividends changes send a signal to investors about the firm future earning and management perception Miller (1980). Another research is based on transaction cost and residual theory. This theory indicates that the firm will pay high transaction cost if it needs external finance. So firms tend to reduce the dividends to avoid such cost (Mueller, 1967; Higgins, 1972). In addition to Agency cost theory, firms with high dividends pay out are more valuable than firms with low dividends pay out (Rozeff, 1982; Easterbrook, 1984; Lloyd, 1985).

This paper tend to examine determination of Dividend Policy for non-financial firms in the Saudi Arabia, the country with the economy with the largest proven crude oil reserves in the world at 266.7 billion barrels, representing 57% of the GCC reserves, almost 20% of the world total reserves. It ranks as the largest producer as well as exporter of petroleum in the world and plays a leading role in the OPEC, producing 28% of the total OPEC oil production.

This paper is organized as follow: the introduction in part one, then the literature review in part two, then Saudi Stock market overview in part three, after that data source & Methodology of analysis in part four and finally the conclusion in part five.

Literature Review:

According to Miller and Modigliani (1961), dividends were irrelevant and had no influence on a firm's share price, they believed in the world of efficient market, dividends policy does not affect the shareholders wealth. The original proponents of the Dividends policy since Miller and Modigliani is illustrated that dividends were irrelevant and had no influence on a firm's share price (the firms value is determined only by its basic earning power and its business risk). Under very strict assumptions, especially the absence of taxes and transaction cost. Then financial researchers and practitioners have disagreed with Miller and Modigliani's proposition and have argued that, they based their proposition on perfect capital market assumptions, assumptions that do not exist in the real world. Those in conflict with Miller and Modigliani's ideas introduced competing theories and hypotheses to provide empirical evidence to illustrate that when the capital market is imperfect, dividends do matter. Miller and Modigliani (1961)

The bird in the hand theory (Dividends Preference) criticized Miller and Modigliani's paper, explains that investors prefer dividends (certain) to retained earnings since the stock price risk declines as dividends increased. A return in the form of dividends is a sure thing, but a return in the form of capital gains is risky, therefore, firms should set a large dividend payout ratio to maximize firm share price. Myron Gordon (1963) and John Lintner (1962).

The tax preference theory introduced after that in 70th, this theory claims that investors prefer lower payout companies for tax reasons long-term capital gains allow the investor to defer tax payment until they decide to sell the stock. Because of time value effects, tax paid immediately has a higher effective capital cost than the same tax paid in the future. Summer (Brennan, 1970; Elton and Gruber, 1970; Litzenberger and Ramaswamy, 1979; Litzenberger and Ramaswamy, 1982; Kalay, 1982; John and Williams, 1985; Poterba and Summers, 1984; Miller and Rock, 1985; Ambarish et al., 1987)

Later, dividends signaling theory initiated and arguing that dividends changes send a signal to investors about the firm future earning and management perception. Management will not increase the dividends unless they certain about the future earning to meet the increase in dividends. And conversely dividend cuts are perceived as "bad news" if the firms reduce dividends, it sends to investors a negative message that future earning will be less than current. Miller (1980)

Another research introduce the transaction cost and residual theory, this theory indicate that the firm will pay high transaction cost if it need external finance. So firms to tend to reduce the dividends to avoid such cost (Mueller, 1967; Higgins, 1972; Crutchley and Hansen, 1989; Holder et al., 1998).

Later agency cost theory assumed Firms with high dividends pay out are more valuable than firms with low dividends pay out, since the investors will avoid to pay the agency cost to monitor management actions in inappropriate behaviors (Rozeff, 1982; Easterbrook, 1984; Lloyd, 1985; Crutchley and Hansen, 1989; Dempsey and Lauer, 1992; Holder et al., 1998; Saxena, 1999).

After introducing the theories of dividends policies, now, we will discuss some of papers investigating the dividends determination in various countries.

Chen & Nont Dhiensir (2009) analyzed the determinants of the corporate dividend policy using a sample of firms listed on New Zealand Stock Exchange (NZSE). NZSE firms traditionally have high dividend pay-outs compared with companies in the US. This raises the question which the existing dividend theories are applicable in the NZSE firms. Their findings are mostly consistent with the agency cost theory. Ownership structure seems to be the most important determinant of dividend policy for NZSE firms. NZSE firms tend to have a high dividend payout ratio when they have high ownership dispersion. They tend to have a lower dividend payout ratio when they have high degree of insider ownership. Also their findings are partly consistent with the transaction cost and residual theory. In additions, they find that, firm that experience rapid growth in the recent past tends to pay lower dividend. Moreover, they find some evidence that the dividend imputation system provides firms with an incentive to pay higher dividends. Finally, they do not find evidence to support the dividend stability theory and the signaling theory.

Hafeez Ahmed & Attiya Y. Javid (2009) examines the dynamics and determinants of dividend payout policy of 320 non-financial firms listed in Karachi Stock Exchange during the period of 2001 to 2006. For the analysis they use dividend model of Lintner (1956) and its extended versions in dynamic setting. The results consistently support that Pakistani listed non-financial firms rely on both current earnings per share and past dividend per share to set their dividend payments. However, the dividend tends to be more sensitive to current earnings than prior dividends. The listed non-financial firms having the high speed of adjustment and low target payout ratio show the instability in smoothing their dividend payments. It is found that the profitable firms with more stable net earnings can afford larger free cash flows and therefore pay larger dividends. Furthermore the ownership concentration and market liquidity have the positive impact on dividend payout policy. Besides, the investment opportunities and leverage have the negative impact on dividend payout policy. The market capitalization and size of the firms have the negative impact on dividend payout policy which shows that the firms prefer to invest in their assets rather than pay dividends to their shareholders.

Okpara, Godwin Chigozie (2009), Investigate the factors determining dividend pay-out policy in Nigeria. To do this, factor analysis technique was first employed and then alternate econometric method used on the identified critical factors to ascertain the authenticity or validity of the identified factors. The results show that three factors-earnings, current ratio and last year's dividends impact significantly on the dividend payout and dividend yield in Nigeria. Earnings exert a negative impact on the payout ratio indicating that they are apportioned to retention (as they increase) for the growth of the firm. While current ratio and the previous year's dividend exert a positive impact on the payout ratio and dividend yield, showing firstly that firms are more willing to pay out dividends when they have no problem with meeting their short-term needs for cash, and secondly that firms try to increase their payout ratio from its previous level. The researchers therefore conclude that the three variables, earnings, current ratio and previous year's dividends are goods predictors of dividend payout policy in Nigeria. (Okpara, Godwin Chigozie)

Duha Al-Kuwari (2009) examined the determinants of dividend policies for firms listed on Gulf Co-operation Council (GCC) country stock exchanges. Seven hypotheses theories were investigated using a series of random effect Tobit models. The models considered the impact of government ownership, free cash flow, firm size, growth rate, growth opportunity, business risk, and firm profitability on dividend payout ratios. He has approved that the firms in which the government owned a proportion of the shares, paid higher dividends compared to the firms owned completely by the private sector. Furthermore, the results illustrated that the firms chose to pay more dividends when firm size and profitability were high. Also his study indicate that the leverage ratio is additional variable that affecting the dividend payout ratios of firms.

Santhi Appannan and Lee Wei Sim (2011), examine the leading determinants that affecting the dividend payment decision by the company management in Malaysia listed companies for food industries under the consumer products sector, on how the changes in dividend payment decision vary according with the predictors' variables. The relationship between independent variables with the current dividend per share as dependent variable is empirically analyzed through the Pearson correlation analysis and Regression Model. Sample companies selected, that declared cash dividend from year 2004 until 2008 chosen to be analyzed had confirmed that the fact that most of the food industries companies are relying on the debt equity ratio when deciding the dividend

payment ratio. The debt equity ratio is proved to be positively correlated with the current dividend per share and affecting much of the firm's decision when setting the dividend policy.

Faris AL- Shubiri (2011), Investigate the deterrents of the dividend policies of the 60 industrial firms listed on the Amman stock exchanges (ASE) for the period of 2005-2009, and to explain their dividend payment behavior. This study used the Tobit regression analysis, and Logit regression analysis, and hence the random effects Tobit / Logit models are favorable than the pooled models. This paper show that, there is a significant effect of Leverage, Institutional Ownership, Profitability, Business Risk, Asset Structure, , Growth Opportunities , Firm Size on the dividend payout in listed firms of Amman stock exchange as the same determinations of dividends policy as suggested by the developed markets.

Saudi Stock Market Overview:

We can split the Saudi Stock Market grown in two main periods: Source is Macroeconomic determinants of the stock market movements: empirical evidence from the Saudi stock market

Initial period (1930 - 2003):

Saudi joint stock companies had started in the mid 1930's, when the "Arab Automobile" company was established as the first joint stock company. By 1975 there were about 14 public companies. The Saudi stock market remained informal and primitive since the primary economic objectives were to build the infrastructure, develop human resources, and increase the standard of living for the Saudi citizens, and thus little effort was focused on developing the stock market.

The rapid economic expansion, besides the Saudisation of part of the foreign banks capital in the 1970's led to the establishment of a number of large corporations and joint stock banks.

The market remained informal, until the early 1980's when the Saudi government aims to regulate and modernize the capital market to ensure safe and efficient functioning of the stock market when it embarked on forming a regulated market for trading together with the required systems. In 1984, a Ministerial Committee composed of the Ministry of Finance and National Economy, [Ministry of Commerce](#) and [Saudi Arabian Monetary Agency \(SAMA\)](#) was formed to regulate and develop the market. SAMA was the government body charged with regulating and monitoring market activities.

In 1984, the 12 commercial banks established the Saudi Share Registration Company (SSRC), which provides central registration facilities for joint stock companies and settles and clears all share transactions. In 1990, SAMA introduced an electronic system, Electronic Share Information System (ESIS). ESIS concentrates all multi-location equity trading into one single floorless market and processes buy-sell orders from order entry to transfer of ownership.

Restructured period (2003 - Present):

In July 2003 the Capital Market Authority (CMA) was established under the Capital Market Law (CML) by Royal Decree No. (M/30). The CMA is the sole regulator and supervisor of the capital market, it issues the required rules and regulations to protect investors and ensure fairness and efficiency in the market. The CMA is an independent government entity that reports directly to the Prime Minister of the Saudi government. Therefore, the CMA has the full authority to enforce and regulate all aspects of the Saudi capital market. The CMA's role is not restricted to supervising and monitoring participants in the capital market. The CMA has created many channels for increasing awareness and building a stock investment culture among Saudis and foreign residents in order to protect them from capital market risk.

The following points highlight some of the remarkable improvements that have been made to the Saudi stock market:

1. In 2007, the Saudi Stock Exchange (SSE) was established to be the sole entity authorized to carry out the trading of financial securities in Saudi Arabia
2. In April 2008, the CMA restructured the Saudi stock market sectors based on the nature of business of each listed company (see table 1) and its income and earnings structure. After the new market structure, the Saudi stock market consisted of 15 instead of its previous eight.

Table 1: New market sector in Saudi stock market

New Sectors	
Agriculture & Food Industries	Petrochemical Industries
Building & Construction	Real States
Cement	Retail
Energy	Telecommunication & Information Technology
Hotel & Tourism	Transport
Industrial Investment	Banks & Financial Services
Media and Publishing	Insurance
Multi-Investment	

3. Along with the previous advancement, the TASI and the new sector indices were calculated based on the actual tradable shares, and free-floating shares
4. Commercial banks no longer offer intermediary services for the participants in the Saudi stock market. Since the end of 2009, the CMA authorized up to 110 independent brokers and research houses to offer the intermediary services and promote competition within the Saudi stock market.
5. 2009, the CMA approved the trading of Sukuk¹⁹ and bonds for the first time in Saudi Arabia. This is considered to be a step towards launching a second regulated market

Table 2: History of growth of Saudi Stock Market

End of Period	Listed Companies		Value of Shares Traded (Billion RLS)		Share Price Index (1985= 1000)	
	No.	Growth %	No.	Growth %	Index	Growth %
1986	46.		0.83		646.03	
1990	57	24	4.40	430	979.80	52
1995	69	21	23.23	428	1367.60	40
2000	75	9	65.29	181	2258.29	65
2001	76	1	83.60	28	2430.11	8
2002	68	-11	133.79	60	2518.08	4
2003	70	3	596.51	346	4437.58	76
2004	73	4	1773.86	197	8206.23	85
2005	77	5	4138.70	133	16712.64	104
2006	86	12	5261.85	27	7933.29	-53
2007	111	29	2557.71	-51	11038.66	39
2008	127	14	1962.95	-23	4802.99	-56
2009	135	6	1264.01	-36	6121.76	27
2010	146	8	759.18	-40	6620.75	8

Data Source & Methodology

Data:

The objectives of this study are to find out the determinants of dividend per share by testing the public nonfinancial companies in Saudi Arabia stock Exchange. The Data research is collected mainly from Gulf Base (Zughaibi & Kabbani Financial Consultants (ZKFC)) for seven years for the period between 2004 & 2010. Below our assumptions and conditions for the data:

The data collected annually for dividends & all other variables,

Since some of companies are new in the market, market risk is not available for these companies, so some of financial data are eliminated.

Some companies pay dividends in same -annual or quarterly, we summed up the during the year dividends as one year total.

Two companies issue their financial statements following the Hijri calendar; we considered them as Gregorian calendar. (Makah & Jabil Omer) in retail sector, since the effect is minor.

Four companies their financial year ended in 31st of March. We treat them as the majority of other companies (Al-Hukair, Sadafco, Tohammah and Ethad Atheeb companies).

Petrochemical Industries and Telecommunication & Information Technology are major sectors paying dividends among Saudi stock market; the drop in earnings in 2008 is due to huge loss in Kingdom Company from their investment outside Saudi market by 29b SAR in 2008. SABIC earning influence over all market earnings in 2009 when their net income to level Of 9B SAR table 3 show more details of some statistic about Saudi stock market.

Table 3: summarize the key factors related to the stock change:

Year	Sales Growth	Debt To Equity	Net Profit	EPS	Dividends
2004	36%	24%	33,878,549	8.45	21,550,676
2005	156%	23%	45,401,412	8.02	27,625,630
2006	20%	23%	50,830,042	23.28	32,554,628
2007	47%	31%	62,078,619	23.24	30,951,466
2008	30%	39%	22,565,348	2.22	32,494,161
2009	47%	47%	36,226,010	1.66	26,219,635
2010	19%	49%	55,554,121	1.84	34,092,651

The dividends payout ratio is one of major ratio used by companies to establish their dividends policy. Table 4 illustrates the average of dividends per share for the Saudi stock market and per new sectors for the investigated period. The energy sector is dividends payout is more than earnings per share due to that governments grantees 10% dividends from capital issued.

Table 4: The payout ratio for Saudi stock market:

Row Labels	2004	2005	2006	2007	2008	2009	2010
Agriculture & Food Industries	20%	15%	24%	30%	44%	30%	25%
Building & Construction	19%	29%	23%	29%	35%	57%	35%
Cement	81%	67%	62%	69%	54%	59%	66%
Energy	157%	139%	137%	131%	170%	102%	93%
Hotel & Tourism	37%	25%	33%	32%	34%	14%	14%
Industrial Investment	52%	14%	25%	18%	30%	38%	47%
Media and Publishing	33%	24%	40%	54%	64%	29%	62%
Multi-Investment	9%	3%	0%	5%	16%	43%	68%
Petrochemical Industries	19%	14%	18%	18%	18%	40%	22%
Real States	81%	74%	85%	46%	69%	91%	24%
Retail	51%	14%	13%	20%	38%	34%	37%
Tele. & Information Technology	84%	37%	45%	51%	31%	28%	24%
Transport	41%	38%	18%	43%	77%	32%	61%
Grand Total	41%	29%	31%	32%	41%	45%	40%

Methodology:

In this study, multiple regression analyses are run to explain the relationship between firm's dividends per share and earnings per share, Previous Dividends represented by dividends per share for last year, Growth, Debt to Equity ratio, Beta and Capital Size on Dividends per Share. Panel data for 105 non financial firms in Saudi Stock market for their annual financial ratio from the period 2004 to 2010 for each firm. We used SSPS program to analysis the data

Our Dividends per share model would be as follows:

$$DPS = \beta_0 + \beta_1 EPS + \beta_2 PrevDPS + \beta_3 Growth + \beta_4 Leverage + \beta_5 Beta + \beta_6 Size + \epsilon$$

Item	Abbreviation
Dividends per Share	DPS
Earnings per Share	EPS
Growth	Growth
Debt to Equity (D/E)Ratio	Leverage
Market Risk	Beta
Size of Equity	Size
Previous Dividends per Share	PrevDPS

The following hypothesized relationships are predicted for each variable with respect to the dividends per share ratio:

- H1: The Dividends per share is positively associated with Earnings per share.
- H2: The Dividends per share is positively associated with Previous Dividends per share.
- H3: The Dividends per share is negatively associated with Sales Growth.
- H4: The Dividends per share is negatively associated with Debit to Equity Ratio.
- H5: The Dividends per share is positively associated with Capital Size.
- H6: The Dividends per share is positively associated with market risk.

Dividends per Share (DPS): is our dependent variable, what we expected will be affected by independent variables. The dividend per share ratio is the amount of dividends paid to stockholders relative to the total number of a company issued shares. DPS give unbiased result to earning Comparing with Dividends payout ratio.

1. **Earnings per share (EPS):** is the amount of earnings per each outstanding share of a company's stock, and calculated by dividing current Net profit on total outstanding shares. Is representing the capacity of corporation to pay dividends. A firm's Earning per share is considered to be an important factor that affects its dividend level. This is because firm is willing to pay higher amounts of dividends if firms increase their profitability level, and hence a positive relationship is expected between firm's earning per share and its dividend payments.
2. **Previous Dividends per Share Ratio:** is the company last year dividend per share, we anticipate it is highly significant to the current Dividends per share ratios, always consider past dividend as a more important benchmark for deciding the current dividend payment. Thus, companies attempt to maintain a high degree of consistency in their firms' dividends level by referring to the past dividend declared. This also consists with singling Hypothesis.

Growth: is calculated by dividing current sales to last year sales minus last year sales. Our expectation is firm which has high growth will have greater need for financing and thus firms with high growth and investment opportunities will need the external & internally generated funds to finance those investments, and thus tend to pay little or no dividends. This prediction is consistent with the pecking order Hypothesis.

Debt Equity Ratio: is playing a key role in explaining firm's dividend policy. It is negatively related to dividends. This means that firms with low debt ratios are willing to pay more dividends. This result is supported by the agency costs theory of dividend policy. Thus, firms with high leverage ratios have high transaction costs, and are in a weak position to pay higher dividends to avoid the cost of external financing. Debt Equity Ratio is calculated by dividing total long term debt to total Equity. Debt equity ratio (capital structure) can be considered as another feature which has a strong impact on dividend behavior.

Capital Size: firm's size is expected to explain the firm's dividends policy. Large firms are more likely to be mature and thus have easier access to capital markets, and should be able to pay more dividends. This indicates that, large firms can afford to pay higher dividends than the smaller ones. This relationship is supported by the transaction cost explanation of dividend policy. The company Capital size is calculated by level of capital and for our study, we segregated by three categories :

	Size of Equity	Size
0	Less than 500 Million	Small
1	More than 500 Million & less than 1000 Million	medium
2	More than 1000 Million	large

Beta (Market Risk): is a number describing the relation between firm price return with financial market as a whole. Assuming price return reflecting book value increased. It is argued that business risk is one of the determinants of firm's dividend policy. "A firm with stable earnings can predict its future earnings with a greater accuracy. Thus, such a firm can commit to paying larger proportion of its earnings as dividends with less risk of cutting its dividends in the future.

Empirical Result:

Table 5 demonstrates the descriptive statistic for all regression variables. It present the average indicators of variables computed from financial statements. Also, it presents the standard deviation for the mean

Table 5: Data Descriptive Statistics:

Descriptive Statistics					
Variable	N	Minimum	Maximum	Mean	Std. Deviation
DPS	665	.00	162.10	1.4818	7.61422
EPS	665	-30.97	1561.90	8.9654	80.97422
Growth	665	-1.79	654.00	3.7470	40.72174
Leverage	665	.00	5.66	.7822	.87766
Beta	551	.10	1.95	.9999	.23619
Size	665	.00	2.00	.6135	.65363
PrevDPS	665	.00	162.10	1.4334	7.72711

The correlation amongst all variables, show the range is between -0.30 (between market risk Beta & dividends per share) and 0.561(between Dividends per share & previous dividends per share). Also correlation among the independents variables show that the range between -.205 and .127 is highest correlations which is consider low correlation. See Appendix (1)

From the result we can build our estimation model as below equation:

$$DPS = 0.16 + 0.23 EPS + 0.596 PrevDPS + 0.0 Growth - 0.036Leverage - 0.165 Beta + 0.12 Size$$

Equation (1)

Table 6 illustrate the Model Summary and ANOVA for the regression, it show that Adjusted R square is 0.79, which mean that the variables can explain the model also the table show that F-statistic is significant since (F=345.5 and P< 0.05) at confidence interval level 95%, suggest that the model is capable to determine the variation in the criterion dividends per share.

Table 6: the Model summary & ANOVA result:

Model Summary						
Model		R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1		.890	.792	.790	.78761	2.162
ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1285.871	6	214.312	345.480	.000 ^a
	Residual	337.460	544	.620		
	Total	1623.330	550			

Table 7 Illustrate the coefficient for each variable with the dependant variable

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	.160	.167		.960	.338	-.168	.488
	EPS	.231	.017	.371	13.315	.000	.197	.266
	Growth	-.001	.001	-.014	-.721	.471	-.002	.001
	Leverage	-.036	.041	-.018	-.887	.375	-.117	.044
	Beta	-.165	.154	-.023	-1.074	.283	-.467	.137
	Size	.120	.054	.046	2.230	.026	.014	.226
	PrevDPS	.596	.031	.573	19.508	.000	.536	.656

As predicted, the result of this study show that (see table 7) earnings per share, Size and previous dividends per share are significantly has positive relationship with dividends per share. So when firms increase their profitability we expect firms to raise their dividends per share. Similarly the result proved that when firms looking to at least maintain their dividends level to not sending negative signals to investors. In addition, study approved that large firms are more likely to be mature and thus have easier access to capital markets, and should be able to pay more dividends.

The result also indicate that firms which experience more growth opportunity are more to reduce their dividends per share, since there is a negative relationship between increase in sales growth and dividends per share. However this relationship is not significant relationship with dividends per share in our predicted model, since the t. (-.721) statistic is low.

Also the outcome as expected show that firms which finance their assets from heavily debt is more likely to reduce their level of dividends, supporting the negative relationship between debt to equity ratio and company dividends per share. However this result is not significant, since the t. (-.887) statistic is low.

In addition, our model cannot approve the positive relation between market risk and dividends per share, since our model show different negative relative between them. However the drop in Saudi stock market may in 2006 have major effect to show this result, since the market drop from 20,000 to 5,000 indexes, this result is not significantly sported by t. statistic is (-1.074)

Extending the Test: The second round of testing the model using stepwise the variables suggests the model of estimation the DPS can be explain by EPS and last year dividend level as below equation:

$$DPS = 0.31 + 0.618 \text{ EPS} + 0.227 \text{ PrevDPS}$$
Equation (2)

Which is excluding four variables, Growth, Size, Beta & Debt Equity ratio from the previous model see table 10. When comparing the two models using the adjusted R square, Equation (1) = 0.790 to Equation (2) Adjusted R Square = 0.789. It obvious that the four variables adding little explanation for the model (0.001). See table 8. This result is supporting the low t. statistic in the model without excluding the four independents variables (Growth, Size, Beta & Debt Equity ratio). As will, is supported by F statistic in the second model (1,028.365) which is higher than F. statistic in first model (345.480).

Finally, we can conclude that, the determination of dividends in Saudi stock market is heavily depending on firms earning and firms last year dividends, as resulted from second model. See table 8.

Table 8 the Model summary & ANOVA result (stepwise)

Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
	.889 ^b	.790	.789	.78945		
a. Predictors: (Constant), PrevDPS						
b. Predictors: (Constant), PrevDPS, EPS						
ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
2	Regression	1281.804	2	640.902	1028.365	.000 ^b
	Residual	341.527	548	.623		
	Total	1623.330	550			
b. Predictors: (Constant), PrevDPS, EPS						
c. Dependent Variable: DPS						

Table 9 Illustrate the coefficient for each variable with the dependant variable

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients		Sig.
		B	Std. Error	Beta	t	
2	(Constant)	.031	.043		.726	.468
	PrevDPS	.618	.029	.594	21.397	.000
	EPS	.227	.017	.363	13.096	.000
a. Dependent Variable: DPS						

Table 10 Illustrate the **Excluded Variables** from the model

Excluded Variables						
Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics
						Tolerance
2	Growth	-.013 ^b	-.653	.514	-.028	.996
	Leverage	-.012 ^b	-.605	.545	-.026	.987
	Beta	-.022 ^b	-1.044	.297	-.045	.875
	Size	.037 ^b	1.879	.061	.080	.984
b. Predictors in the Model: (Constant), PrevDPS, EPS						
c. Dependent Variable: DPS						

Conclusion:

From our study, we may conclude that firm's profitability and the previous dividends level has significant influence on the company's decision to increase or decrease the level of dividends in Saudi Stock market. Their positive relationships with dividend per share show that the companies willing to pay more dividends when experience an increase in their level of profitability with high consideration of the level of last year dividends. This support that Saudi stock market take in his consideration the signaling theory.

One way to extend this study is to investigate the dividend per share ratios by disaggregating the firms into sectors, such as the Petrochemical Industries sector. Another way is extend this study to broaden the data for longer period. One more also, through include the firms' ownership between individuals & institutional owners.

References

1. Abdullah M. Al-Obaidan 2008. International Research Journal of Finance and Economics, ISSN 1450-2887 Issue 17
2. Ahmad h. Juma'h (2008). The financial factors influencing cash dividend policy: a sample of US. Manufacturing companies. professor of finance & school of economics & carlos j. Olivares pacheco associate professor department of management.
3. Bluman. Elementary Statistics 7th Ed.
4. Brigham Ehrhardt 2009. Financial Management theory and practice 13e
5. Carlo Alberto Magni. (2006). Relevance or irrelevance of retention for dividend policy irrelevance. Department of Economics, University of Modena and Reggio Emilia
6. Carter Hill, Griffiths & Lim Principles of Econometrics. 3rd ed.
7. Duha Al-Kuwari (2009). Determinants of the Dividend Policy in Emerging Stock Exchanges: The Case of GCC Countries Global Economy & Finance Journal Vol. 2 No. P. 38-63.
8. Faris Nasif AL- Shubiri 2011. Determinants of Changes Dividend Behavior Policy: Evidence from the Amman Stock Exchange Amman Arab University Jordan College of Business, Department of Finance and Banking
9. Groppelli and Nikbakht. Finance 5th Ed.
10. Hafeez Ahmed Shaheed Zulfiqar Ali Bhutto (2009). The Determinants of Dividend Policy in Pakistan Institute of Science and Technology, Islamabad, Pakistan. International Research Journal of Finance and Economics ISSN 1450-2887 Issue 29
11. Husam-Aldin Nizar Al-Malkawi. (2007). Determinants of Corporate Dividend Policy in Jordan: An Application of the Tobit Model. Journal of Economic & Administrative Sciences Vol. 23, No. 2, December 2007 (44-70).
12. Ian Pool. (2007). Demographic Dividends: Determinants of Development or Merely Windows of Opportunity? Copyright 2007 by the Oxford Institute of Ageing AGEINGHORIZONS Issue No. 7, 28-35
13. Jaratin Lily, Sundar Venkatesh & Thumwimon Sukserm. Determinants of Dividend Payout in Thailand
14. Jianguo Chen & Nont Dhiensiri (2009). Determinants of dividend policy: the evidence from New Zealand . International research journal of finance and economics
15. Julia Sawicki, An Investigation into the Dividend Policy of Firms in East Asia
16. M. KABIR HASSAN*, JOSEPH FARHAT** AND BASHIR AL-ZU'B (2003). Dividend Signaling Hypothesis and Short-Term Asset Concentration of Islamic Interest-Free Banking. Islamic Economic Studies Vol. 11, No. 1, September 2003.
17. Mofleh Alshogeathri (2011). Macroeconomic determinants of the stock market movements: empirical evidence from the Saudi stock market.
18. Okpara, Godwin Chigozie (2010) A Diagnosis of the Determinant of Dividend Pay-Out Policy in Nigeria: A Factor Analytical Approach Department of Banking and Finance, Abita State University Uturu-Nigeria American Journal of Scientific Research ISSN 1450-223X Issue 8(2010), pp.57-67.
19. Ross Westerfiled Jaffe. Corporate Finance 7th. Ed
20. Santhi Appannan and Lee Wei Sim (2011) study on leading determinants of dividend policy in Malaysia listed companies for food industry under consumer product sector 2nd international conference on business and economic.
21. Subba Reddy. Dividend Policy of Indian Corporate Firms: An Analysis of Trends and Determinants
22. Talla M. Al-Deehani. (2003). Determinants of Dividend Policy: The Case of Kuwait. Journal of Economic & Administrative Sciences Vol. 19, No. 2, December 2003 (59 -76)
23. Yiu Man Leung (2006). Analysis of determinants of dividend policy in UK.
24. Atul K. Saxena Determinants of Dividend Payout Policy: Regulated Versus Unregulated Firms
25. Chris Brooks Introductory Econometrics for Finance 2nd Ed.

“Insider Trading in Mergers and Acquisitions in U.K. U.S and China”

Wei Shi (University of Bath, United Kingdom)

This research focuses on insider trading in Mergers and Acquisitions. It is based on mainly three countries which could represent three different economic regions--U.K, U.S and China . In this thesis, event study is applied to analyze the existence of insider trading. The announcement date is taken as day 0 and a 70-day period surrounding day 0 (-60 to +10 day) is examined in order to find out whether insider trading takes place. The model used in the thesis is market model. Dummy variables are in use to find out the exact day(s) on which the targets and bidders have abnormal return. Apart from this, day 0 hypotheses and the ratio of the error term square of the suspected firms to that of the clean firms are used in finding out the trend and the evidence of insider trading which are brand new. Day 0 hypotheses assume that there should be significant return on day 0, however, due to the existence of insider trading, the day 0 return might be absorbed in the previous period. Hence, the day 0 abnormal return of the suspected firms should be lower than that of the clean firms. This new theory is proved in the thesis. Also, the ratio of the error term square of the suspected firms to that of the clean firms shows when day approaches 0, the ratio becomes greater which indicates there is a trend of insider trading. The two methods used in this thesis provide new ways of analyzing insider trading in the future research.

“Modelling Housing Market in China: a Dynamic Panel Data Model”

Fang Zhang (University of Bath, United Kingdom)

As we know, China has become one of the fastest developing countries in the world. The housing market has become a significant industry affecting the whole economic system and has become a barometer for the economy. Over the last 30 years in China, there have been a dramatic increase in house prices and house purchases. During the global financial crisis periods, most countries' housing markets have been through an unprecedented period of volatility; while the Chinese housing market has sustained growth rather than a decline. My paper is focusing on the Chinese housing market, trying to find the factors which affect Chinese house prices. The paper will use the panel data across 30 provinces/cities from 1999 to 2009 to construct the dynamic VAR model with GMM method. Moreover, some dummy variables will be included in my estimation, dividing 30 provinces/cities into different geographical groups (East China, Middle China and West China). By adopting some econometric techniques, such as the Unit Root test, Johansen Cointegration test, Granger Causality test, impulse response and variance decomposition analysis, the empirical evidences will imply how these factors diversely impact house prices in different provinces/cities or regions across China. The conclusion of my paper will also make some policy implications and suggestions for the participants of the Chinese housing market.

Keywords:

house price, determinants, panel data, dynamic VAR model, GMM method

Linking the micro-economic analysis, managerial decision-making methods and apparatus of game theory in order to clarify and explain the behavior of imperfectly competitive markets

Simona Hašková (University of Economics in Prague, Czech Republic)

The aim of the paper is to present foundations of the method of analysis of the oligopoly markets behavior based on a purpose-built linking of analytical microeconomics knowledge, principles of managerial decision making and game theory. The method is based on a "case-based reasoning" allowing considerations of various specifics of firms and industries. Its output (outcome) is a simple, easily understandable, sufficiently informative (and thus suitable for managers) tool for identification of a potential global impact of firms' decisions on markets.

Key words: duopoly analysis, strategic behavior of duopoly firms, pay-out matrix, sequential decision tree

Introduction¹

As we know, oligopoly is a market structure consisting of a small number of producers. This is the reason that everyone observes the behavior of others and responds accordingly. It is the feature of dependency distinguishing the oligopoly from other market forms that is worthy of closer examination, which we realize in the case of two large firms in the oligopoly position (approximate duopoly) offering slightly mineralized bottled water in the Czech market.

The first firm is Carlsbad Mineral Water Company, Inc. with its brand product Aquila, mineralized water drawn from a natural spring in Carls Bad, which is the product holding the lead marketing position among Czech producers. The second is the Coca-Cola Company offering the brand water Bonaqua in the Czech market. This springs from natural a source in Slovakian Považský Inovec. Both products are available in retail stores for the same price and in about the same quantity, so we can assume that both manufacturers are equally big.²

In the analysis of the market we work with some simplifying assumptions, by which we build the correct microeconomic duopoly model in order to analyze the prices of these companies' products. These include: 1. the water of both companies is conceived as a homogeneous product (in fact, the products can be considered as very close substitutes in terms of taste and content of minerals). 2. in order to simplify the problem we exclude from our considerations all minority firms with similar products in the sector.

These assumptions lead us to the analysis of the duopoly, on which basis we meet with a few elementary strategies of the behavior of the duopoly cooperative and competing firms and with the impact of these strategies on the sector. The outputs of the analysis of the relevant strategies will be recorded in the managerial decision-making models (sequential decision trees) and (within the apparatus of game theory) will be incorporated into the pay-out matrix simulating the behavior of the duopoly market players that, in the case of three strategies (cooperation, myopic, and leadership strategy), is the matrix of the third order.

The basic economic data³

Let us denote the company that produces the unflavored mineralized water Aquila with letter A and the company producing water Bonaqua as B. They bottle water and sell it for the same price P in the common market with a curve of a daily market demand:

$$D = AR(Q) = 22 - (Q) / 2, \quad 0 \leq Q = (Q_A + Q_B) \leq 44$$

¹ This conference contribution was carried out with financial support from the Internal Grand Agency of University of Economics in Prague. The project's number is IG632052.

² This conclusion is based on the author's survey of the regional market in the hypermarkets Globus and Interspar carried out in December 2011. The unflavored sparkling water Bonaqua and Aquila were sold at an average price of 14 Czk per 1,5 liter bottle. The amount of these products on the shelves in the stores was estimated to be equivalent. That means the retailers provide customers with approximately the same amount of products according to the expected demand, which is based on recent sales data recorded in the analytical financial accounting books.

³ It is the author's estimation based on results both in the footnote 1 referring to a market research and a survey among consumers.

(see the line D in Figure 1), where Q_A is the amount produced by the company A, Q_B is the amount from the company B stated in thousands of bottles. $AR(Q)$ is the average revenue from selling one bottle of water in Czk. To the demand curve D the curve of marginal yield belongs:

$$MR(Q) = 22 - (Q), \quad 0 \leq Q = (Q_A + Q_B) \leq 44,$$

(in Figure 1 it is identical to the line segment D_{AB}). The variable costs of one bottle of water include the cost of packages (bottles) and the average cost incurred by extracting its contents. With the same capital equipment of each of the firms they are constant on the level of Czk 4, i.e. the price at average variable cost equaling marginal cost $AVC = SMC = 4$ and the curve of short term average total costs $SAC(Q) = AVC + AFC(Q) = 4 + 2FC/Q$ (where FC are daily fixed costs of one company in thousands Czk) decreases in its entirety of production volume to this value.

The cooperative duopoly

According to our assumption the bottle of water provided by the company A is no different from the bottle of water from the company B, and both companies are equally sized. If we also assume that the firms always sell for the same price and share the market equally (i.e. they always supply the same quantity $Q_A = Q_B = Q$ to the market), then they cooperate. Each of them faces the same daily demand.

$$D_{AB} = AR_{AB}(Q) = AR(Q + Q) = 22 - 2 \cdot Q / 2 = 22 - Q, \quad 0 \leq Q \leq 22,$$

which corresponds to the marginal revenue curve

$$MR_{AB}(Q) = 22 - 2 \cdot Q, \quad 0 \leq Q \leq 22.$$

From the firms perspective it is optimal for each of them to produce 9 thousand bottles a day ($SMC(Q_0) = 4 = 22 - 2 \cdot Q_0 = MR_{AB}(Q_0), \Rightarrow Q_0 = 9$), i.e. 18 thousand bottles together and to sell them for 13 Czk ($AR_{AB}(9) = 13$), see Figure 1.

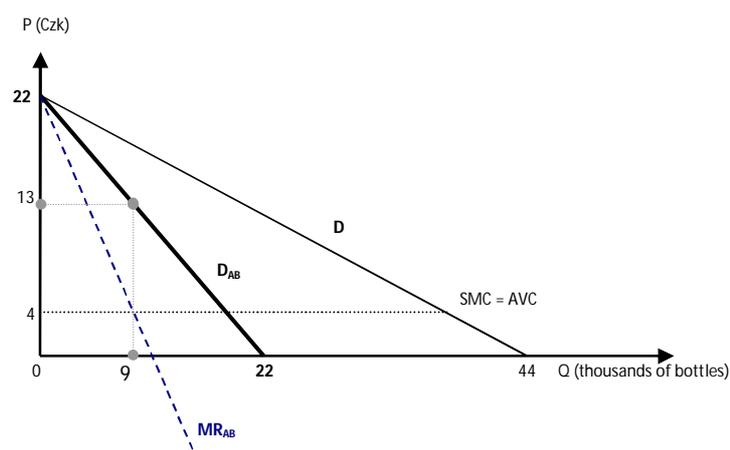


Figure 1 Model of the equilibrium situation of each company

The same price is not in itself the evidence of the cartel, and as we shall see in the following text, the results of the analysis of myopic and leadership competitive behavior also lead firms to choose the same prices. In case of homogeneous products or very close substitutes, the same prices are typical in the oligopoly market, as firms constantly observe each other, react to each other and compete with their daily production volume placed on the market, which they try to sell at a price that clears the market.

In the following, we consider and theoretically examine cases where firms successively or simultaneously break the act of agreement with the intention of increasing its current profit and get richer to the detriment of its competitor. We are interested in the case where both companies will continue to offer a homogeneous product and will compete only with a daily offered quantity. In this context, we focus on two of the possible competitive strategies: the myopic strategy and the leadership strategy.

Myopic strategy

Myopic strategy is one of the competitive strategies of the firms' behavior in an oligopoly market where (as opposed to "acting in concert") is no coordination of prices or offered quantities. Its "myopia" lies in the fact that with every decision on the output volume and the selling price the firm takes into account only the amount of the actual output of its competitor, which is considered to be constant. The firm does not attempt to "supervise" the competitor's subsequent reaction to its decision. When acting according to the myopic strategy let firm A expect

that firm B has already provided the sales of its Q_B bottles according to the market demand curve $D = AR(Q_A + Q_B)$ and the rest of the unsatisfied demand it leaves to firm A.

The expression $D = AR(Q_A + Q_B) = 22 \cdot (Q_A + Q_B) / 2$ for the sector demand of duopoly can be formally modified to the form $D = AR(Q_A + Q_B) = (44 - Q_B) / 2 - Q_A / 2$. The fact that firm A assumes in the myopic strategy that firm B has been satisfied and therefore it considers Q_B as an invariant parameter (constant) and perceives a modified expression as a newly induced demand D_A for its product, in which the only independent variable is its offered quantity Q_A . For D_A we can write:

$$D_A = AR_A(Q_A) = (44 - Q_B) / 2 - Q_A / 2, \quad 0 \leq Q_A \leq (44 - Q_B), \quad Q_B = \text{constant}$$

It is obvious that for each constant value Q_B holds $AR_A(Q_A) = AR(Q_A + Q_B)$, so the D_A curve is consistent with the part of the curve D lying to the right of the level Q_B . Therefore, it is called a **residual demand curve** (see Figure 2)⁴, which then corresponds to the marginal revenue curve:

$$MR_A(Q_A) = (44 - Q_B) / 2 - Q_A, \quad 0 \leq Q_A \leq (44 - Q_B), \quad Q_B = \text{constant}$$

The equilibrium quantity Q_A^* of the firm A is in the myopic strategy given by the intersection of the horizontal line $SMC = 4$ with the curve $MR_A(Q_A)$, thus a solution of the equation $(44 - Q_B) / 2 - Q_A^* = 4$. Thence

$$Q_A^* = 18 - Q_B / 2 = R_A(Q_B).$$

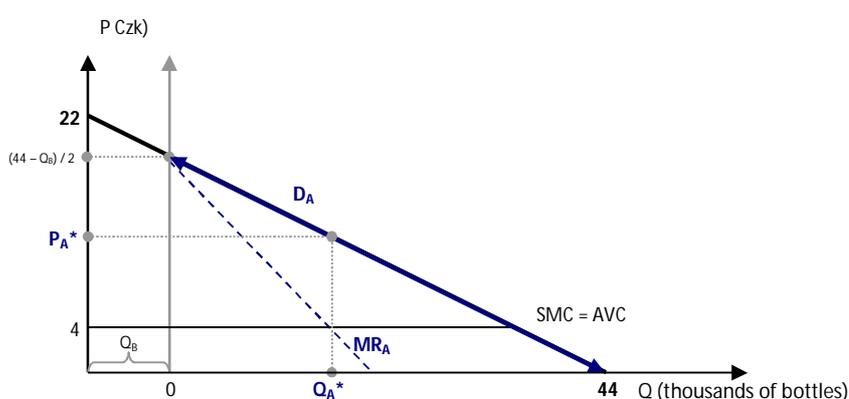


Figure 2 The equilibrium amount Q_A^* of firm A in myopic strategy

The last derived relation marked as $R_A(Q_B)$ giving the dependence of the equilibrium amount Q_A^* of firm A on Q_B is the reaction function of firm A. It expresses how firm A will react by its offered quantity on the quantity offered by firm B. In terms of all possible combinations of volumes Q_A and Q_B of A and B companies' output this relation is defined by a Q_A^* line segment (see the graphs in Figure 3), which is the geometric location of equilibrium points of firm A within the myopic strategy.

⁴ The transition from the variable $Q = Q_A + Q_B$ in the $D = AR(Q)$ to the variable $Q_A = Q - Q_B$, where Q_B is a constant, requires either to maintain the curve D and to change the coordinate system (in which it is drawn) by moving the origin (and with it the vertical coordinate axes) of the Q_B to the right (see Figure 2) or to maintain the coordinate system and to move to curve D to the left of Q_B . The result of both shifts is the same (a new function $AR_A(Q_A)$). In Figure 2 is $Q_B = 9$ and the residual demand $D_A = AR_A(Q_A)$ is a part of the curve D to the right of the gray colored vertical.

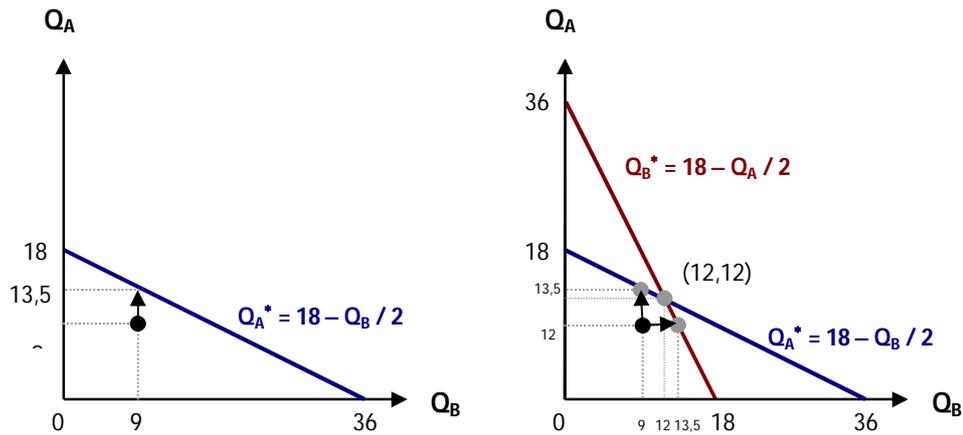


Figure 3 The reaction functions of the myopic strategies

If the expectations of the myopic strategy are met and firm B does not change its sales volume, then firm A, which is exposed to the residual demand, sells its 13 500 bottles for 10,75 Czk (at $Q_B = 9$, $AR_A(9) = 10,75$) increasing its daily margin from the original value of 81 to 91,125 thousand Czk ($13,5 \cdot (10,75 - 4) = 91,125$). In this situation for firm B it means to accept the price of 10,75 Czk so as to be able to sell its 9 thousand bottles daily (instead of the original 13 Czk). Thus its daily margin reduces from the original value of 81 to 60,750 thousand Czk ($9 \cdot (10,75 - 4) = 60,750$).

Since the problem is symmetrical, then in the opposite case, when only firm B decides myopically, using the same considerations we can derive and plot an analogous reaction function $Q_B^* = 18 - Q_A / 2 = R_B(Q_A)$ for firm B (see the right graph in Figure 3, in which both reaction functions are drawn).

What happens if both firms apply the myopic strategy, i.e., if it comes to a conflict of the myopic strategies? There will be a series of alternating myopic reactions, while a stable balance is established right in the intersection of the two reaction functions. At this point, according to the myopic strategy, neither of the companies have any reason to change their production volume. Solving a system of equations $Q_A^* = 18 - Q_B^* / 2$, $Q_B^* = 18 - Q_A^* / 2$, for the intersection of both lines we get $Q_A^* = Q_B^* = 36 / 3$. In the intersection of the reaction functions each of the companies offers daily 12 000 bottles for 10 Czk ($AR_A(36 / 3)$) and collects a daily margin of about $12 \cdot (10 - 4) = 72$ thousand Czk.

Leadership strategy

The initial state of our considerations is again the unstable equilibrium of the cooperation of duopoly, in which each of the firms reaches a daily margin of Czk 81 thousand. Let us assume that company A knows that company B wants to apply the myopic strategy in choosing its production volume. **How this information about firm B may affect the decision of firm A?**

Firm A can use the knowledge of the reaction function of firm B to its advantage in such a way that it ignores its own myopic reaction function, which moves the equilibrium point to a position on the myopic reaction curve of firm B. This strategic decision induces firm B to accept it. For these reasons, firm A is in the position of leader and firm B of its successor. The leader strategically manipulates its successor as to the decision about the quantity of bottles to be produced.

In Figure 4 we see that the location on the myopic reaction curve of firm B for firm A is the point at which firm A produces 18 thousand bottles a day, while firm B has to reconcile with the daily amount of 9 thousand bottles. As a result the price of one bottle of water drops to 8,50 Czk (P is derived from the daily demand curve $D = AR(Q_A + Q_B) = 22 - (Q_A + Q_B) / 2$, $0 \leq (Q_A + Q_B) \leq 44$) by substituting for $Q_A = 18$ and $Q_B = 9$ thousand bottles). Firm A will thus retain its 81 thousand Czk of a daily margin ($18 \cdot (8,5 - 4) = 81$) and at the same time maintains the equilibrium point on the reaction curve of firm B. Firm B then collects a daily margin of 40,5 thousand Czk ($9 \cdot (8,5 - 4) = 40,5$).

Here we also have to ask the question: "What would happen if both firms behave as leaders simultaneously?" Then there is a clash of two leaders that will result in the market combination (18, 18). Each company will

increase its daily production volume to 18 thousand bottles at the market price of Czk 4 for a bottle (AR $(18 + 18) = 4$), i.e. a price equal to the marginal and variable cost for one bottle.

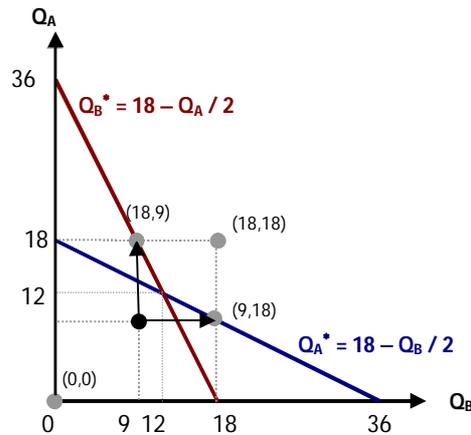


Figure 4 The leading strategy of firm A or of firm B or the clash of two leaders

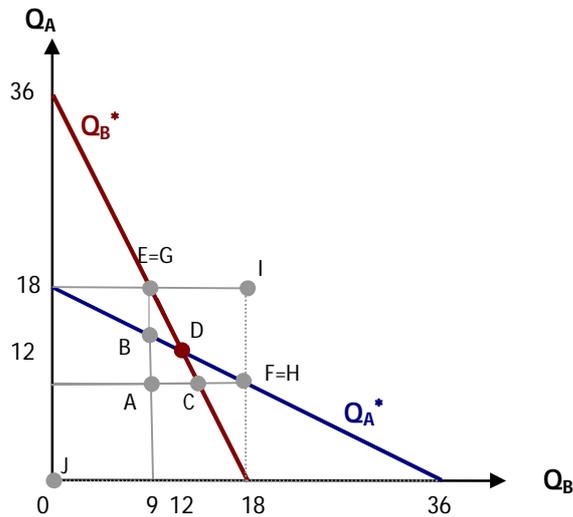


Figure 5 The steady combinations of daily offered quantities

In this situation it comes to an outcome⁵, which would occur in perfect competition if this could exist here. The customers are satisfied, but not the firms, because of their zero margin. A subsequent step in a consistent application of the leadership strategy by both firms would be their simultaneous market withdrawal.

The competition as a game

Let us suppose that our companies consider only the three above mentioned strategies when deciding on their daily amount of products: cooperation strategy (K), myopic strategy (M) and leadership strategy (V). Then by the composition of the graphs in Figure 3 and Figure 4 we get the graph in Figure 5, from which it is obvious what combinations of the daily offered quantities can stabilize in our duopoly market.

⁵ The same outcome does not mean the same price but that the price is at the level of the marginal cost in both cases.

The consumers perceive these combinations as is shown in Figure 6, which presents the steady combinations as equilibrium states in the market:

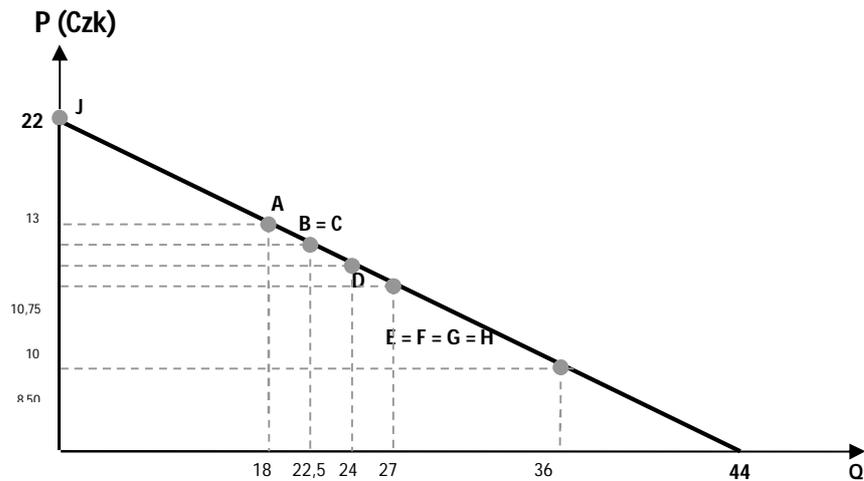


Figure 6 Possible equilibrium states of the analyzed duopoly

The least acceptable for the consumers is the marginal combination J, in which they are offered nothing, and in which our duopoly comes to an end. However, this combination is also not wished for by either company. The most acceptable for the consumer is combination I; but this one is, from the companies' perspective, also undesirable because it results in a loss of fixed costs. In reality we meet with some of the remaining four steady-state combinations located on the line segment of the market demand between the points I and J. To determine which one has the greatest chance to occur in the market is the subject of our next analysis.

The payout matrix of the combination strategic game

The core of the competitive contest in serving one market is the effort of every firm to achieve the highest margin of production and sale of mineralized water. What will happen in our duopoly market each time is the consequence of the outcome of this contest. That is why we can not overlook the companies' perspective and their view of the matter. The perspective of the firms can be presented by the following payout matrix (see Figure 7), which has the standard form of a payout matrix of a simple strategic game with two players, which is well known from the game theory.

		Firm B			
		E	G	I	
Firm A	leadership str. (V)	40,5 E 81	40,5 G 81	0 I 0	
	myopic str. (M)	60,75 B 91,12	72 D 72	81 H 40,5	
	cooperation (K)	81 A 81	91,12 C 60,75	81 F 40,5	

Figure 7 The payout matrix of the combination game

The game proceeds as follows:

- It is based on the initial position A (the lower left corner of the matrix), in which players do not compete together.
- At a given moment each of them (independently of each other) selects one of the three strategies. The chosen strategies are applied simultaneously.
- After this the game moves from the initial position to the final position that is given by the field of the matrix located in the intersection of applied strategies. The numbers in the corners of the field denote the value of prizes, which are paid for the outcome of the game (the blue numbers for the player A, the red ones for the player B).
- If the game is repeated, it always starts from the position A.

The strategies both players can choose in the above described game are the strategies K, M, and V of our companies. The fields of the payout matrix correspond with the steady combinations of the daily amount of A to J of the graph in Figure 5 except for the combination of J, which does not belong to the game (it is the termination of the market). The payouts are the margins of the daily sales volume. If the competitive behavior of our companies within the duopoly analysis occurred in such a way that the companies would have decided every morning whether and how to break the cooperation then, the referred combination game would be a good model of the behavior of the companies in our duopoly. The external manifestation of this would be the fact that both the offered quantities and the prices would change almost every day.

But nothing of this sort occurs, which indicates that this game does not take place. Rather, we can assume that if the companies decide to do something, then the stabilizing state is maintained and the change of the existing strategy is considered after the competitor has reacted and changed the state of things. When the firm considers the strategy change it moves from the actual position. Thus, we go from the combination game to the sequential strategy game and its description in the form of the sequential decision making tree. This will be discussed in the next section. However, the above stated payout matrix of the combination game is useful in helping us to reveal two facts:

- none of these strategies is the dominant one in the sense that its application would prevent the competitor from achieving a better outcome than ours;
- in the positions G and H the game is in a state of Nash equilibrium (gray colored game positions). From them none of the firms can escape to improve its situation by changing its own strategy, i.e. on their own without the help of another company. We find from the analysis of the sequential decision tree in the next section of this chapter that to G and H Nash equilibrium positions, the position D has to be assigned as well.

The sequential decision tree of a strategic game

The analogous role that the payout matrix plays in the combination strategic game is played by the sequential decision tree in the sequential strategic game. In both cases they are tools to facilitate the formulation of rules for the correct choice of strategies.

In contrast to the combination game, in which the choice of the strategy starts in the initial position and selected strategies of both players are applied simultaneously (which also ends the game), in the sequential game the strategy is chosen in any of the actual positions and is implemented gradually (the players take turns in reacting and the game continues). The conflict (i.e. the simultaneous application) of strategies can occur only in the selected positions, in which no player is granted a "first move". Such a game then satisfactorily models the competitive behavior of firms in our duopoly, which can be characterized as follows:

- A clash of the competing strategies M or V (both companies will change their offered amount on the same day) can occur only when both sides first violate the cooperation (the A game position) or in the position I (see below).
- The company by the change of its strategy responds to the actual game position, which was established by the opponent's previous strategy change or by the clash of strategies.

The sequential decision tree of our game from the viewpoint of firm A is shown in Figure 8 (the analogous tree in terms of firm B has the same structure). The graph nodes (rectangles or ovals), which correspond to the payout matrix field describe the relevant game situation. In the rectangular graph nodes firm A selects its strategy (taking into account the first outcome inscribed to the node). In the oval graph nodes firm B chooses its strategy (following the second outcome inscribed to the node). The arrows marked with the relevant strategies define the transitions from the actual to the subsequent game position (the symbol V/V refers to the clash of leadership strategies).

In the graph of the decision tree two nodes with the outcomes (162, 0) or respectively (0, 162) are also plotted that convert the duopoly to monopoly, and therefore, they do not belong to the duopoly game (their corresponding positions are not marked in Figure 5 or in the payout matrix). It is a combination of the offered amount (18, 0) or respectively (0, 18) in Figure 5 corresponding to the potential game positions after the immediate response with the strategy V to the strategy V. From the tree it is obvious that the answer V to V is the worst possible move of all (it deprives the respondent of any initial outcome and doubles the outcome of its competitor) so the rational player will not make this move. The other available moves offer much better results. Therefore, this reaction is crossed out in red in the tree, which indicates that it is not taken into account. There are other red crossed out moves in the tree made for the same reason - the existence of more favorable moves.

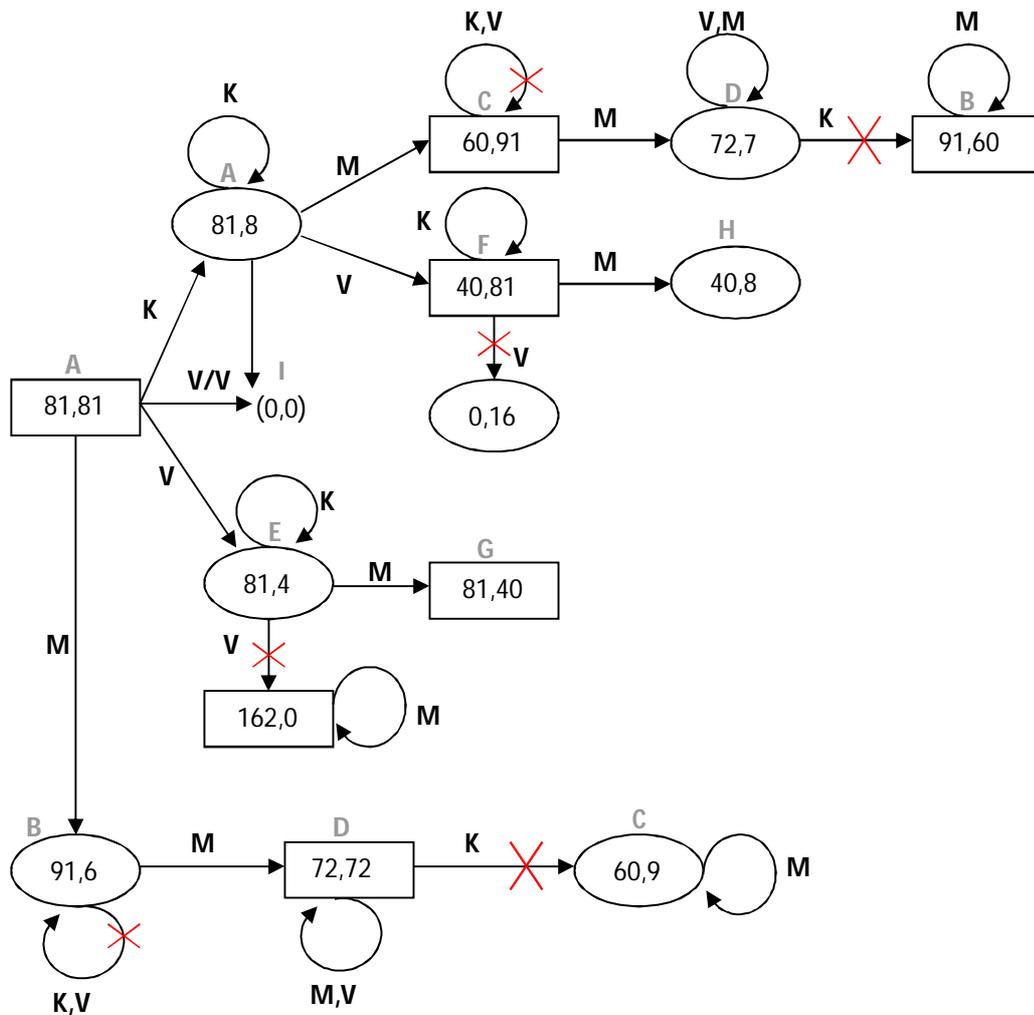


Figure 8
The sequential decision tree of firm A with the symmetrical behavior of both players

As we can see from the tree, if the game does not hold in the position A it ends up in one of the positions G, H or D very quickly, in which no company has the possibility by itself (i.e. only by its decision within the considered strategies) to improve the balance, and so they do not attempt it. From the payout matrix of the combination game we already know that the positions G and H are the Nash equilibriums. From the decision tree we have found that the Nash equilibrium is also the position D.

The aim of the game

This brings us to the fundamental question, which is: "What should the company strive for in the game?" The decision tree shows that the most favorable game position with the best outcome for firm A is obviously position B. However, it can not stay there for long. Then the game slips into the position D. The more stable one than B (and more profitable than D) seems to be position A. For how long, however? How much can one competitor trust another? If he breaks the conformity there is a risk of not only the final position D, but even the final position H, which for firm A is the worst position. The optimum seems to stabilize in the position G. However, it is only possible to get to it in the case of the successful application of strategy V. This will happen if firm A applies strategy V in the position A before firm B does it. Firm B considers symmetrically according to the analogous decision tree and reaches the same conclusion. So if strategy V is applied immediately and company B hesitates, success is guaranteed.

However, this is not so simple. There is a very probable threat of a clash of the two leaders (V/V), which, if it occurs, transfers the game to the position I. It is a risky position in the sense that its consequences are not clear. Suppose that firms A and B located in the position I are equally economically efficient, and therefore show symmetric behavior (they behave in the same way). The position I is the result of the first clash of strategies V/V. The repetition of this clash would lead to the position J (withdrawal from the market). The clash of myopic strategies (M/M) would lead to the position D and the clash of cooperative strategies (K/K) would lead to the position A.

There is a possibility of unilateral responses to the position I. The company which responds first, will improve its balance but it will increase the balance of its competitor more:

- The unilateral reaction of firm A (or B) in the position I using the strategy V leads to the withdrawal of firm A (or B) from the market and giving it up in favor of firm B (or A), which will result in a monopoly.
- The unilateral reaction of firm A (or B) in the position I using the strategy M or K leads to the position H (or G).

From the above it is obvious that a unilateral response in the position I will not be sought by the companies voluntarily. It can occur almost certainly in the case of the existence of the asymmetry in the economic efficiency of the companies, of which both are aware. If the companies are not aware of any such asymmetry, then in addition to the withdrawal from the market or conversion to monopoly, anything can occur (i.e. positions A, D, H or G may stabilize).

Both mentioned tools, the payout matrix and the decision tree, can be transferred by an appropriate adjustment of the matrix and the tree to the models of asymmetric or reduced companies' behavior. With their help we estimate, which market positions plotted in Figure 6 can be expected and which can not in our duopoly.

Conclusion

A remarkable conformity in the market positions of the approximate duopoly firms, observed by the author of the contribution within the regional market survey referred to in the introduction, leads naturally to the question: "*To what extent can we believe that the observed conformity is not the result of a secret cartel, but of the spontaneous competitive behavior of the two firms?*"

To search for an answer to this question we chose an approach that views the competitive race as a strategic game. The approach consists of two successive stages. In the first stage it was necessary to formulate appropriate tools, then in the second, with the help of these tools to make the appropriate analyses. This paper deals with the issue of the first stage in detail. In its framework we formulated three basic game strategies K - Cooperation, M - Myopic strategy and L - Leadership strategy.

Due to the fact that firms mainly change their strategy behavior in response to the market changes caused by the competitor, the adequate model of a competitive race is a sequential strategic game, in which the players apply their game strategies gradually. The basic instrument suitable for the game analysis is a sequential decision tree, the structure of which is shown in Figure 8. The construction of the tree is adequately justified in the paper including the indication of its effective usage. The subtrees derived from the basic tree work as asymmetric, reduced or differently modified tools that are necessary to answer the above stated question.

Finally, I can conclude that the analysis made by the instruments within the second stage, which is not the topic of this paper showed that the possibility of a secret cartel of firms A and B can almost certainly be ruled out.

Bibliography

Brealey R. A. & Myers S. C. (1991). *Principles of corporate finance*. Praha. Victoria Publishing, a.s.

Frank H. F. (1995). *Microeconomics and Behavior*. Praha. Nakladatelství Svoboda.

Holman R. (2007). *Mikroekonomie, středně pokročilý kurz*. Praha. C. H. Beck.

“Performance Evaluation and Improvement Strategy Analysis of Service Quality: A Fuzzy Multiple Criteria Decision-Making Model”

Wei Hsu (Kainan University, Taiwan)

Keywords: Service Quality, Performance Evaluation, Strategy Analysis, Fuzzy Multiple Criteria Decision-Making Analysis

In a complex system, it is difficult for managers to identify a specific aspect of the system in isolation to evaluate service quality. This study, based on the gap model of service quality, provides a fuzzy multiple criteria decision making (MCDM) model to evaluate the performance of service quality by an empirical case of a movie theater in Taiwan. This fuzzy MCDM model integrated the fuzzy analytic network process (FANP) method and the fuzzy VIKOR (VišeKriterijumska Optimizacija I Kompromisno Resenje in Serbian), and provides a complete process to evaluate the gaps of service quality empirically. Furthermore, the importance-performance analysis (IPA) would be employed to analyze and diagnose the managerial strategies to reduce the customer gaps and assist managers to improve the service quality.

1. Introduction

Parasuraman, Zeithaml and Berry (1985) developed the gap model of service quality with the focus on the customer gap and four provider gaps. According to the gap model of service quality, successful service providers are those who are able to zero the gaps. Thus, service providers are striving to reduce these service quality gaps and have to be intelligent enough to integrate customers' requirements and expectations into service strategies (Kumar and Kumar, 2004).

In a complex system, all system factors are directly or indirectly related, so it is difficult for a decision maker to define a specific objective or to identify a specific aspect of the system in isolation. While the vision of an interdependent system can lead to passive positioning, a clearer hierarchical structure can lead to linear activity that creates new problems because dependence and feedback are not considered (Tzeng et al., 2007). The fuzzy analytic hierarchy process (ANP) can be used to systematically overcome the problem of interdependences and feedbacks among attributes or criteria. The fuzzy VIKOR (VišeKriterijumska Optimizacija I Kompromisno Resenje in Serbian, means Multicriteria Optimization and Compromise Solution) method is a measurement of measuring the closeness to the ideal level, so it would be employed to calculate the gaps of service quality.

In this study, a movie theater in Taiwan would be selected as a case study and a fuzzy multiple-criteria decision-making (MCDM) model, which can be used to evaluate the five gaps of service quality based on the service gap model, would be provided. This fuzzy MCDM model, which integrated the fuzzy ANP and fuzzy VIKOR, can help investigate customers' or employees' satisfaction and preference and also consider interdependences and feedbacks among criteria. Finally, the importance-performance analysis (IPA) can be employed to diagnose the managerial strategies.

2. Literature Review

2.1 Service Quality

Services are basically intangible because they are performances and experiences rather than objects. The performance often varies from producer to producer, from customer to customer, and from day to day. Quality in services often occurs during service delivery, usually in an interaction between the customer and the provider. The judgments of high and low service quality depend on how customers perceive the actual service performance in the context of what they expected, and, therefore, service quality can be defined as the extent of discrepancy between customers' expectations or desires and their perceptions (Zeithaml, Parasuraman & Berry, 1990).

2.1.1 Gap Model of Service Quality

Parasuraman et al. (1985) established the gap model of service quality. The service gap model, presented in Figure 1, positions the key concepts, strategies, and decisions in services marketing in a manner that begins with the customer and builds the organization's tasks around what is needed to close the gap between customer expectations and perceptions (Zeithaml, Bitner and Gremler, 2006). The central focus of the service gaps model is the customer gap which is the difference between customer expectations and perceptions. Firms need to close this gap in order to satisfy their customers and build long-term relationship with them. Customer perceptions are subjective assessments of actual service experiences; customer expectations are the standards of, or reference point for, performance against which service experiences are compared.

The gaps model also provided the four provider gaps, occurring within the organization providing the service (Zeithaml et al., 2006). In Figure 1, provider gap 1 is the gap between customer expectations of service and company understanding of those expectations. Provider gap 2 is the difference between company understanding of customer expectations and development of customer-driven service designs and standards. Provider gap 3 is

the discrepancy between development of customer-driven service standards and actual service performance by company employees. Provider gap 4 illustrates the difference between service delivery and the service provider's external communications. The gaps model of service quality serves as a framework for service organizations attempting to improve quality service and the key to closing the customer gap is to close provider gap 1 through 4 (Zeithaml et al., 2006).

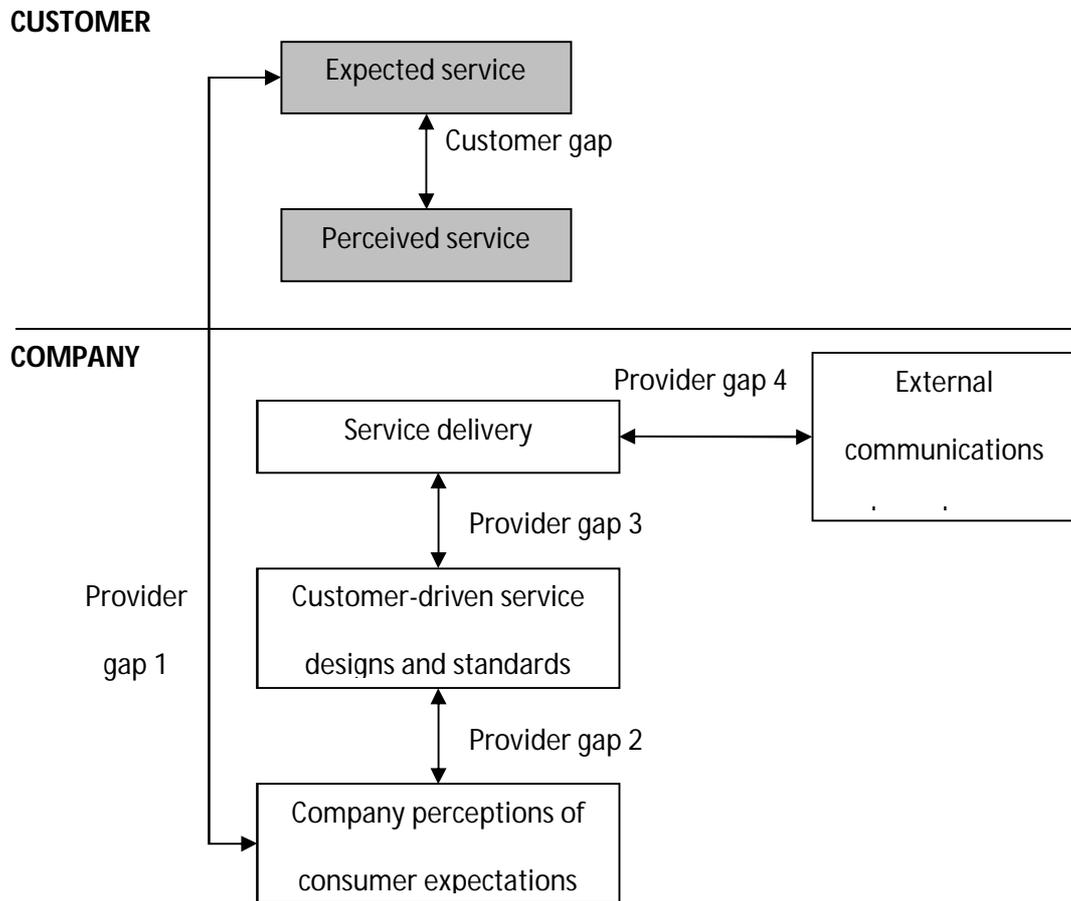


Figure 1. Gaps Model of Service Quality

(Source: Zeithaml, Bitner and Gremler, 2006, pp. 46)

2.1.2 Multidimensional Scale of Measuring Service Quality Gaps

Zeithaml et al. (1990) refined the original SERVQUAL instrument, a concise multiple-item scale with good reliability and validity that companies can use to better understand the customers' expectations and perceptions. Research suggests that customers do not perceive quality in a uni-dimensional way but rather judge quality based on multiple factors relevant to the context (Zeithaml et al., 2006). As shown in Figure 2, service quality is an evaluation that reflects the customer's perception of five SERVQUAL dimensions: reliability, assurance, responsiveness, empathy, and tangibles.

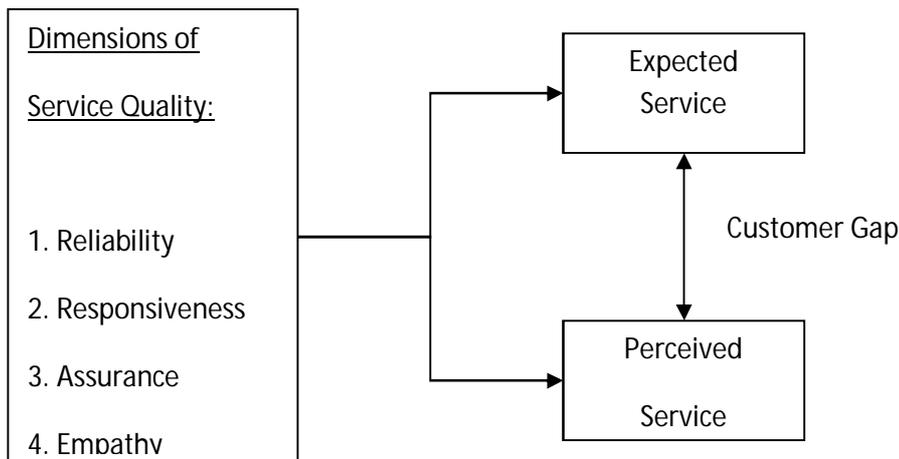


Figure 2. Dimensions of Service Quality

According to Zeithaml et al. (2006), reliability is ability to perform the promised service dependably and accurately. Responsiveness refers to willingness to help customers and provide prompt service. Assurance is employees' knowledge and courtesy and their ability to inspire trust and confidence. Empathy is defined as the caring, individualized attention that the firm provides its customers. Tangibles are appearance of physical facilities, equipment, personnel, and written materials.

For measuring the four provider gaps, provider gap 1 is different from the other three ones because it crosses the boundary between the customer and provider sides of the service gap model (Zeithaml et al., 1990). Therefore, the measurement of provider gap 1 requires a comparison of responses pertaining to expectations from both of customers and managers and the relative importance of the five dimensions would be included in the instrument of measurement. Provider gap 2 through 4 would be measured by asking samples of employees in the company participating to indicate their perceptions of the extent of those gaps.

2.2 Evaluation Methods of Service Quality Performance

Because organizations offering services are highly interactive, labor intensive and performed in multiple locations, quality control is complicated (Zeithaml et al., 1990). It can be difficult to quantify precise values in a complex evaluation system of service quality performance. A complex evaluation environment can, however, be divided into multiple subsystems to more easily judge differences and measure scores. Fuzzy multiple criteria decision making (MCDM) analysis has been widely used to deal with decision-making problems involving multiple criteria evaluation of alternatives. There are numerous attributes or features of service quality performance, so this decision-making that involved in evaluating service quality performance can be formulated as a fuzzy MCDM problem.

Fuzzy numbers are a fuzzy subset of real numbers, representing the expansion of the idea of the confidence interval. A triangular fuzzy number should possess the following basic features (Laarhoven and Pedrycz, 1983). According to Zadeh (1975), it is very difficult for conventional quantification to express reasonably those situations that are overtly complex or hard to define; so the notion of a linguistic variable is necessary in such situation. A linguistic variable is a variable whose values are words or sentences in a natural or artificial language. In this study, customers' preference and satisfaction would be evaluated by using linguistic variables. Each scale of fuzzy number is defined by three parameters of the symmetric triangular fuzzy number, the lower point, middle point and upper point of the range over which the scale is defined for either importance (customer preference) or performance (customer satisfaction).

2.2.1 Methods of Evaluating Customer Preference

In a complex system, all system factors are directly or indirectly related, so it is difficult for a decision maker to define a specific objective or to identify a specific aspect of the system in isolation. Therefore, for evaluating customers' preference, the interrelations among factors should be considered simultaneously. In order to illustrate the interdependencies existing among the attributes or criteria, the fuzzy ANP (which could consider interdependencies and feedbacks) would be employed to determine the relative weights of the attributes and criteria.

The ANP method was proposed by Saaty (1996) to extend the Analytic Hierarchy Process (AHP) for releasing the restrictions on such the hierarchical structure (Ahn & Choi, 2008). Part of previously published investigations in customer preferences of financial services chose to gather frequencies of importance associated with conjoint analysis, ANOVA method, or both (e.g., Karjaluo, 2002; Pass, 2005; Vyas, 2005). In tangible product industry

and chemical industry, some research papers introduce the AHP method to deal with customer preferences (e.g., Helm *et al.*, 2004; Partovi, 2007; Soota *et al.*, 2008). Moreover, Helm *et al.*, (2004) compared conjoint analysis and the AHP method and found the AHP method performed slightly better. Besides, the AHP and ANP methods have an advantage in obtaining a set of weights from measuring relative importance of service attributes and this set of weights represented as customer preferences can be subsequently involved in the measurement of customer satisfactions. AHP, however, could not consider interdependences and feedbacks among attributes or criteria, and therefore, this study would apply the fuzzy ANP method into the evaluation model to analyze customer preference.

2.2.1 Methods of Evaluating Service Gaps

According to the gap model of service quality, the key to ensuring good service quality is meeting or exceeding what customers expect from the service and there are five service gaps which can be used to audit the service performance effectively (Zeithaml *et al.*, 1990). Customer satisfaction has emerged as a key factor in modern marketing and consumer behavior analysis since service providers are concerned with continuously monitoring how effectively they meet or exceed the needs of their customers with this prevailing focus on customers and service quality (Shin & Elliott, 2001).

The VIKOR method is an MCDM method to build a ranking index based on the particular measure of closeness to the ideal level (Opricovic, 1998; Opricovic & Tzeng, 2002, 2003, 2004; Tzeng *et al.*, 2002). Thus, it is a useful tool employed to evaluate the service quality gaps. Opricovic and Tzeng (2004) compared two MCDM methods, VIKOR and Technique for Order Preference by Similarity to an Ideal Solution (TOPSIS), which are based on an aggregate function representing "closeness to the ideal point". Their results showed the VIKOR method was slightly better than the TOPSIS method. VIKOR method has been applied to several different fields such as hospitality management (Tzeng *et al.*, 2002), public transportation (Tzeng *et al.*, 2005), policy making (Yang &

Wang, 2006) and university development (Chen & Chen, 2008). Figure 3 illustrates the ideal point (F^*), the negative point (F^-) and a perceived alternative (F^p). The gap between the perceived alternative (F^p) and the ideal point (F^*) can also be illustrated in Figure 3.

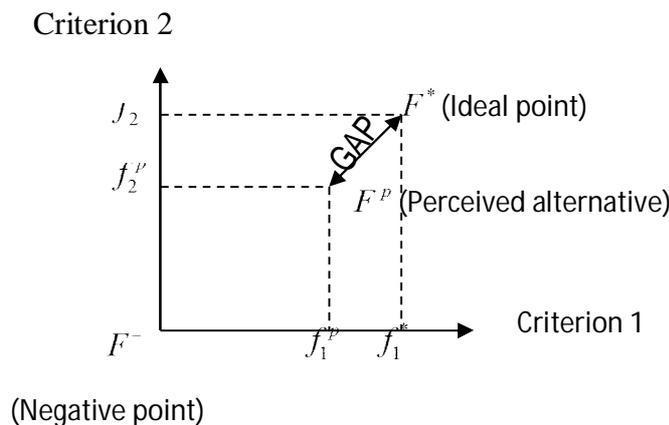


Figure 3. Illustration of VIKOR (Source: Tzeng *et al.*, 2002)

An IPA technique (Martilla & James, 1977) is useful to diagnose the managerial strategies by analyzing customer preferences (importance) and customer satisfaction (performance) simultaneously within an MCDM problem. For importance rating in traditional IPA, statistically inferred methods, not like stated importance ratings, can overcome the shortcomings of a lack of discriminating power (Myers, 2001), and, however, they have assumptions which are almost always violated (Garver, 2003). Hence, the ANP method would be employed to avoid such problem. Customer satisfaction surveys typically requested participants to rate the performance and researchers have traditionally measured either actual or relative performance for input IPA (Garver, 2003). The relative performance comparing to the best competitor does not have a problem in actual performance scores to decide the split point to discriminate high performance and low performance, but another problem arises if the competitors all have equivalent or even worse performances; these competitors are not appropriate reference points (Tsai, Hsu & Lin, 2009). Therefore, in this study, the unimproved distance gained from the VIKOR method would be used to replace the actual or relative performance in the traditional IPA.

3. Research Design

3.1 Case Study

The case study would be employed in this study to empirically investigate service quality by using the fuzzy MCDM model based on the gap model of service quality.

3.1.1 Problem description

This study would introduce a movie theater XYZ in Taiwan as the case study to empirically conduct the evaluation model of service quality. This study would also categorize the characteristics of the target customers by interviewing high-level executives in the movie theater XYZ. According to the suggestions from the high-level executives and previous literature review, the attributes and criteria of movie theater service quality would be categorized.

3.1.2 Data collection

For investigating the service quality gaps, this study required to collect data from both of customers and employees. In order to empirically establish the multiple-criteria evaluation framework of the service quality, this study collected in-depth qualitative data from customers and employees in the movie theater XYZ. Based on the five SERVQUAL dimensions (Reliability, Assurance, Responsiveness, Empathy, and Tangibles), this study build 17 items for the questionnaire, shown in Table 1. After eliminating incomplete questionnaires, the total sample size of customers was 423 and the sample size of employees was 35.

Table 1. Dimensions of service quality in the movie theater

Dimensions	Items
Tangibles	1. Environment and equipment of ticket area are visually appealing.
	2. Environment and equipment of waiting area are visually appealing.
	3. Environment and equipment of movie area are visually appealing.
	4. Design of the website is friendly.
Reliability	5. Accurate information is on the billboard and website.
	6. Real-time information is on the billboard and website.
	7. Employees perform the services right the first time.
	8. Employees provide the services at the time they promise.
Assurance	9. Employee behaviors instill confidence in customers
	10. Employees have professional knowledge to answer questions
	11. Employees are consistently courteous with customers.
Responsiveness	12. Employees give customers prompt services.
	13. Employees are always willing to help.
	14. Employees are never too busy to respond.
Empathy	15. Employees give customers personal attention.
	16. Employees understand customers' specific needs.
	17. Employees have customers' best interests at heart.

In order to investigate the customer gap, customers' preference and satisfaction would be needed. For collecting data of customers' preference, this study focused on measuring the relative importance of the nine criteria by the ANP questionnaire. This study would use this kind of expression to compare the nine evaluation criteria by five basic linguistic terms, as "absolutely important," "very strongly important," "essentially important," "weakly important" and "equally important" with respect to a fuzzy five level scale (Chiou & Tzeng, 2001). That is, $\tilde{1}^c$ represents "equally important" with scale of fuzzy number (1, 1, 3); $\tilde{2}^c$ represents "weakly important" with scale of fuzzy number (1, 3, 5); $\tilde{3}^c$ represents "essentially important" with scale of fuzzy number (3, 5, 7); $\tilde{4}^c$ represents "very strongly important" with scale of fuzzy number (5, 7, 9); $\tilde{5}^c$ represents "absolutely important" with scale of fuzzy number (7, 9, 9).

For collecting data of customers' satisfaction, the respondents evaluated the service quality on each criterion by using a five-point linguistic scale from "extremely dissatisfactory" to "extremely satisfactory." That is, $\tilde{1}^s$ represents "extremely dissatisfactory" with scale of fuzzy number (1, 1, 2); $\tilde{2}^s$ represents "dissatisfactory" with scale of fuzzy number (1, 2, 3); $\tilde{3}^s$ represents "ordinary" with scale of fuzzy number (2, 3, 4); $\tilde{4}^s$ represents "satisfactory" with scale of fuzzy number (3, 4, 5); $\tilde{5}^s$ represents "extremely satisfactory" with scale of fuzzy number (4, 5, 5).

For provider gap 1, managers would be asked to fill out the questionnaire pertain to managers' perceptions of customers' satisfaction and the relative importance customers attach to the criteria of service quality. For managers' perceptions of customers' preference, a fuzzy ANP five level scale would be used. That is, $\tilde{1}^c$

$$\begin{matrix}
A_1 & A_2 & L & A_n \\
= & A_1 & \begin{bmatrix} \left[\varrho_{ee}^{11} \right] & \left[\varrho_{ef}^{12} \right] & L & \left[\varrho_{eg}^{1n} \right] \\ \left[\varrho_{fe}^{21} \right] & O & & \left[\varrho_{fg}^{2n} \right] \\ M & M & & O & M \\ A_n & \begin{bmatrix} \left[\varrho_{ge}^{n1} \right] & \left[\varrho_{gf}^{n2} \right] & L & \left[\varrho_{gg}^{nn} \right] \end{bmatrix}
\end{matrix}, \text{ where } \varrho_{pq}^{ij} = (c_{pq,l}^{ij}, c_{pq,m}^{ij}, c_{pq,u}^{ij}).
\end{matrix}$$

The next step is computing the un-weighted super-matrix \mathbb{W}^0 for considering the relationships among the attributes.

$$\begin{matrix}
A_1 & A_2 & L & A_n \\
= & A_1 & \begin{bmatrix} \left[\varrho_{ee}^{11} \right] \times \frac{\varrho_{11}^0}{\sum_{j=1}^n \varrho_{1j}^0} & \left[\varrho_{ef}^{12} \right] \times \frac{\varrho_{12}^0}{\sum_{j=1}^n \varrho_{1j}^0} & L & \left[\varrho_{eg}^{1n} \right] \times \frac{\varrho_{1n}^0}{\sum_{j=1}^n \varrho_{1j}^0} \\ \left[\varrho_{fe}^{21} \right] \times \frac{\varrho_{21}^0}{\sum_{j=1}^n \varrho_{2j}^0} & O & & \left[\varrho_{fg}^{2n} \right] \times \frac{\varrho_{2n}^0}{\sum_{j=1}^n \varrho_{2j}^0} \\ M & M & & O & M \\ A_n & \begin{bmatrix} \left[\varrho_{ge}^{n1} \right] \times \frac{\varrho_{n1}^0}{\sum_{j=1}^n \varrho_{nj}^0} & \left[\varrho_{gf}^{n2} \right] \times \frac{\varrho_{n2}^0}{\sum_{j=1}^n \varrho_{nj}^0} & L & \left[\varrho_{gn}^{nn} \right] \times \frac{\varrho_{nn}^0}{\sum_{j=1}^n \varrho_{nj}^0} \end{bmatrix}
\end{matrix}
\end{matrix}$$

$$\begin{matrix}
A_1 & A_2 & L & A_n \\
= & A_1 & \begin{bmatrix} \left[w_{ee}^{11} \right] & \left[w_{ef}^{12} \right] & L & \left[w_{eg}^{1n} \right] \\ \left[w_{fe}^{21} \right] & O & & \left[w_{fg}^{2n} \right] \\ M & M & & O & M \\ A_n & \begin{bmatrix} \left[w_{ge}^{n1} \right] & \left[w_{gf}^{n2} \right] & L & \left[w_{gn}^{nn} \right] \end{bmatrix}
\end{matrix}, \text{ where } w_{pq}^{ij} = (w_{pq,l}^{ij}, w_{pq,m}^{ij}, w_{pq,u}^{ij}).
\end{matrix}$$

Then, the un-weighted super-matrix should be normalized to obtain the weighted super-matrix, which is used finally to calculate the weights. The weighted super-matrix is derived by setting the "all columns sum" to unity by normalization. This step is very similar to the use of the Markov chain to ensure that the sum of the probabilities of all states equals 1 (Huang et al., 2005). The weighted super-matrix can then be raised to limiting

powers, to calculate the fuzzy weights, $\mathbb{W}^p = (w_{i,l}, w_{i,m}, w_{i,u})$. Here, $w_{i,l}$, $w_{i,m}$ and $w_{i,u}$ stand for the lower, middle and upper values of the fuzzy weight of the i th criterion. After the de-fuzzification of \mathbb{W}^p , the non-fuzzy weights w_i can be obtained.

3.2.2 Calculating the service gaps by fuzzy VIKOR

The VIKOR method is performed by comparing the measure of closeness to the ideal level (Opricovic, 1998; Opricovic and Tzeng, 2002, 2003, 2004; Tzeng et al., 2002). The multiple-criteria merit for compromise ranking is developed from the d_k - metric used in the compromise programming method (Zeleny, 1982). The criteria will be denoted as c_1, c_2, \dots, c_n . The merit of the i th aspect is denoted by f_i^p ; i.e., f_i^p is the value of i th criterion (c_i).

Compromise programming method introduced the $d_k - metric$ as an aggregate function. The development of the VIKOR method started with the following form of the $d_k - metric$:

$$d^k = \left\{ \sum_{i=1}^n \left[w_i (f_i^* - f_i^p) / (f_i^* - f_i^-) \right]^k \right\}^{1/k}, \quad 1 \leq p \leq \infty$$

For fuzzy VIKOR, this study set the value of the ideal point $f_i^{\%}$ as the fuzzy scale of “very satisfactory” of each criterion; the value of the negative point $f_i^{\%}$ as the fuzzy scale of “very dissatisfactory” of each criterion of the i^{th} criterion. Hence, $f_i^{\%} = \mathfrak{F}_i^{\%}$; $f_i^{\%} = \mathfrak{F}_i^{\%}$.

By the compromise-ranking method, the compromise solution is determined, which could be accepted by the decision makers because it provides a maximum “group utility” of the “majority” (with fuzzy measure $E^{\%}$, representing “concordance”), and a minimum of the individual regret of the “opponent” (with fuzzy measure $F^{\%}$, representing “discordance”). Thus, we computed the fuzzy values of the perceived $E^{\%}$ and $F^{\%}$, the fuzzy measure $E^{\%}$ of the ideal point ($E^{\%}$) and the negative point ($E^{\%}$), and the fuzzy measure $F^{\%}$ of the ideal point ($F^{\%}$) and the negative point ($F^{\%}$) by the equations (5) and (6).

$$E^{\%} = d^{\%} = \sum_{i=1}^n w_i (f_i^{\%} - f_i^{\%}) / (f_i^{\%} - f_i^{\%}) \quad (5)$$

$$F^{\%} = d^{\%} = \max_i [(f_i^{\%} - f_i^{\%}) / (f_i^{\%} - f_i^{\%}) | i = 1, 2, \dots, n] \quad (6)$$

where the weights of the criteria (w_i) are introduced to express the relative importance of the criteria calculated by the ANP method. The smaller value of measure $E^{\%}$ indicates the larger “group utility” of the “majority”; the smaller value of measure $F^{\%}$ indicates the smaller “individual regret” of the “opponent”. Finally, the values $G^{\%}$ would be computed as the aggregate distance from the ideal point by the equation (7).

$$G^{\%} = v(E^{\%} - E^{\%}) / (E^{\%} - E^{\%}) + (1-v)(F^{\%} - F^{\%}) / (F^{\%} - F^{\%}) \quad (7)$$

where $E^{\%}$ = the fuzzy measure $E^{\%}$ of the ideal point, $E^{\%}$ = the fuzzy measure $E^{\%}$ of the negative point, $F^{\%}$ = the fuzzy measure $F^{\%}$ of the ideal point, $F^{\%}$ = the fuzzy measure $F^{\%}$ of the negative point, v is introduced as the weight of the strategy of “the majority of criteria” (or “the maximum group utility”), usually $v = 0.5$. $E^{\%}$ = the fuzzy measure $E^{\%}$ of the perceived alternative and $F^{\%}$ = the fuzzy measure $F^{\%}$ of the perceived alternative. After the de-fuzzification of $G^{\%}$, the non-fuzzy measure G^{def} can be obtained. The smaller value of measure G^{def} represents the smaller service gap.

3.2.3 Analyzing strategies of closing the service gaps by IPA

In the strategy analysis phase, the IPA method would be employed to diagnose the managerial strategies for reducing customer gaps. The traditional IPA method was introduced by Martilla and James (1977). In the traditional IPA method, attributes or criteria pertaining to a particular service are evaluated on the basis of how important each is to the customer, and how the service is perceived to be performing to each attribute (Sampson & Showalter, 1999). This study would apply the de-fuzzification of weight of each criterion as the relative importance value of each criterion, and then use the un-weighted relative distance to replace the performance and to represent as the relative unimproved distance. The de-fuzzification of un-weighted relative distance ($(f_i^{\%} - f_i^{\%}) / (f_i^{\%} - f_i^{\%})$) indicates the relative unimproved distance of the i^{th} criterion (c_i) (i.e., $f_i^{\%}$ is the

fuzzy value of the i^{th} criterion (c_i) of the ideal point; f_i^{\oplus} is the fuzzy value of the i^{th} criterion (c_i) of the negative point; f_i^{\ominus} is the fuzzy value of the i^{th} criterion (c_i). Therefore, the unimproved distance (x-axis) and the importance value (y-axis) can be mapped on a two-axis map, the improvement strategies map of gap reduction as shown in Figure 4.

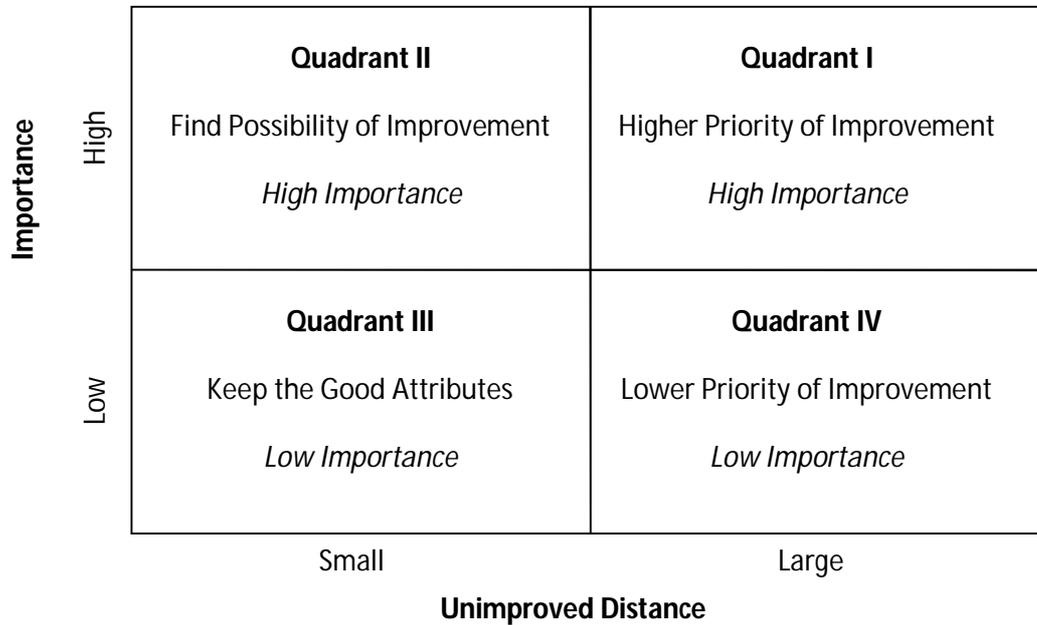


Figure 4. Improvement strategy map of gap reduction (Source: Tsai *et al.*, 2009)

4. Research Results

After the analysis of the MCDM model, the research results were displayed in this section.

4.1 Results of ANP

In the assessment of customers' preferences, the weights were obtained through the ANP method, shown in

Table 2. The analysis of ANP includes employee analysis and customer analysis and the non-fuzzy weights W_i of employees and customers can be obtained. Overall, employees and customers emphasize "Assurance" mostly. The three items in "Assurance," which is "Customer's Confidence," "Employee's Knowledge" and "Courteous Employee," are the top three important items of service quality both for employees and customers. After the ANP analysis, the importance weights for employees and customers can be used in the calculation of the following VIKOR analysis.

Table 2. The ANP weights/preferences

Dimensions/Items	Employees		Customers	
	Weight (%)	Ranking	Weight (%)	Ranking
Tangibles				
▪ Ticket-area Environment	5.63	11	5.62	17
▪ Waiting-area Environment	5.86	9	5.77	12
▪ Movie-area Environment	5.63	11	6.05	4
▪ Website Design	5.56	14	5.66	15
Reliability				
▪ Accurate Information	6.09	8	5.91	8
▪ Real-time Information	6.13	7	5.89	9
▪ Immediate Services	6.23	4	5.95	5
▪ Commitment Services	6.18	5	5.94	6
Assurance				
▪ Customer's Confidence	6.67	1	6.24	2
▪ Employee's Knowledge	6.25	3	6.17	3
▪ Courteous Employee	6.40	2	6.25	1
Responsiveness				
▪ Prompt Responses	5.65	10	5.81	10
▪ Employee's Sincere Help	6.16	6	5.93	7
▪ Never Busy for Responding	5.48	15	5.70	14
Empathy				
▪ Personal Attention	5.24	17	5.63	16
▪ Understanding Customers' needs	5.26	16	5.70	13
▪ Customers' Best Interests	5.58	13	5.78	11

4.2 Results of VIKOR

Then, this study employed the weights from ANP and consumer satisfaction to process the VIKOR analysis. The VIKOR analysis can be divided into the analysis of employees and the analysis of customers. The research results of VIKOR are displayed in Table 3. In both of the employee analysis and customer analysis, the results showed that the dimension of service quality "Tangibles" has the largest aggregate gap ($G=0.2557$ and 0.2151) from both of the employees and customers' ideal level.

Table 3. The results of VIKOR measures

VIKOR Measures	Employees		Customers	
	Fuzzy Values	Non-fuzzy Values	Fuzzy Values	Non-fuzzy Values
<u>Tangibles:</u>				
<i>E</i>	(0.0445, 0.0852, 0.1130)	0.0809	(0.0419, 0.0826, 0.1096)	0.0780
<i>F</i>	(0.2813, 0.4375, 0.5729)	0.4306	(0.1935, 0.3706, 0.4925)	0.3522
<i>G</i> ($v=0.5$)	(0.1629, 0.2614, 0.3430)	0.2557	(0.1177, 0.2266, 0.3010)	0.2151
<u>Reliability:</u>				
<i>E</i>	(0.0230, 0.0658, 0.0878)	0.0589	(0.0347, 0.0733, 0.0970)	0.0683
<i>F</i>	(0.1354, 0.3125, 0.4167)	0.2882	(0.1524, 0.3141, 0.4154)	0.2940
<i>G</i> ($v=0.5$)	(0.0792, 0.1892, 0.2522)	0.1735	(0.0936, 0.1937, 0.2562)	0.1811
<u>Assurance:</u>				
<i>E</i>	(0.0275, 0.0583, 0.0778)	0.0545	(0.0347, 0.0647, 0.0855)	0.0616
<i>F</i>	(0.1458, 0.3047, 0.4063)	0.2856	(0.1901, 0.3492, 0.4623)	0.3339
<i>G</i> ($v=0.5$)	(0.0867, 0.1815, 0.2420)	0.1701	(0.1124, 0.2070, 0.2739)	0.1977
<u>Responsiveness</u>				
<i>E</i>	(0.0347, 0.0633, 0.0832)	0.0604	(0.0322, 0.0613, 0.0811)	0.0582
<i>F</i>	(0.2292, 0.3828, 0.5104)	0.3741	(0.1977, 0.3649, 0.4841)	0.3489
<i>G</i> ($v=0.5$)	(0.1319, 0.2231, 0.2968)	0.2173	(0.1149, 0.2131, 0.2826)	0.2035
<u>Empathy:</u>				
<i>E</i>	(0.0413, 0.0657, 0.0859)	0.0643	(0.0363, 0.0645, 0.0852)	0.0620
<i>F</i>	(0.2917, 0.4375, 0.5729)	0.4340	(0.2169, 0.3819, 0.5050)	0.3680
<i>G</i> ($v=0.5$)	(0.1665, 0.2516, 0.3294)	0.2492	(0.1266, 0.2232, 0.2951)	0.2150
<u>Total:</u>				
<i>E</i>	(0.1549, 0.3065, 0.4080)	0.2898	(0.1611, 0.3127, 0.4167)	0.2968
<i>F</i>	(0.2917, 0.4375, 0.5729)	0.4340	(0.2169, 0.3819, 0.5050)	0.3680
<i>G</i> ($v=0.1$)	(0.2780, 0.4244, 0.5564)	0.4196	(0.2113, 0.3750, 0.4962)	0.3608
<i>G</i> ($v=0.5$)	(0.2233, 0.3720, 0.4905)	0.3619	(0.1890, 0.3473, 0.4608)	0.3324
<i>G</i> ($v=0.9$)	(0.1686, 0.3196, 0.4245)	0.3042	(0.1667, 0.3197, 0.4255)	0.3039

Notes: *E* indicates the group utility of the majority; *F* indicates the individual regret of the opponent; *G* is the aggregate distance from the ideal point; v is the weight.

4.3 Results of IPA

This study also used IPA to analyze the improvement strategies. According to the weights, representing the

importance, from ANP and the un-weighted distances $(\frac{p_i^h}{f_i^h} - \frac{p_i^l}{f_i^l}) / (\frac{p_i^h}{f_i^h} + \frac{p_i^l}{f_i^l})$, representing the unimproved distance, from VIKOR, the improvement strategy map can be mapped out by IPA.

From employees' data, Table 4 displays the fuzzy un-weighted distance, non-fuzzy un-weighted distance and weights for the IPA analysis. By IPA technique, the improvement strategy map of employees was mapped in Figure 5. The mean (0.059) of the important values of the 17 criteria/items was used to split between high importance and low importance. The mean (0.322) of the 17 un-weighted relative distances was used to split between large unimproved distance and small unimproved distance.

Table 4. The IPA data of employees

Items	Fuzzy un-weighted distance	Non-fuzzy un-weighted distance	Weight (w_i)
Ticket-area Environment	(0.188, 0.375, 0.500)	0.3542	0.0563
Waiting-area Environment	(0.281, 0.438, 0.573)	0.4306	0.0586
Movie-area Environment	(0.146, 0.336, 0.448)	0.3099	0.0563
Website Design	(0.167, 0.352, 0.469)	0.3290	0.0556
Accurate Information	(0.125, 0.297, 0.396)	0.2726	0.0609
Real-time Information	(0.135, 0.313, 0.417)	0.2882	0.0613
Immediate Services	(0.042, 0.211, 0.281)	0.1780	0.0623
Commitment Services	(0.073, 0.250, 0.333)	0.2188	0.0618
Customer's Confidence	(0.146, 0.297, 0.396)	0.2795	0.0667
Employee's Knowledge	(0.146, 0.305, 0.406)	0.2856	0.0625
Courteous Employee	(0.135, 0.305, 0.406)	0.2821	0.0640
Prompt Responses	(0.229, 0.383, 0.500)	0.3707	0.0565
Employee's Sincere Help	(0.177, 0.336, 0.438)	0.3168	0.0616
Never Busy for Responding	(0.198, 0.383, 0.510)	0.3637	0.0548
Personal Attention	(0.240, 0.398, 0.521)	0.3863	0.0524
Understanding Customers' Needs	(0.292, 0.438, 0.573)	0.4340	0.0526
Customers' Best Interests	(0.240, 0.391, 0.510)	0.3802	0.0558

Figure 5 illustrates the importance–unimproved distance map from employees' data. In Figure 5, majority of the 17 items were mapped in Quadrant II "Find Possibility of Improvement" and Quadrant IV "Lower Priority of Improvement"; none of items was mapped in Quadrant I "Higher Priority of Improvement" and only the item "Movie-area Environment (3)" was mapped in Quadrant III "Keep the Good Attributes."

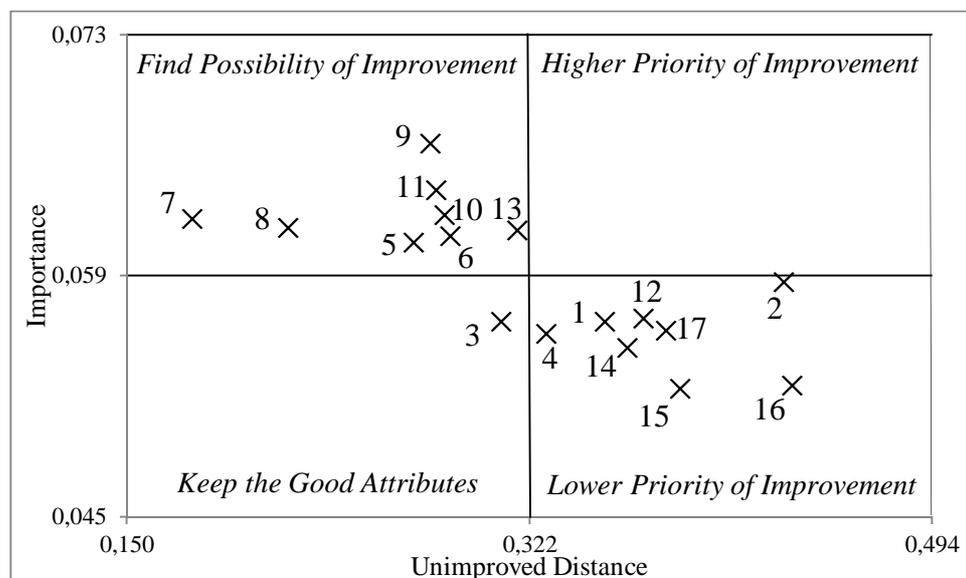


Figure 5. Improvement strategy map of employees

Notes: 1=Ticket-area Environment; 2=Waiting-area Environment; 3=Movie-area Environment; 4=Website Design; 5=Accurate Information; 6=Real-time Information; 7=Immediate Services; 8=Commitment Services; 9=Customer's Confidence; 10=Employee's Knowledge; 11=Courteous Employee; 12=Prompt Responses; 13=Employee's Sincere Help; 14=Never Busy for Responding; 15=Personal Attention; 16=Understanding Customers' Needs; 17=Customers' Best Interests.

From customers' data, Table 5 displays the fuzzy un-weighted distance, non-fuzzy un-weighted distance and weights for the IPA analysis and the improvement strategy map of customers was mapped in Figure 6. The mean (0.059) of the important values of the 17 criteria/items was used to split between high importance and low importance. The mean (0.329) of the 17 un-weighted relative distances was used to split between large unimproved distance and small unimproved distance.

Table 5. The IPA data of customers

Items	Fuzzy un-weighted distance	Non-fuzzy un-weighted distance	Weight (w_i)
Ticket-area Environment	(0.185, 0.371, 0.492)	0.3494	0.0562
Waiting-area Environment	(0.193, 0.370, 0.490)	0.3511	0.0577
Movie-area Environment	(0.165, 0.337, 0.448)	0.3168	0.0605
Website Design	(0.183, 0.354, 0.470)	0.3358	0.0566
Accurate Information	(0.145, 0.305, 0.405)	0.2852	0.0591
Real-time Information	(0.148, 0.312, 0.412)	0.2908	0.0589
Immediate Services	(0.140, 0.306, 0.405)	0.2834	0.0595
Commitment Services	(0.152, 0.314, 0.415)	0.2940	0.0594
Customer's Confidence	(0.190, 0.348, 0.460)	0.3326	0.0624
Employee's Knowledge	(0.183, 0.349, 0.462)	0.3314	0.0617
Courteous Employee	(0.184, 0.342, 0.451)	0.3260	0.0625
Prompt Responses	(0.198, 0.365, 0.484)	0.3489	0.0581
Employee's Sincere Help	(0.179, 0.346, 0.457)	0.3275	0.0593
Never Busy for Responding	(0.177, 0.344, 0.455)	0.3250	0.0570
Personal Attention	(0.212, 0.374, 0.495)	0.3604	0.0563
Understanding Customers' Needs	(0.208, 0.375, 0.494)	0.3589	0.0570
Customers' Best Interests	(0.217, 0.382, 0.505)	0.3680	0.0578

Figure 6 illustrates the importance–unimproved distance map from customers' data. In Figure 6, the IPA result is difference from the result of employee analysis. The two items "Customer's Confidence (9)" and "Employee's Knowledge (10)" were mapped in Quadrant I "Higher Priority of Improvement." Thus, the two items, belong to the dimension "Assurance," should be regarded as improvement items with the highest priority because they have more potential to rapidly reduce the customer gap. The items "Ticket-area Environment (1)," "Waiting-area Environment (2)," "Website Design (4)," "Prompt Responses (12)," "Personal Attention (15)," "Understanding Customers' Needs (16)," and "Customers' Best Interests (17)" are mapped in Quadrant IV "Lower Priority of Improvement." The seven items, almost belong to the two dimensions "Tangibles" and "Empathy," are regarded as lower priority improvement items because they contained large rooms for improvement while being relatively unimportant to customers. In Quadrant II "Find Possibility of Improvement," the six items (3, 5, 7, 8, 11, and 13) are categorized to those with relative smaller unimproved distances; managers may adopt the strategy of finding any possible methods of improving these to reduce gaps. The remaining items (6 and 14) mapped in Quadrant III "Keep the Good Attributes" with relative lower importance and smaller unimproved distances are those with satiated passenger needs; managers could employ the strategy of maintaining these items. Consequently, managers can arrange appropriate strategies according to the customer preferences and unimproved gaps of present services in order to reduce the customer gap and to achieve customer expectations. Therefore, this research proposes the MCDM evaluation model as a suitable and effective method for evaluating and reducing the gaps of the improvement of the service quality.

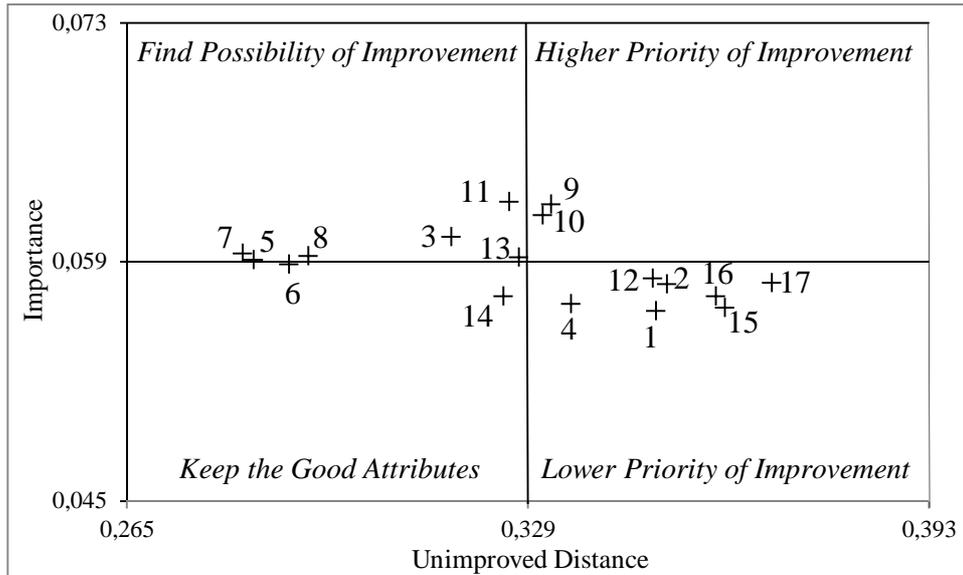


Figure 6. Improvement strategy map of customers

Notes: 1=Ticket-area Environment; 2=Waiting-area Environment; 3=Movie-area Environment; 4=Website Design; 5=Accurate Information; 6=Real-time Information; 7=Immediate Services; 8=Commitment Services; 9=Customer's Confidence; 10=Employee's Knowledge; 11=Courteous Employee; 12=Prompt Responses; 13=Employee's Sincere Help; 14=Never Busy for Responding; 15=Personal Attention; 16=Understanding Customers' Needs; 17=Customers' Best Interests.

5. Conclusions

This paper employed the ANP and VIKOR methods to overcome the shortages of the traditional IPA. This paper also used an empirical sample of a movie theater in Taiwan to evaluate the service quality by the MCDM model combined three methods: ANP, VIKOR and IPA. The application of both the ANP and the VIKOR methods to the empirical data was employed to analyze customer preferences and customer satisfactions and also to illustrate the customer gap of the service quality. The IPA technique was then applied to diagnose managerial strategies for reducing the customer gap between customer perceptions and expectations. The improvement strategy map of gap reduction was conducted to categorize various items of the service quality.

The major contribution of this paper lies in the development of an integrated model, which incorporates diversified issues for evaluating the service quality. Through this MCDM evaluation model, managers can decide which item of service quality should be further improved in order to achieve air customers' aspired levels. Our empirical case study demonstrated the effectiveness and feasibility of the proposed model. This proposed model successfully integrates ANP, VIKOR and IPA methods; it can simultaneously deal with customer preferences and satisfactions and help the managers to confidently create improvement strategies.

Acknowledgements

The author thanks the National Science Council of Taiwan for providing the financial support for this research under the grant NSC99-2221-E-424-004.

References

- Ahn, B. S. and Choi, S. H. (2008), "ERP System Selection Using a Simulation-based AHP Approach: A Case of Korean Homeshopping Company," *Journal of the Operational Research Society*, 59(3), 322-330.
- Chen, J.K., & Chen, I.S. (2008). VIKOR method for selecting universities for future development based on innovation. *Journal of Global Business Issues*, 2(1), 53–59.
- Chiou, H. K. and Tzeng, G. H. (2001), "Fuzzy Hierarchical Evaluation with Grey Relation Model of Green Engineering for Industry," *International Journal of Fuzzy System*, 3(3), 466–75.
- Chiu, Y. J., Chen, H. C., Tzeng, G. H. and Shyu, J.Z. (2006), "Marketing Strategy Based on Customer Behaviour for the LCD-TV," *International Journal and Decision Making*, 7(2/3), 143-165.
- Garver, M.S. (2003). Best practices in identifying customer-driven improvement opportunities. *Industrial Marketing Management*, 32(6), 455– 466.
- Helm, R., Scholl, A., Manthey, L., & Steiner, M. (2004). Measuring customer preferences in new product development: comparing compositional and decomposition methods. *International Journal of Product Development*, 1(1), 12–29.
- Huang, J. J., Tzeng, G. H., and Ong, C. S. (2005), "Multidimensional Data in Multidimensional Scaling Using the Analytic Network Process," *Pattern Recognition Letters*, 26(6), 755-767.
- Karjaluo, H. (2002). Selection criteria for a mode of bill payment: empirical investigation among finish bank customers. *International Journal of Retail & Distribution Management*, 30(6), 331–339.
- Kumar, R. and Kumar, U. (2004). A conceptual framework for the development of a service delivery strategy for industry systems and products. *The Journal of Business & Industrial Marketing*, 19(5), 310–319.
- Laarhoven, P. J. M. and Pedrycz, W. (1983), "A Fuzzy Extension of Saaty's Priority Theory," *Fuzzy Sets System*, 11(3), 229-41.
- Liou, J. J. H., Tzeng, G.H. and Chang, H.C. (2007), "Airline Safety Measurement Using a Novel Hybrid Model," *Journal of Air Transport Management*, 13(4), 243-249.
- Martilla, J.A., & James, J.C. (1977). Importance-Performance Analysis. *Journal of Marketing*. 41(1), 77–79.
- Myers, J. (2001). *Measuring customer satisfaction: hot buttons and other measurement issues*. Chicago, IL: American Marketing Association.
- Mon, D. L., Cheng, C. H. and Lin, J. C. (1994), "Evaluating Weapon System Using Fuzzy Analytic Hierarchy Process Based on Entropy Weight," *Fuzzy Sets System*, 62(2), 127-34.
- Opricovic, S. (1998). *Multicriteria optimization of civil engineering systems*. Belgrade: Faculty of Civil Engineering.
- Opricovic, S., & Tzeng, G.H. (2002). Multicriteria planning of postearthquake sustainable reconstruction. *Computer-Aided Civil and Infrastructure Engineering*, 17(3), 211–220.
- Opricovic, S., & Tzeng, G.H. (2003). Fuzzy Multicriteria model for post-earthquake land-use planning. *Natural Hazards Review*, 4(2), 59–64.
- Opricovic, S., & Tzeng, G.H. (2004). Compromise solution by MCDM methods: a comparative analysis of VIKOR and TOPSIS. *European Journal of Operational Research*, 156(2), 445–455.
- Parasuraman, A., Zeithaml, V.A., & Berry, L.L. (1985). A conceptual model of service quality and its implications for future research. *Journal of Marketing*, 49(4), 41–50.
- Partovi, F.Y. (2007). An analytical model of process choice in the chemical industry. *International Journal of Production Economics*, 105(1), 213–227.
- Pass, M.W. (2005). Western US college students: banking preferences and marketplace performance. *Journal of Financial Services Marketing*, 11(1), 49–63.
- Saaty, T. L. (1996), *Decision Making with Dependence and Feedback: The Analytic Network Process*, Pittsburgh, PA: RWS Publications.
- Sampson, S.E., & Showalter, M.J. (1999). The performance-importance response function: observations and implications. *The Service Industries Journal*, 19(3), 1–25.
- Shin, D. and Elliott, K. (2001), "Measuring Customers' Overall Aatisfaction: a Multi-attributes Assessment," *Services Marketing Quarterly*, 22(1), 3-20.
- Soota, T., Singh, H., & Mishra, R. (2008). Defining characteristics for product development using quality function deployment: a case study on Indian bikes. *Quality Engineering*, 20(2), 195–208.
- Tsai, W. H., Chou, W. C., and Hsu, W. (2009), "The Sustainability Balanced Scorecard as a Framework for Selecting Socially Responsible Investment: An Effective MCDM Model," *Journal of the Operational Research Society*, 60(10), 1396-1410.
- Tsai, W.H., Hsu, W. & Lin, T.W. (2009), "New Financial Service Development for Banks in Taiwan Based on Customer Needs and Expectations," *The Service Industries Journal*, Vol. 30, No. 14, pp. 1-22.
- Tsai, W. H. and Hsu, W. (forthcoming), "A Novel Hybrid Model Based on DEMATEL and ANP for Selecting Cost of Quality Model Development," *Total Quality Management & Business Excellence*, Accepted on 3 June, 2009.
- Tzeng, G. H., Chiang, C. H. and Li, C. E. (2007), "Evaluating Intertwined Effects in E-learning Programs: A Novel Hybrid MCDM Model Based on Factor Analysis and DEMATEL," *Expert Systems with Applications*, 32(4), 1028-1044.
- Tzeng, G.H., Lin, C.W., & Opricovic, S. (2005). Multi-criteria analysis of alternative-fuel buses for public transportation. *Energy Policy*, 33(11), 1373–1383.

- Tzeng, G.H., Teng, M.H., Chen, J.J., & Opricovic, S. (2002). Multicriteria selection for a restaurant location in Taipei. *Hospitality Management*, 21(2), 171–187.
- Vyas, P.H. (2005). Measuring Consumer Preferences for Sales Promotion Schemes in FMCG Sector in FMCG sector in an emerging market: India. *The Business Review, Cambridge*, 4(2), 231–238.
- Warfield, J. (1976), *Societal Systems: Planning, Policy, and Complexity*, New York: Wiley Interscience.
- Wey, W. M. and Wu, K. T. (2007), "Using ANP Priorities with Goal Programming in Resource Allocation in Transportation," *Mathematical & Computer Modelling*, 46(7-8), 985-1000.
- Wu, W. W. and Lee, Y. T. (2007), "Developing Global Managers' Competencies Using the Fuzzy DEMATEL Method," *Expert Systems with Applications*, 32, 499-507.
- Yang, C., & Wang, T.C. (2006). VIKOR method analysis of interactive trade in policy-making. *The Business Review, Cambridge*, 6(2), 77–85.
- Zadeh, L. A. (1975), "The Concept of a Linguistic Variable and its Application to Approximate Reasoning," *Information Science*, 8(1), 199-249.
- Zeithaml, V. A., Bitner, M.J. and Gremler, D. D. (2006), *Service marketing: integrating customer focus across the firm*, 4nd ed. Boston, MA: Irwin McGraw-Hill.

“Firm-Specific, Industry-Wide and Country-Wide Determinates of Capital Structure”

Tarek Ibrahim Eldomiaty (British University, Egypt)

Ahmed A. Badawi (German University Cairo, Egypt)

Abstract

This study aims at examining the relative speed of adjusting the debt ratio and the explanatory powers of three groups of determinants of capital structure; firm-specific, the country-wide and the industry-wide. The methodology is designed to show the relative effects of these determinants in the case of low debt ratios and high debt ratios. The sample includes the non-financial firms listed in the DJIA and Nasdaq covering the quarterly periods 1992-2010. The estimation of the models begins with the Hausman test to identify whether the model is subject to fixed or random effects. In the case of low debt financing, the results show that the assumptions of the three theories of capital structure are present. Regarding the industry-wide variables, the results show that the prospects of many products in the industry call for higher debt ratios. Regarding the effects of the country-wide variables, a positive relationship exist between unemployment rates and debt ratios calling for a warning signal that the excessive use of debt financing adds to the level of unemployment. The comparative effects of the three groups of variables show that the firm-specific, industry-wide and country-wide variables help firms associated with low debt ratio adjust the observed debt financing to a target level at relatively the same speed. The overall results for the low debt firms show that debt financing is much more affected by the assumptions of the theories of capital structure than industry-wide and country-wide. Regarding firms associated with high debt ratio, the effects of the theories of capital structure are present relatively as they are in the low debt firm. The effects of the industry-wide variables are the same as in the case of low debt firms. The effects of the country-wide variables, the negative relationship between inflation and debt financing indicates that when inflation rises, firms prefer equity financing to avoid the increasing interest burdens on earnings. A positive relationship exists as well between debt financing and both of productivity growth, exports and growth of unemployment rate. The comparative effect of the firm-specific, industry-wide and country-wide variables, show that firms characterized by high debt ratios are much more influenced by the assumptions of the theories of capital structure as well as the macro variables than firms characterized by low debt.

JEL classification:

Keywords: Debt ratio, Industry-wide determinants, Country-wide determinants, Partial Adjustment, DJIA, Nasdaq

1 Introduction

The literature includes the foundation of the determinants of capital structure that have evolved across different successive theories. Each theory is based on certain assumptions that have been subject to scrutiny in many researches. To the extent that those assumptions have been examined across time, now they have become of capital structure. The trade-off theory is centered on an examination of the tax shields that motivate a firm to further borrowing. The pecking order theory is centered on the role of firm's profitability as a venue to borrow. The higher the firm's profitability, thus retained earnings, the lower its need to borrow. The free cash flow (or agency) theory is centered on monitoring the amount of free cash flow as an indicator to the extent to which corporate managers make discretionary financing decisions.

The evolution of the theories of capital structure has resulted an independent treatment of the determinants of capital structure. It has also been realized that each theory does not provide complete explanation on the real determinants of capital structure. In the late 1980s and 1990s, several researches in the literature have taken forward steps considering combinations of the determinants of capital structure as set by each theory. Since then, the determinants of capital structure have been the subject of many examinations in various settings. The thoughts on the real determinants of capital structure were further extended beyond the corporate boundaries. A progressive research has offered explanations to the determinants of capital structure that do exist in the industry and the country. The shared understanding is that an industry boom and an economic progress are good motivations for firms to change capital structure by further borrowing, issuing equity or both. The literature on corporate capital structure has offered various insights on the firm-specific factors that influence firms borrowing decisions. Many studies in the literature have reached a consensus that certain factors influence the firm's ability to change its capital structure. Most of the identified factors are under the firm' control such as the size of fixed assets (being used as collateral), the amount of paid (or deferred) taxes and the amount of retained earnings. Other factors are country-wide that are not the firm's control such as the level of interest rate that determines the timing of borrowing.

It has been realized that most of the studies on the determinants of capital structure do actually follow the premises of the theories of capital structure namely: the trade-off, the pecking order and the free cash flow (or agency) theories. These theories focus on the factors that firm managers are able to control.

Nevertheless, few studies have considered the effect of macro variables on firm's borrowing decisions. It is well observed that the general level of economic activity motivates firm-level expansion. The outcome is a change in firm's capital structure. The studies in the relevant literature did not reach a consensus regarding the macro variables that have an influence on the firm's ability to borrow. In addition, these studies usually address the county-wide variables, while the industry-wide factors are not examined thoroughly.

2 Research Objectives and Hypotheses

The literature on the determinants of firms' borrowing decisions is well established. It has evolved through various micro, or firm level, assumptions. Nevertheless, the reality of the business environment requires that firms' managers are at all times influenced by many other factors surrounding the firm's environment. These factors refer to the influence of the industry and the influence of the country macros. The former refer, broadly, to the prospects of the industry sales, while the latter refer, broadly, to the major economic indicators of economic growth. Accordingly, the paper aims at examining the objectives that follow.

1. Examine the significant effects of the assumptions of theories of capital structure on low versus high debt ratios.
2. Examine the significant effects of the industry-wide factors on low versus high debt ratios
3. Examine the significant effects of the country-wide factors on low versus high debt ratios
- The above mentioned three objectives reflect the full domain of the factors that surround corporate financing decisions.

3 Research Contribution

This paper contributes to the relevant literature as follows.

- (a) The paper examines the assumptions of the three theories of capital structure all together on two different levels of debt financing; low debt ratio versus high debt ratio. This approach aims at providing in-depth scrutiny regarding how the assumptions of the theories of capital structure explain the changes in debt financing.
- (b) The paper examines the influence of relevant industry factors which is the ratio of inventory to sales for all major products recognized and classified by the U.S Census Bureau. These factors are not examined in the current literature (to the best of the authors' knowledge).
- (c) The paper examines the influence of greater number of country economic indicators than in the current literature.

4 Determinants of Capital Structure: Micro and Macro Perspectives

The literature on the determinants of capital structure can be divided into mainly two parts. The first part discusses the well-known determinants of capital structure as derived from theories of capital structure. The authors refer to those determinants as "firm-specific." The second part discusses the macro influence of the industry-wide and country-wide factors on corporate financing decisions. The authors refer to these determinants as "industry-wide and country-wide" determinants. This section discusses the two parts as follows.

The firm specific Determinants of Capital Structure

Since the famous work of Modigliani and Miller (1958) appeared, researchers started to examine the MM propositions providing the literature number of factors that affect corporate financing decision using debt and/or equity. These factors cover not only those related to tax shields and bankruptcy costs, but also many other factors that affect corporate financing decisions. Other distinct approaches have been proposed to explain the rational of financing decisions. Those approaches were developed later on to other theories of capital structure such as the pecking order theory and the free cash flow theory. Therefore, the determinants of capital structure were expanding trying to provide evidence on each theory, hence on the practice of corporate financing. This vast literature is summarized in table (1) which summarizes the capital structure determinants examined in this study, the ratio(s) or proxy for each determinant, the previous related studies, and the expected relationship between each determinants and firms' short-term and long-term debt.

Table 1: The List of the factors that are examined in the study.

The 'Expected Relationship' refers to the expected sign of the formulated hypothesis according to the assumptions of theories of capital structure.

Theory of Capital Structure	Determinants of Capital structure	Expected Relationship	Variables (Ratio/Proxy)	Definition	
Trade-Off Theory (Modigliani and Miller, 1963; Gupta, 1969; Schmidt, 1976; Schwarz & Aronson, 1967; White and Turnbull, 1974; Scott, 1976; Warner, 1977; Smith and Warner, 1979; Ferri and Jones, 1979; DeAngelo & Masulis, 1980; Marsh, 1982; Castanias, 1983; Bradley et al., 1984; Auerbach, 1985; Moore, 1986; Kim and Sorensen, 1986; Titman and Wessels 1988; Fischer et al., 1989; Harris and Raviv, 1991; Homaifar, 1994; Rajan and Zingales, 1995; Lasfer, 1995; Andrade and Kaplan, 1998; Shyam-Sunder & Myers, 1999; Wiwattanakitang, 1999; Chirinko and Singha, 2000; Nuri, 2000; Ghosh et al., 2000; Bevan and Danbolt, 2000, 2002; Hovakimian, 2001; Booth et al., 2001; Ozkan, 2001; Antonio, 2002; Tong and Green, 2004)	Target Debt Ratio	(+)	DE_{t+1}	Debt-equity ratio in a next period	
			ΔDR_t^*	An indicator to the relationship between actual and optimal (target) capital structure	
	Average Industry Leverage	(+)	ΔDR_{AVG}	An indicator to the average leverage level of other firms in the same industry.	
	Structure of Tangible Assets	(+) (for the first two rows)	$FATA_t$	Ratio of Fixed Assets/Total Assets. An indicator to the structure of tangible assets.	
			$\Delta NDTAX_t$	The ratio of depreciation to total assets. A proxy for non-debt tax shields	
			$\Delta NDTA_t$	A direct estimate of non-debt tax shields over total assets (Titman and Wessels 1988). ⁶	
	Bankruptcy Risk	(-)	BR_t	A direct measure of bankruptcy risk, which is taken as a proxy for the bankruptcy costs (White and Turnbull, 1974). ⁸	
			DCR_t	Debt Coverage Ratio: a proxy for firm's failure.	
	Pecking Order Theory (Chudson, 1945; Donaldson, 1961; Hall and Weiss, 1967; Gupta, 1969; Baxter and Cragg, 1970; Bosworth, 1971; Gale, 1972; Toy et al., 1974; Carleton and Silberman, 1977; Nakamura and Nakamura, 1982; Myers, 1984; Myers & Majluf, 1984; Long and Malitz, 1985; Titman and Wessels, 1988; Kester, 1988; Baskin, 1989; Pinegar & Wilbricht, 1989; Whited, 1992; Chung, 1993; Allen, 1993; Shyam-Sunder & Myers, 1999; Wiwattanakitang, 1999;	Growth	(-)	$CETA_t$	Proxies for firm's future growth rate, which include: (1) Capital Expenditures over Total Assets
				GTA_t	(2) Growth of Total Assets = percentage change in total assets
SG_t				(3) Sales Growth	
$ASTURN_t$				(4) Assets Turnover	
Investment Growth		(-)	MB_t	Market-Book Ratio as a proxy for Firm's growth	

⁶

$$NDT = OI - i - \frac{T}{CTR}, \text{ where } OI = \text{Operating Income, } i = \text{Interest payments, } T = \text{Income tax payments}$$

$$CTR = \text{Corporate tax rate}$$

$$^7 ECTR_t = \frac{\text{Estimated taxable profits} \times \text{Corporate tax rate}}{\text{Pre-tax profits}}$$

$$^8 \text{Bankruptcy risk} = \frac{\text{Fixed charges} - \text{Earnings before income and tax}}{\sigma \text{ of earnings}}$$

Ghosh et al., 2000; Chirinko and Singha, 2000; Um, 2001; Frank and Goyal, 2003 ⁹ ; Tong and Green, 2004; Chen, 2004)	Opportunities			options.
	Uniqueness	(-)	SES_t	Selling Expenses over Sales. The relationship between specialized products and capital structure..
	Size	(+)	$LnAssets_t$	The effects of firm's size on the composition of capital structure.
	Profitability	(-)	$\Delta EBITDA_t$	Earnings Before Interest, Taxes, and Depreciation over Total Assets
			ΔOIS_t	Operating Income over Sales
			ΔOIA_t	Operating Income over Total Assets
			ΔPM_t	Profit Margin
			ΔROI_t	Return on Investment
	Financial Flexibility	(-)	REA_{t+1}	The expected effect of 'Retained Earnings Ratio' as a proxy for the retention rate
			ΔREA_t	A measure of the cumulative effect retained earnings, thus the extent of firm's financial flexibility
	Liquidity Position	(-)	ΔQR_t	Quick Ratio
			ΔWCR_t	Working Capital Ratio
			$\Delta CashR_t$	Cash Ratio
ΔCR_t			Current Ratio	
Timing Effect	(-)	ΔPE_t	Price/Earnings Ratio	
Dividend Paid Out	(+)	DPR_t	Dividend Payout Ratio	
Free Cash Flow Theory (Jensen & Meckling, 1976; Myers, 1977; Grossman & Hart, 1982; Easterbrook, 1984; Jensen, 1986; Stulz, 1990; Chung, 1993; Maloney et al., 1993; Parrino and Weisbach, 1999; Ang et al., 2000;)	Agency Costs	(+)	ER_t	Expense Ratio = Operating expenses scaled by annual sales. A measure of how effectively the firm's management controls operating costs, including excessive prerequisite consumption, and other direct agency costs. ¹⁰
		(+)	AUR_t	Assets Utilization Ratio = Annual sales/Total assets. A measure of how effectively the firm's management deploys its assets.
	Estimate of free cash flow	(-)	FCF_t	Direct estimate of firm's free cash flow (Operating perspective)

⁹ Frank and Goyal (2003) report an exceptional result that contrary to the pecking order theory, financing deficits were covered by equity rather than debt.

¹⁰ The expenses ratio is not assumed to measure all agency costs as discussed in the literature. Nevertheless, and according to the availability of data, this ratio can be considered a first-order estimate and easy-to-measure indicator of the presence of agency costs at the firm level.

The Macro Determinants of Capital Structure

Table (2): List of the studies that examined the Macro Economic Determinants of Capital Structure

Author(s)	Dependent variable(s)	Independent variables	Estimation Model	Main Findings
Haug & Ritter (2004)	Likelihood of debt issuance	Real GDP growth	regression	positive
Dorbetz&Wanze nrid (2004)	Speed of adjustment to target leverage	Term spread	Regression	positive
Haas and Peeters (2004)	Speed of adjustment to target leverage	GDP growth	regression	positive
Levy & Hennessy (2007)	Leverage ratio	Output growth	Computable general equilibrium model	Firms with less stringent financing constraints issue less debt during expansions, while firms facing more stringent constraints issue more debt. Similarly, both firms issue less equity during contractions. However, less constrained firms issue more debt during contractions while more constrained firms issue less debt. More constrained firms are those with severe agency problems indicated by low dividend payout ratio or small firms if no data about dividends are available.
Mahmud, Muhammad Herani, Gobind M., Rajar, A.W. and Farooqi, Wahid (2009)	-Debt to equity ratio -Long-term debt to total capitalization ratio -Total debt to total assets ratio	-Growth in GNP per capital -Prime lending rate -Financial Liberalization (dummy) -Efficiency of Financial Markets (dummy) -Creditor's rights (dummy) -Enforcement (dummy)	Regression using cross section data from 1996 to 2005 for: Pakistan, Japan, and Malaysia firms (The mean is taken for each year of the data for 525 Japanese companies, 129 Malaysian companies and 114 Pakistani companies)	the null hypothesis is rejected for three economic variables, financial liberalization, efficiency of financial markets and creditors' rights for the three leverage ratios at 1% and 5% level of significance
Journal of Academy of Business and Economics (2003)	Total debt ratio (DEBT)	Firm size (SIZE), Growth opportunities (GRTH), profitability (ROA)	Multiple linear regression models , Variance components Models , First-order autoregressive models, and Variance-component moving average model	<ul style="list-style-type: none"> Debt ratios of larger firms are more diversified and less limited by the amount of financial breakdown The more profitable the firm the lower the debt ratio Traditional firm have lower and negative ratios of business risk than high tech. ones
Harjoat S. Bhamra, Lars-Alexander Kuehn, and Ilya A. Strebulaev (2008)	Aggregate leverage: the ratio of the sum of all debt to the sum of all firms' market value of assets.	Real consumption growth Real earnings growth	structural-equilibrium model	capital structure is pro-cyclical at refinancing dates when firms relever, but counter-cyclical in aggregate dynamics
Robert A. Korajczyk and Amnon Levy (2001)	expected optimal leverage ratio measured in four ratios: The first measure is the ratio of short-term plus long-term debt to market value of assets, measured as the sum of the market value of common equity and	Firm specific variables Macro variables The macro variables are: -2-year aggregate domestic nonfinancial corporate profit growth (computed using quarterly data from the Flow of Funds and is matched with the firm quarter with the most	Multiple regression Sample is split into two categories refer to as financially constrained and financially unconstrained. the specific criteria for a firm-event window to be labeled financially constrained are: (1)	the unconstrained sample has both statistically and economically significant counter-cyclical coefficients but the constrained sample has, in general, pro-cyclical coefficients that are statistically different from the unconstrained sample

	<p>book value of debt. In the second, the measure is the ratio of long-term debt to market value of assets. In the third, the measure is the ratio of short-term plus long-term debt less cash and marketable securities to market value of assets less cash and marketable securities. In the fourth measure is the ratio of short-term plus long-term debt to book value of assets.</p>	<p>overlap) - 2-year equity market return is computed from the CRSP value weighted index of stocks traded on NYSE, AMEX and NASDAQ - commercial paper spread over the Treasury bill</p>	<p>the firm does not have a net repurchase of debt or equity and does not pay dividends within the event window (2) the firm's Tobin's Q, defined as the sum of the market value of equity and the book value of debt, divided by the book value of assets, at the end of the event quarter be greater than one</p>	
<p>Dilek Teker, Ozlem Tasseven, and Ayca Tukul (2009)</p>	<p>Leverage = total liabilities / total assets</p>	<ul style="list-style-type: none"> - tangibility of assets measured as the ratio of fixed assets to total assets - size measured as the natural logarithm of net sales - growth opportunities measured as the ratio of book value to market value - return on assets (ROA) <p>-profit margin on sales (PMS) measured as the ratio of operating income over total sales.</p> <ul style="list-style-type: none"> - the ratio of total depreciation to total assets (tax shield measure) - ratio of depreciation over operating profit (tax shield measure) 	<p>Regression on panel data that covers 42 selected firms traded at the Istanbul Stock Exchange ISE-100 index Random effect model is used after Hausman test procedure.</p>	<p>return on assets and tangibility of assets have a positive and statistically significant impact on the firm's leverage ratio, while the ratio of total depreciation to total assets and profit margin on sales seem to have some negative and significant impacts on firms' leverage degree.</p>

5 Data and Research Variables

5.1 Data

The firm-specific data used are obtained from Reuters® financial database for the non-financial firms included in the DJIA30 and Nasdaq 100 indexes. The data cover the years 1992-2010 on quarterly basis. The basic forms of the data are the income statement and balance sheets. The industry-wide and country wide data are obtained from the U.S. economic indicators provided by the Bureau of Labor Statistics (<http://www.bls.gov/>) and the U.S. Census Bureau (<http://www.census.gov>).

5.2 Dependent Variables

The dependent variable is the debt ratio that calculates as the total debt / total assets.

5.3 Independent Variables

The independents refer to the variables included in each group. The first group includes the variables that measure the assumptions of the trade-off, pecking order and free cash flow theories. These factors are shown in above mentioned table 1. The second group includes the growth of wholesalers' sales and inventory in addition to the inventory to sales ratios for the products listed in the U.S. Census Bureau (<http://www.census.gov>). The third group refers to the macroeconomic indicators as listed in U.S. Census Bureau (<http://www.census.gov>). Descriptive statistics of all variables in the three groups are reported in the Appendix.

The estimating equation of the model takes the form that follows.

$$y_{tk} = \alpha_k + y_{t-1k} + \sum_{i=1}^k \beta_{ik} X_{itk} + \varepsilon_{tk}$$

Where $t = 1, \dots, n$

K = number of firms in each group

y = Debt ratio

X = Firm-specific, Industry Wide and Country Wide variables

Model Estimation

Since the data are cross section-time series panel, the Hausman specification test (Hausman, 1978; Hausman and Taylor, 1981) is required to determine whether the fixed or random effects model should be used. The test looks for the

correlation between the observed x_{it} and the unobserved λ_k , thus is run under the hypotheses that follow.

$$H_0 : \text{cov}(x_{it}, \lambda_k) = 0$$

$$H_1 : \text{cov}(x_{it}, \lambda_k) \neq 0$$

Where x_{it} = regressors, and λ_k = error term.

The results of the test show that the coefficient of λ_k is insignificant at 1% level. Therefore, the fixed effect model is relevant. Therefore, the OLS can be used appropriately for estimating the model's parameters.

6 Results and Discussion

Table 3: Firm-Specific, Industry-Wide and Country-Wide Determinants of Low Debt Ratio¹¹

Predictors	Firm-Specific	Industry-Wide	Country-Wide
Constant	0.165	-0.110	0.131
Debt Ratio _{t-1}	0.147 (16.759)***	0.149 (16.589)***	0.150 (16.668)***
Fixed assets/ total assets	-0.021 (-5.214)***		
Non debt tax shield/total assets	0.036 (1.971)**		
Tax Rate	0.00039 (1.109)		
Bankruptcy Risk	0.0005 (1.090)		
Capital expenditure/total assets	0.001 (5.253)***		
Growth of total assets	-0.033 (-9.107)***		
Market-to-book	0.000023 (1.582)		
Earnings before interest, tax and depreciation/total assets	-0.082 (-3.183)***		
Retained Earnings/Total assets	0.116 (4.405)***		
Working Capital Ratio	-0.071 (-21.191)***		
Cash Ratio	0.046 (6.438)***		
Current ratio	-0.0008 (-8.090)***		
Asset Utilization Ratio	0.075 (9.59)***		
Free Cash Flow	-0.00007 (-1.124)		
Time Effect	0.00026 (4.021)***		
Growth Retail Inventory		0.370 (2.847)**	
Growth Retail Sales		0.113 (1.076)	
Retail Clothing and clothing access. stores		4.411 (2.025)**	
Growth Sales Wholesalers		0.194 (2.806)***	
Growth Inventories Wholesalers		-0.134 (-1.003)	
Furniture & Home Furnishings		0.440 (2.141)**	
Computer & Computer Peripheral Equipment & Software		0.046 (2.950)**	
Electrical & Electronic Goods		-0.022 (-1.303)	
Miscellaneous Nondurable Goods		0.041 (1.382)	
Time Effect		0.001 (5.82)***	

¹¹ The table shows the regression coefficients (stepwise-backward) for the 1st quartile of debt ratio. The dependent variable is the debt ratio. The t-statistics are shown between brackets. The multicollinearity is examined using the Variance Inflation Factor (VIF) and the predictors associated with VIF > 5 are excluded. Outliers are detected and excluded as well. The heteroskedastic effects are corrected using the White's HCSEC, which improves the significance of the OLS estimates.

Growth Inflation			0.0004 (1.113)
Unemployment Rate			0.182 (1.738)*
Growth Unemployment Rate			-0.028 (-1.122)
Exports			-0.00008 (-1.159)
Time Effect			0.0004 (4.528)***
\bar{R}^2	0.327	0.154	0.142
N	1841	1841	1841
F-statistic	56.99***	31.05***	51.61***
Durbin-Watson	0.546	0.305	0.272

*** Significant at 1% significance level.

** Significant at 5% significance level.

* Significant at 10% significance level.

Table (3) reports the results of the OLS estimates for the low debt ratios. The results show the effects of the firm-specific, industry-wide and country-wide variables of firms' debt ratio. Regarding the firm-specific variables, the results show that the assumptions of the three theories of capital structure are present. The positive coefficients of non-debt tax shields and Capital expenditure/total assets reflect the assumptions of the trade-off theory. Nevertheless, other variables present a contradiction to the theory. The negative coefficients of fixed assets/total assets and growth of total assets indicate that the additions to fixed assets are financed by equity. The effects of the pecking order theory are also present. The negative coefficient of earnings before interest, taxes and depreciation/total assets, working capital ratio and current ratio indicate that the high firms' liquidity is used as a source of internal financing, leading to lower debt ratios. The negative coefficient of free cash flow shows a clear support to the premises of the free cash flow theory. That is, the higher the free cash flow, the lower the debt ratio.

Regarding the industry-wide variables, the results show quite supportive evidence that the prospects of many products in the industry call for higher debt ratios. The evidence is present by the positive coefficients of growth of the retail inventory and the growth of the wholesalers' sales. The prospects of many products are also present by the positive coefficient of the ratio inventory /sales in many industries such as clothing and furniture, computers.

Regarding the effects of the country-wide variables, the results show that the positive coefficient of unemployment rates indicates that higher debt ratios might put pressures on firms' profitability (which is reflected by the above mentioned pecking order) that firms might eventually resort to downsizing in an attempt to secure acceptable levels of profitability. The comparative effect of the three groups of variables (firm-specific, industry-wide and country-wide) can be shown by

the coefficients of the speed of adjusting the debt ratio DR_{t-1} to a target ratio DR_t . The results show that the speed of adjustments for the three groups is very close to each other (0.147, 0.149 and 0.15 respectively). Nevertheless, the explanatory powers provide clear evidence that the firm-specific variables (that are related to the theories of capital structure) are well over the double of the explanatory power for the industry-wide and the country-wide (0.327, 0.154, and 0.142 respectively).

Table 4: Firm-Specific, Industry-Wide and Country-Wide Determinants of High Debt Ratio¹²

Predictors	Firm-Specific	Industry-Wide	Country-Wide
Constant	1.001	1.151	0.676
Debt Ratio _{t-1}	0.307 (15.370) ^{***}	0.398 (18.506) ^{***}	0.404 (18.926) ^{***}
Fixed assets/total assets	0.880 (6.396) ^{***}		
Non debt tax shield/total assets	0.198 (5.227) ^{**}		
Growth of total assets	-0.573 (-13.046)		
Sales Growth	-0.160 (-3.961) ^{***}		
Size (ln total assets)	-0.021 (-4.115) ^{***}		
Earnings before interest, tax and depreciation/total assets	0.570 (6.245) ^{***}		
Profit Margin	-0.045 (-6.126) ^{***}		
Retained Earnings/Total assets	0.060 (3.084) ^{**}		
Quick Ratio	0.0003 (2.242) ^{**}		
Working Capital Ratio	-0.334 (-14.212) ^{***}		
Cash Ratio	0.565 (13.22) ^{***}		
Current ratio	-0.0002 (-1.935) ^{**}		
Free Cash Flow	-0.0003 (-1.119)		
Growth Sales Wholesalers		-0.881 (-1.259)	
Growth Inventories Wholesalers		-2.156 (-1.684) [*]	
Furniture & Home Furnishings		-0.348 (-1.890) [*]	
Electrical & Electronic Goods		-0.301 (-1.413)	
Miscellaneous Durable Goods		-0.251 (-1.616)	
Farm Product Raw Materials		0.321 (2.109) ^{**}	
Beer, Wine, & Distilled Alcoholic Beverages		0.461 (1.696) [*]	
Time Effect		-0.004 (-3.215) ^{***}	
Inflation			-2.902 (-1.998) ^{**}
Productivity Growth			0.790 (2.032) [*]
T-Bills			-1.408 (-1.169)
Unemployment Rate			-2.880 (-1.698) [*]
Growth Unemployment Rate			0.639 (1.746) [*]
Exports			0.0006

¹² The table shows the regression coefficients (stepwise-backward) for the 4th quartile of debt ratio. The dependent variable is the debt ratio. The t-statistics are shown between brackets. The multicollinearity is examined using the Variance Inflation Factor (VIF) and the predictors associated with VIF > 5 are excluded. Outliers are detected and excluded as well. The heteroskedastic effects are corrected using the White's HCSEC, which improves the significance of the OLS estimates.

			(2.954)**
Time effect			-0.004 (-3.086)***
\bar{R}^2	0.479	0.164	0.171
N	1827	1827	1827
F-statistic	122.14***	40.74***	48.48***
Durbin-Watson	0.790	0.385	0.395

*** Significant at 1% significance level.

** Significant at 5% significance level.

* Significant at 10% significance level

Table 4 reports the results of the firm-specific, industry-wide and country-wide for the firms characterized by high debt ratio. These results are not as indicative as those for the low debt ratio. The signs of the coefficients present mixed results. The positive coefficients of fixed assets/total assets and non-debt tax shields conform to the assumptions of the trade-off theory. The negative coefficients of growth of total assets, sales growth, profit margin, working capital ratio, and current ratio conform to the assumptions of the pecking order theory. Nevertheless, the positive coefficient of earnings before interest taxes and depreciation/total assets, retained earnings/total assets, quick ratio and cash ratio present contra indications to the premises of the pecking order theory. The negative coefficient of firm's size indicates that the higher debt financing is associated with smaller firm size. The negative coefficient of the free cash flow provides the same indication as shown in the low debt ratio.

Regarding the effects of the industry-wide variables, the positive coefficients of inventory/sales ratios in two industries only (farm products, beer and wine) present the same indication that the prospects of the products markets have positive effects on firms' capital structure. Nevertheless, the negative coefficients of the growth of wholesales inventory and furniture industry provide unexpected results.

Regarding the effects of the country-wide variables, the negative coefficient of inflation indicates that when inflation rises, firms prefer equity financing to avoid the increasing interest burdens on earnings. The positive coefficients of productivity growth and exports provide an indication that an increase in the overall productivity encourages firms to seek debt financing. The positive coefficient of growth of unemployment rate carries the same implications as the low debt ratio. Nevertheless, the negative coefficient of unemployment rate is an unexpected.

The comparative effect of the three groups of variables (firm-specific, industry-wide and country-wide) can be shown by

the coefficients of the speed of adjusting the debt ratio DR_{t-1} to a target ratio DR_t . The results show that the speed of adjustments for the industry-wide and country-wide are very close to each other and are greater than the firm-specific. This result provides solid evidence that firms characterized by high debt ratios are much more influenced by macro variables than firms characterized by low debt ratios. The comparative explanatory powers provide further evidence that the firm-specific variables, that do reflect the assumptions of the theories of capital structure, are associated with the highest explanatory power (0.470, 0.164, and 0.171 respectively).

7 Conclusion

This paper examines the comparative effects of three groups of determinants of capital structure. These effects are also examined in two different levels of debt financing; low debt ratio and high debt ratios. In the case of low debt financing, the results show that the assumptions of the three theories of capital structure are present; the trade-off theory, the pecking order theory, and free cash flow. Regarding the industry-wide variables, the results show quite supportive evidence that the prospects of many products in the industry call for higher debt ratios. Regarding the effects of the country-wide variables, a positive relationship is observed between unemployment rates and debt ratios. This is crucial result that provides evidence and warning signal that the excessive use of debt financing adds to the level of unemployment. The comparative effects of the three groups of variables show that the firm-specific, industry-wide and country-wide variables help firms associated with low debt ratio adjust the observed debt financing to a target level at relatively the same speed.

The explanatory powers provide clear evidence that firms associated with low debt ratio are much more affected by the firm-specific variables (theories of capital structure) than industry-wide and country-wide. Regarding firms associated with high debt ratio, the effects of the theories of capital structure are present relatively as they are in the low debt firm. The results also show that higher debt financing is associated with smaller firm size. The effects of the industry-wide variables are the same as in the case of low debt firms.

Regarding the effects of the country-wide variables, a negative relationship exists between inflation and debt financing. This indicates that when inflation rises, firms prefer equity financing to avoid the increasing interest burdens on earnings. A positive relationship exists as well between debt financing and both of productivity growth, exports and growth of unemployment rate. The comparative effect of the firm-specific, industry-wide and country-wide variables, show that firms characterized by high debt ratios are much more influenced by macro variables than firms characterized by low debt ratios. The comparative explanatory powers provide further evidence that the assumptions of the theories of capital structure have much more significant influence on firms' borrowing decisions in the case of high debt ratios than low debt ratios.

REFERENCES

- Allen, David E. (1993). The pecking order hypothesis: Australian evidence. *Applied Financial Economics*, 3: 101-112.
- Andrade, G. and Kaplan, S. (1998). How costly is financial (not economic) distress? Evidence from Highly leveraged transactions that became distressed. *Journal of Finance*, 53: 1443-1494.
- Ang, James S., Robel A. Cole, and James W. Lin. (2000). Agency costs and ownership structure. *Journal of Finance*, 55: 81-106.
- Antonioni, A., Guney, Y. and Paudyal, K. (2002). Determinants of corporate capital structure: Evidence from European countries. *Working paper*, University of Durham.
- Auerbach, Alan. J. (1985). Real determinants of corporate leverage. *NBER*, no. 616, Chicago: University of Chicago Press, pp.301-322.
- Baskin, J. (1989). An Empirical Investigation of the Pecking Order Hypothesis. *Financial Management*, 18: 26-35.
- Baxter, Nevins D. and John G. Cragg. (1970). Corporate choice among long-term financing instruments. *Review of Economics and Statistics*, 52: 225-235.
- Bevan, A. and Danbolt, J. (2000). Dynamics in the determinants of capital structure in the UK. *Working paper*, University of Glasgow.
- _____ (2002). Capital structure and its determinants in the UK: A decompositional analysis. *Applied Financial Economics*, 12: 159-170.
- Booth, L., Aivazian, V., Demircuc-Kunt, A., and Maksimovic, V. (2001). Capital Structure in Developing Countries. *The Journal of Finance*, 56: 87-130.
- Bosworth, B. (1971). Patterns of corporate external financing. *Brookings Papers on Economic Activity*, 2: 253-279.
- Bradley, M., A. Jarrell and E. Han Kim. (1984). On the existence of an optimal capital structure: Theory and evidence. *Journal of Finance*, 39: 857-880.
- Carleton, W. T. and I. H. Silberman. (1977). Joint determination of rate of return and capital structure: An econometric analysis. *Journal of Finance*, 32: 811-821.
- Castanias, Richard. (1983). Bankruptcy risk and optimal capital structure. *Journal of Finance*, 38: 1617-1635.
- Chen, J. (2004). Determinants of Capital Structure of Chinese-listed companies. *Journal of Business Research*, 57: 1341-1351.
- Chirinko, Robert S. and Singha, Anuja R. (2000). Testing Static Tradeoff against Pecking Order Models of Capital Structure: A Critical Comment. *Journal of Financial Economics*, 58: 417-425.
- Chudson, W. (1945). The Patterns of Corporate Financial Structure. N.Y., *National Bureau of Economic Research*.
- Chung, K. H. (1993). Asset characteristics and corporate debt policy: An empirical test. *Journal of Business Finance and Accounting*, 20: 83-98.
- DeAngelo, Harry and Ronald Masulis. (1980). Optimal capital structure under corporate and personal taxation. *Journal of Financial Economics*, 8: 3-29.
- Donaldson, G. (1961). Corporate debt capacity: A study of corporate debt policy and the determination of corporate debt capacity. Boston: Division of Research, *Harvard School of Business Administration*.
- Easterbrook, F. H. (1984). Two agency-Cost Explanations of Dividends. *American Economic Review*, 74: 650-659.
- Fama, Eugene F. and French, Kenneth R. (2002). Testing tradeoff and pecking order predictions about dividends and debt. *Review of Financial Studies*, 15: 1-33.
- Ferri, M. and W. Jones. (1979). Determinants of financial structure: A new methodological approach. *Journal of Finance*, 34: 631-644.
- Fischer, Edwin O., Robert Heinkel, and Josef Zechner. (1989). Dynamic capital structure choice: Theory and tests. *Journal of Finance*, 44: 19-40.
- Frank, Murray Z. and Goyal, Vidhan K. (2003). Testing the pecking order theory of capital structure. *Journal of Financial Economics*, 67: 217-248.
- Gale, B. (1972). Market share and rate of return. *Review of Economics and Statistics*, 54(4):412-423.
- Ghosh, Arvin, Cai, Francis and Li, Wenhui. (2000). The determinants of capital structure. *American Business Review*, 18: 129-132.
- Graham, John R. and Harvey, Campbell R. 2001. The theory and practice of corporate finance: Evidence from the field. *Journal of Financial Economics*, 60: 187-243.
- Grossman, S. and Oliver Hart. (1982). Corporate financial structure and managerial incentives. In McCall, J. (Ed.), *The economics of information and uncertainty*. Chicago: University of Chicago Press.
- Gupta, M. C. (1969). The effect of size, growth and industry on the financial structure of manufacturing companies. *Journal of Finance*, 24: 517-529.
- Hall, M. and Weiss, L. 1967. Firm Size and Profitability. *Review of Economics and Statistics*, 49(3): 319-322.
- Harris, M. and Artur, R. (1991). The theory of capital structure. *Journal of Finance*, 46: 297-355.
- Haug, S. and Song, F. (2002). The determinants of capital structure: Evidence from China. *Working paper*, The University of Hong Kong.
- Hausman, J. A. 1978. Specification Tests in Econometrics, *Econometrica*, 46(6): 1251-1271.
- Hausman, J. A. and Taylor, William E. (1981). Panel Data and Unobservable Individual Effects, *Econometrica*, 49(6): 1377-1398
- Homaifar, G., J. Zietz and O. Benkato. (1994). An empirical model of capital structure: Some new evidence. *Journal of Business Finance and Accounting*, 21: 1-14.

- Hovakimian, A., Opler, Tim C., and Sheridan Titman. (2001). Debt-equity choice. *Journal of Financial and Quantitative Analysis*, 36: 1-24.
- Jensen, Michael C. and William H. Meckling. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3: 305-360.
- _____. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *American Economic Review*, 76: 323-329.
- John, K. (1987). Risk-shifting incentives and signalling through corporate capital structure. *Journal of Finance*, 42: 623-641.
- Johnston, J. and DiNardo, J. 1997. *Econometric Methods*. 4th edition, Singapore: McGraw-Hill.
- Kester, W. Carl. (1986). Capital and ownership structure: A comparison of United States and Japanese manufacturing corporations. *Financial Management*, 15: 5-16.
- Kim, W. S. and E. H. Sorensen. (1986). Evidence on the impact of the agency costs of debt on corporate debt policy. *Journal of Financial and Quantitative Analysis*, 21: 131-144.
- Lasfer, M. A. (1995). Agency costs, Taxes and Debt. *European Financial Management*, 1: 265-285.
- Long, M. and Malitz, I. (1985). The investment financing nexus: Some empirical evidence. *Midland Corporate Finance Journal*, 3: 53-59.
- Maloney, M. T., R. E. McCormick and M. L. Mitchell. (1993). Managerial decision making and capital structure. *Journal of Business*, 66: 189-217.
- Marsh, P. (1982). The choice between equity and debt: An empirical study. *Journal of Finance*, 37: 121-144.
- Modigliani, Franco and Merton H. Miller. (1958). The cost of capital, corporation finance and the theory of investment. *American Economic Review*, 48: 261-297
- _____. (1963). Corporate income taxes and the cost of capital: A correction. *American Economic Review*, 53: 433-443.
- Moore, W. (1986). Asset composition, bankruptcy costs and the firm's choice of capital structure. *Quarterly Review of Economics and Business*, 26: 51-61.
- Myers, Stewart C. (1977). Determinants of corporate borrowing. *Journal of Financial Economics*, 5: 147-175.
- _____. Brealey, R and Schaefer, S. (1977). Term structure with uncertain inflation. *Journal of Finance*, 32: 277-289.
- _____. (1984). The capital structure puzzle. *Journal of Finance*, 39: 575-592.
- _____. and Nicholas S. Majluf. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13: 187-221.
- _____. (2001). Capital Structure. *Journal of Economics Perspectives*, 15: 81-102.
- Nakamura, A. and Nakamura, M. (1982). On the firm's production, capital structure and demand for debt. *Review of Economics and Statistics*, 64:384-393.
- Noe, Thomas H. 1988. Capital structure and signaling game equilibria. *The Review of Financial Studies*, 1: 331-355.
- Nuri, J. (2000). A study of capital structure in the UK: Hotel and retail industries. *Unpublished Ph.D. thesis*, Surry University.
- Ozkan A. (2001). Determinants of capital structure and adjustment to long-run target: Evidence from UK company panel data. *Journal of Business Finance and Accounting*, 28: 175-198.
- Parrino, W., and Weisbach, M. (1999). Measuring investment distortions arising from stockholder-bondholder conflicts. *Journal of Financial Economics*, 53: 3-42.
- Pinegar, J. Michael and Lisa Wilbricht. (1989). What managers think of capital structure theory: A survey. *Financial Management*, 18: 82-91.
- Prasad, S. J., Green, C. J. and Murinde, V. (2001). Corporate financial structures in developing economies: Evidence from a comparative analysis of Thai and Malay corporations. *Finance and Development Research Program working Paper*, no.35
- Rajan, Raghuram G. and Zingales, Luigi. (1995). What do we know about capital structure? Some evidence from international data. *Journal of Finance*, 50: 1421-1460.
- Ross, Stephen A. (1977). The determination of financial structure: The incentive-signalling approach. *Bell Journal of Economics*, 8: 23-40.
- Scott Jr, David F. 1972. Evidence on the importance of financial structure. *Financial Management*, 1: 45-50.
- _____. and John D. Martin. 1975. Industry influence on financial structure. *Financial Management*, 4: 67-73.
- Scott Jr, James H. (1976). A theory of optimal capital structure. *Bell Journal of Economics*, 7: 33-54.
- Shyam-Sunder, L. and Stewart C. Myers. (1999). Testing static tradeoff against pecking order models of capital structure. *Journal of Financial Economics*, 51: 219-244.
- Schmidt, Reinhard H. (1976). Determinants of corporate debt ratios in Germany. *European Finance Association Proceedings*, Amsterdam: North Holland.
- Schwarz, E. and J. R. Aronson. (1967). Some surrogate evidence in support of the concept of optimal capital structure. *Journal of Finance*, 22: 10-18.
- Smith, Clifford W. and Jerold B. Warner. (1979). Bankruptcy, secured debt, and optimal capital structure: Comments. *Journal of Finance*, 34: 247-251.
- Solnik, Bruno H. and Jean Grall. 1974/5. Eurobonds: Determining the demand for capital and the international interest rate structure. *Journal of Bank Research*, 5: 218-230.
- Stulz, René M. (1990). Managerial discretion and optimal financing policies. *Journal of Financial Economics*, 26: 3-28.
- Taggart Jr., Robert A. (1977). A model of corporate financing decisions. *Journal of Finance*, 32:1467-1484.
- Titman, S.. and Wessels, R. (1988). The determinants of capital structure choice. *Journal of Finance*, 43: 1-19.

- Tong, G. and Green, Christopher J. (2004). Pecking order or trade-off hypothesis? Evidence on the capital structure of Chinese companies. *Working paper*, Loughborough University.
- Toy, N., A. Stonehill, L. Remmers, R. Wright, and T. Beekhuisen. (1974). A comparative international study of growth, profitability, and risk as determinants of corporate debt ratios in the manufacturing sector. *Journal of Financial and Quantitative Analysis*, 9: 875-886.
- Um, T. (2001). Determination of capital structure and prediction of bankruptcy in Korea. *Unpublished Ph.D.*, Cornell University.
- Van Horne, J. C. (1977). *Financial Management and Policy*. 4th Edition. Englewood Cliffs, N.J.: Prentice Hall.
- Warner, J. (1977). Bankruptcy costs: Some evidence. *Journal of Finance*, 32: 337-347.
- White, W. L. 1974. Debt management and the form of business financing. *Journal of Finance*, 29:565-577.
- White, R. W. and S. M. Turnbull. (1974). The probability of bankruptcy for American Industrial firms. *Working paper IFA-4-74*, London Graduate School of Business Studies, UK.
- Whited, T. (1992). Debt, liquidity constraints, and corporate investment: Evidence from panel data. *Journal of Finance*, 47: 1425-1460.
- Wiwattanakatang, Y. (1999). An empirical study on the determinants of the capital structure of Thai firms. *Pacific-Basin Finance Journal*, 7: 371-403.

Appendix

	Manufacturing Output% Chg	T-Bills	Unemployment Rate	Growth Unemployment Rate	Exports	Imports	Growth Exports
Mean	0.01444	0.03359	0.05459	0.00546	200633.07	317396.89	0.03606
Standard Error	0.00069	0.00021	0.00015	0.00061	626.40	1296.59	0.00000
Median	0.02400	0.03870	0.05267	0.00000	182752.00	302440.00	0.03606
Mode	0.02400	0.04950	0.05100	0.00000	205369.80	371603.00	0.03606
Standard Deviation	0.05892	0.01804	0.01261	0.05215	53782.67	111325.93	0.00000
Sample Variance	0.00347	0.00033	0.00016	0.00272	2892575510	12393461684	0.00000
Kurtosis	2.99	-1.27	3.79	1.66	-0.05	-0.88	-2.00
Skewness	-1.44	-0.36	1.81	1.04	0.78	0.37	-1.00
Range	0.31800	0.06080	0.05967	0.26707	230773.50	424121.00	0.00000
Minimum	-0.20900	0.00030	0.03933	-0.10318	110926.50	132307.00	0.03606
Maximum	0.10900	0.06110	0.09900	0.16389	341700.00	556428.00	0.03606
Sum	106.44	247.60	402.46	40.24	1479066969.70	2339849865.10	265.82
Count	7372	7372	7372	7372	7372	7372	7372

Descriptive Statistics of the variables examined in this paper.

	Debt Ratio	Debt Ratio (t-1)	Inflation	Growth Inflation	Growth GDP	Growth GNP	Productivity Growth
Mean	0.49838	0.49747	0.02538	-0.34623	0.01160	0.01171	0.04243
Standard Error	0.00484	0.00483	0.00014	0.03609	0.00008	0.00009	0.00055
Median	0.45991	0.45848	0.02720	-0.02847	0.01200	0.01238	0.04700
Mode	1.00000	1.00000	0.03660	0.30568	0.01451	0.01532	0.04700
Standard Deviation	0.41580	0.41456	0.01177	3.09835	0.00698	0.00744	0.04717
Sample Variance	0.17289	0.17186	0.00014	9.59975	0.00005	0.00006	0.00222
Kurtosis	414.61	418.67	3.24	61.88	5.76	8.20	1.72
Skewness	13.33	13.37	-1.07	-7.93	-1.75	-2.14	-1.14
Range	16.11670	16.11670	0.07700	27.50450	0.04486	0.05029	0.25900
Minimum	0.00000	0.00000	-0.02100	-25.66667	-0.02048	-0.02565	-0.13000
Maximum	16.11670	16.11670	0.05600	1.83784	0.02438	0.02464	0.12900
Sum	3674.02	3667.34	187.12	-2552.40	85.52	86.36	312.78
Count	7372	7372	7372	7372	7372	7372	7372

	Growth Imports	Retail Inventory/Sales	Growth Retail Inventory	Growth Retail Sales	Retail Motor vehicle and parts dealers	Retail Furniture, home furn, electronics, and appliance stores	Retail Building materials, garden equip. and supplies dealers
Mean	0.01634	0.01578	0.00738	0.01016	0.01948	0.01789	0.01760
Standard Error	0.00000	0.00001	0.00018	0.00018	0.00002	0.00001	0.00001
Median	0.01634	0.01577	0.00936	0.01152	0.01912	0.01747	0.01760
Mode	0.01634	0.01573	0.02667	0.00963	0.02192	0.01720	0.01590
Standard Deviation	0.00000	0.00074	0.01528	0.01584	0.00193	0.00101	0.00101
Sample Variance	0.00000	0.00000	0.00023	0.00025	0.00000	0.00000	0.00000
Kurtosis	-2.00	-0.77	3.33	15.22	1.47	-0.62	-0.27
Skewness	1.00	-0.01	-1.70	-2.98	1.03	0.96	0.11
Range	0.00000	0.00360	0.08158	0.11875	0.01028	0.00321	0.00460
Minimum	0.01634	0.01367	-0.04902	-0.08313	0.01603	0.01673	0.01547
Maximum	0.01634	0.01727	0.03256	0.03562	0.02630	0.01993	0.02007

	Sum	120.45	116.33	54.41	74.92	143.63	131.90	129.76
	Metals & Minerals, Except Petroleum	Electrical & Electronic Goods	Hardware, & Plumbing & Heating Equipment & Supplies	Machinery, Equipment, & Supplies	Miscellaneous Durable Goods	Nondurable Goods	Paper Products	

Count	7372	7372	7372	7372	7372	7372	7372	7372
-------	------	------	------	------	------	------	------	------

	Retail Food and beverage stores	Retail Clothing and clothing access. stores	Retail General merchandise stores	Retail Department stores (excl. L.D.)	Wholesalers (Inventories/Sales)	Growth Sales Wholesalers	Growth Inventories Wholesalers
Mean	0.00838	0.02581	0.01880	0.02236	1.25156	0.01137	0.01003
Standard Error	0.00000	0.00001	0.00003	0.00002	0.00070	0.00031	0.00019
Median	0.00850	0.02577	0.01783	0.02153	1.25977	0.01607	0.01320
Mode	0.00870	0.02550	0.01670	0.02083	1.18396	0.01620	0.03369
Standard Deviation	0.00040	0.00074	0.00295	0.00173	0.05973	0.02654	0.01663
Sample Variance	0.00000	0.00000	0.00001	0.00000	0.00357	0.00070	0.00028
Kurtosis	-1.37	0.00	-1.28	-1.05	-0.94	16.78	3.06
Skewness	-0.39	0.51	0.36	0.61	-0.05	-3.61	-1.67
Range	0.00133	0.00360	0.00990	0.00600	0.26062	0.18468	0.08069
Minimum	0.00767	0.02410	0.01413	0.02007	1.14370	-0.14108	-0.04701
Maximum	0.00900	0.02770	0.02403	0.02606	1.40432	0.04360	0.03369
Sum	61.77	190.26	138.61	164.87	9226.49	83.84	73.92
Count	7372	7372	7372	7372	7372	7372	7372

	Total Merchant Wholesalers, Except Manufacturers' Sales Branches and Offices	Durable Goods	Motor Vehicle & Motor Vehicle Parts & Supplies	Furniture & Home Furnishings	Lumber & Other Construction Materials	Professional & Commercial Equipment & Supplies	Computer & Software
Mean	1.25166	1.57116	1.52095	1.49816	1.23861	1.15758	0.80535
Standard Error	0.00070	0.00095	0.00171	0.00114	0.00154	0.00153	0.00112
Median	1.25977	1.56432	1.46881	1.46304	1.18843	1.10426	0.76980
Mode	1.18396	1.47765	1.46782	1.41902	1.22527	1.02859	0.75087
Standard Deviation	0.05969	0.08124	0.14649	0.09722	0.13186	0.13076	0.09622
Sample Variance	0.00356	0.00660	0.02146	0.00945	0.01739	0.01710	0.00926
Kurtosis	-0.94	5.76	5.96	0.22	1.56	-1.11	1.43
Skewness	-0.06	1.99	2.11	1.05	1.45	0.53	1.46
Range	0.26062	0.48598	0.82989	0.40302	0.60831	0.54124	0.42344
Minimum	1.14370	1.43548	1.31985	1.34402	1.07515	0.95475	0.65245
Maximum	1.40432	1.92146	2.14974	1.74704	1.68346	1.49599	1.07589
Sum	9174.69	11516.57	11148.54	10981.51	9079.04	8485.04	5903.25
Count	7330	7330	7330	7330	7330	7330	7330

Mean	1.77546	1.36775	1.88248	2.34769	1.42814	0.92334	0.96979
Standard Error	0.00266	0.00123	0.00118	0.00242	0.00171	0.00067	0.00064
Median	1.74714	1.36582	1.85808	2.30961	1.42724	0.93583	0.96654
Mode	1.62088	1.25588	1.83250	2.24842	1.39324	0.87969	0.90129
Standard Deviation	0.22760	0.10528	0.10140	0.20721	0.14649	0.05737	0.05444
Sample Variance	0.05180	0.01108	0.01028	0.04294	0.02146	0.00329	0.00296
Kurtosis	5.97	-0.32	3.10	1.35	0.57	-1.11	-0.27
Skewness	2.20	0.45	1.66	1.08	0.71	-0.42	0.15
Range	1.22765	0.52762	0.52653	0.94548	0.75009	0.20008	0.29618
Minimum	1.49316	1.18273	1.74937	2.06532	1.12922	0.80422	0.84525
Maximum	2.72080	1.71035	2.27590	3.01080	1.87931	1.00430	1.14143
Sum	13014.16	10025.60	13798.57	17208.59	10468.25	6768.11	7108.60
Count	7330	7330	7330	7330	7330	7330	7330

	Drugs & Druggists' Sundries	Apparel, Piece Goods, & Notions	Grocery & Related Products	Farm Product Raw Materials	Chemicals & Allied Products	Petroleum & Petroleum Products	Alcoholic Beverages
Mean	1.30624	1.77096	0.64607	1.03483	1.12904	0.34821	1.15858
Standard Error	0.00260	0.00187	0.00051	0.00141	0.00074	0.00061	0.00072
Median	1.39226	1.74975	0.64352	1.05692	1.12880	0.34320	1.14232
Mode	1.26479	1.59064	0.59650	0.98939	1.02143	0.30609	1.10471
Standard Deviation	0.22290	0.16037	0.04365	0.12060	0.06346	0.05235	0.06153
Sample Variance	0.04968	0.02572	0.00191	0.01454	0.00403	0.00274	0.00379
Kurtosis	-1.11	0.36	-0.72	-0.42	-0.01	-0.59	-0.41
Skewness	-0.32	0.87	0.35	-0.46	0.41	0.20	0.74
Range	0.78702	0.70565	0.20685	0.51061	0.29951	0.22266	0.24130
Minimum	0.93116	1.55002	0.57513	0.73990	1.02143	0.24824	1.07248
Maximum	1.71818	2.25567	0.78198	1.25051	1.32094	0.47090	1.31378
Sum	9574.77	12981.11	4735.68	7585.34	8275.83	2552.38	8492.37
Count	7330	7330	7330	7330	7330	7330	7330

	Miscellaneous Nondurable Goods	Fixed assets/total assets	Dep/ Assets	Non debt tax shield/total assets	Tax Rate	Bankruptcy Risk	DCR
Mean	1.16299	0.57565	0.01344	0.01202	1.01126	-9.98285	122
Standard Error	0.00082	0.01026	0.00204	0.00231	0.27834	0.31915	52.23522
Median	1.15268	0.44593	0.00819	0.00000	0.32168	-5.20982	0.00000
Mode	1.07906	1.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Standard Deviation	0.07034	0.88124	0.17538	0.19824	23.89878	27.40207	4485
Sample Variance	0.00495	0.77659	0.03076	0.03930	571	751	20114636
Kurtosis	1.21	154.48	5800.49	3706.42	2236.60	177.38	3559.71
Skewness	1.11	9.45	73.78	-41.92	43.90	-1.98	-46.67
Range	0.32933	23.49076	14.33792	21.45253	1621	1335	419966
Minimum	1.05684	0.00000	-0.18607	-14.05311	-189	-728	-318457
Maximum	1.38616	23.49076	14.15185	7.39942	1432	607	101509
Sum	8524.71	4243.70	99.05	88.59	7454.99	-73593.60	901471
Count	7330	7372	7372	7372	7372	7372	7372
	Capital expenditure/total assets	Growth of total assets	Sales Growth	ASTURN	Market-to-book	Size (ln A)	Earnings before interest, tax and depreciation/total assets
Mean	-67	0.04686	0.04585	0.29544	8.43559	21.99787	0.05273
Standard Error	67	0.00344	0.00388	0.00345	2.25267	0.02826	0.00151
Median	0.00752	0.02722	0.04087	0.21720	3.51258	21.81958	0.04933
Mode	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

	Operating Income/Sales	Operating Income/Assets	Profit Margin	return on Investments	return on equity	Retained Earnings/Total assets	Quick Ratio
Mean	-14.07	0.03941	-14.60064	0.01313	-0.38165	-0.06564	5.36904
Standard Error	9.16728	0.00255	9.45242	0.00229	0.37060	0.00697	1.22430
Median	0.16316	0.03957	0.08496	0.02138	0.04438	0.01429	1.57201
Mode	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Standard Deviation	787.11	0.21895	811.59	0.19626	31.81946	0.59850	105.12
Sample Variance	619535.40	0.04794	658674.56	0.03852	1012.48	0.35820	11050.00
Kurtosis	5475.14	2588.73	5658.24	3658.75	7164.46	236.23	1126.62
Skewness	-71.65	-33.97	-72.83	-53.02	-84.16	-12.52	31.84
Range	62491.20	21.53316	65071.17	16.94958	2746.13	19.19117	5467.40
Minimum	-62391.00	-14.11	-64982.00	-14.05352	-2712.50	-16.29511	-1163.82
Maximum	100.20	7.41905	89.17123	2.89607	33.62565	2.89607	4303.57
Sum	-103742.67	290.52	107635.93	96.76	-2813.55	-483.93	39580.59
Count	7372	7372	7372	7372	7372	7372	7372

Standard Deviation	5725	0.29510	0.33291	0.29649	193	2.42610	0.13004
Sample Variance	32776685	0.08708	0.11083	0.08791	37409	5.88595	0.01691
Kurtosis	7372.00	703.48	157.24	131.58	3808.43	19.57	1483.81
Skewness	-85.86	-14.63	3.78	6.52	-48.53	-2.27	20.90
Range	491563	17.08546	14.96702	9.37739	17159	32.36267	10.82974
Minimum	-491558	-14	-4.83480	0.00000	-14029	0.00000	-3.40504
Maximum	4.68890	3.30845	10.13222	9.37739	3129	32.36267	7.42470
Sum	-491644	345.48	338.04	2178.01	62187.19	162168	388.75
Count	7372	7372	7372	7372	7372	7372	7372

	Working Capital Ratio	Cash Ratio	Current ratio	Price-to-earnings	Expense Ratio	Asset Utilization Ratio	Free Cash Flow
Mean	0.29916	0.15897	8.26338	194.96	15.08415	0.29544	2253264563
Standard Error	0.00398	0.00243	1.72070	53.99151	9.16728	0.00345	1591261813
Median	0.25280	0.09771	1.94784	70.27549	0.83782	0.21720	25829500
Mode	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Standard Deviation	0.34203	0.20848	147.74	4635.73	787.11	0.29649	136626298941
Sample Variance	0.11698	0.04347	21827.01	21489990	619535.30	0.08791	186667
Kurtosis	24.17	33.31	1174.40	5690.82	5475.14	131.58	7333.12
Skewness	2.55	4.54	33.07	71.95	71.65	6.52	85.52
Range	7.34078	2.56016	6143.72	389499.53	62491.18	9.37739	11874052102000
Minimum	-2.50311	0.00000	-0.22287	-16658.60	-99.18	0.00000	-158099000000
Maximum	4.83767	2.56016	6143.50	372840.93	62392.00	9.37739	11715953102000
Sum	2205.37	1171.92	60917.65	1437280.15	111200.39	2178.01	16611066361482
Count	7372	7372	7372	7372	7372	7372	7372

Session B (Salon C&D, Munich Marriott Hotel)

“Credit Default Swaps and the Financial Stability”

Jamal Mattar (HEC Management School, University of Liege, Belgium)

Danielle Sougne (HEC Management School, University of Liege, Belgium)

The rapid growth of credit derivatives market has evoked an ongoing debate on its consequences for financial stability. Some have argued that they are desirable because they improve the diversification of risk and they increase the liquidity in the financial markets. On the other hand, others have indicated that there would be risks involved in credit risk transfer such as erroneous ex-ante of risk/return profiles, a high concentration of intermediary services on only a small number of market participants, asymmetric information, and the possibility of using regulatory arbitrage. These risks may be undesirable especially when they increase the possibility of financial crises.

Using a model with banking, insurance and hedging fund sectors, we will analyze in a theoretical way the consequences of Credit Default Swaps as a main credit risk transfer instrument on the financial stability. We will show that in a boom or in times characterized by a moderate economic up-or downturn, the CDSs could be beneficial for the financial system as they increase the liquidity. However, in a recession period time they can contribute to systemic risk through counterparty risk and contagion impact by the default of other institutions. The main message in this paper is to demonstrate that excessive risk taken by one reckless institution may spread to the entire financial system via the CDSs market.

KEYWORDS: Credit Default Swaps, counterparty risk, contagion impact, financial stability.

Modeling the Reaction of Stock Market Investors toward Trade-Based Manipulation

Dezsi Diana, Ph.D. Candidate (Bucharest University of Economics, Romania)

Prof. Scarlat Emil, Ph.D. (Bucharest University of Economics, Romania)

Abstract

This paper considers stock market manipulation as a strategic signaling game with asymmetric information, between the truthful investor and the large trader who possesses market power and can manipulate the market price. Market manipulation can be conducted through transactions or orders to trade, which give false or misleading signals as to the supply or demand for a stock price, which secure the price of the financial instruments at an artificial level. We develop a model which involves a single asset and two players, the truthful investor and a large trader, which maximize the expected utility of their final wealth. We also analyze how truthful investors react to the possibility of a price manipulation, given their beliefs regarding the probability for a large trader to be a manipulator. We can then decide if a regulatory intervention is welcomed and in what circumstances.

Key Words: trade-based manipulation, signaling game, stock market

Introduction

Since the effects of the crisis have started to mirror on the stock market, many politicians and business commentators argued that investors were abandoning the stock market because they had lost their confidence in regulators' ability to come up with solutions to the economic problems (Guiso et al. 2008). In spite of the popularity of this interpretation, the finance literature has thus far ignored the role of trust in explaining stock market participation and portfolio choices. This paper tries to fill this gap. We show that, in theory, lack of trust can explain why individuals do not participate in the stock market.

In a new CNBC/Associated Press poll, conducted between August 26 and September 8, 2010, 86% of the 1,035 respondents view the market as unfair to small investors, while they consider that the market is fair to big investment banks, hedge funds and professional traders. Half the questioned investors have little or no confidence in the ability of regulators to make the market fair for all investors, while only 8% reported a [high](#) level of confidence in regulators. The firms which use high powered computers to send rapid buy and sell orders, have said they provide liquidity to the market place, generating 56% of market volume, while individuals account for only 11% of the volume in a market that has seen trading volume continually shrinking (Domm 2010).

According to the Directive 2003/6/EC of the European Parliament and of the Council of the European Union on insider dealing and market manipulation, the market abuse takes the form of insider dealing and market manipulation. Inside information means information which has not been made public, relating to one or more issuers of financial instruments or to one or more financial instruments and which, if it were made public, would have a significant effect on the prices of those financial instruments. Market manipulation can be conducted through transactions or orders to trade, which give false or misleading signals as to the supply or demand for a price of financial instruments, which secure the price of the financial instruments at an artificial level. Market manipulation can also be conducted by the dissemination of information or rumors through the media (especially the Internet) which gives false or misleading signals as to the financial instruments, where the person who made the dissemination knew that the information was false or misleading. Therefore, large block trades can influence prices by purchasing a large volume of financial instruments, a trader can drive the price up, and profit on the back of the price increase (Aggarwal&Wu 2006). Note that in this paper, we refer only to the regulated market and to the manipulation driven by transactions, not by rumours.

The examples of market manipulation derived from the behaviour exposed above are the securing of a dominant position over the supply or demand for a financial instrument, the buying or selling of financial instruments at the close of the market with the effect of misleading investors acting on the basis of closing prices, or using the access to media by expressing an opinion about a financial instrument, while having previously taking position on that financial instrument and gaining from the impact of the opinions expressed on the price of the instrument.

The recently financial and technical developments increase the incentives, means and opportunities for market manipulation through new types of financial instruments, new technologies, increasing cross-border activities and the Internet through which rumours are widely spread in a very short period of time.

Potentially manipulators are corporate insiders, brokers, large shareholders and market makers, while illiquid stocks are more likely to be manipulated and manipulation increases stock volatility (Aggarwal&Wu 2003). An investor, especially an informed trader, has to balance the short term profit from the trade with the long term effect his trade has on the beliefs of the market and on future profits, thus a strategy is manipulative if it involves the large trader undertaking a trade in any period which gives him strictly negative short term profit in order to manipulate the beliefs of the market regarding his private information, enabling him to recoup the short term losses and to gain more in the future (Chakraborty&Yilmaz 2004).

Market Manipulation Literature Review

Market manipulation is an issue that is almost as old as the earliest speculative market, as cases of “pump and dump” strategies have been reported since the beginning of the 17th century on the Amsterdam Stock Exchange. Evidence of manipulation has been found in many emerging markets, as well as in the U.S.A. market, Aggarwal and Wu (2003) documenting hundreds of cases of price manipulation in the US market in the 1990s. The classification of Allen and Gale (1992) regarding manipulation into three categories: information-based manipulation, action-based manipulation, and trade-based manipulation, has been widely recognized and used by the literature in this field.

Information-based manipulation is undertaken by releasing false information or spreading misleading rumors, recent examples in this case being Enron and Worldcom in 2001. The most important paper related to this type of manipulation was developed by Van Bommel (2003) who shows the role of rumors in facilitating price manipulation. In this case, opportunistic individuals such as corporate officers, financial journalists, or “gurus”, can manipulate the market, although their manipulation power is limited in the long run by investors’ constant reassessment of their credibility. Vila (1989) presents an example of information-based manipulation where the manipulator shorts the stock, release false information, and then buys back the stock at a lower price. Benabou and Laroque (1992) also study information-based manipulation, showing that if a person has privileged information about a stock and his statements are viewed as credible by investors, he can profitably manipulate the stock price by making misleading announcements and trading. Action-based manipulation is based on actions, rather than trading, that change the actual or perceived value of the asset. Bagnoli and Lipman (1996) investigate action-based manipulation using take-over bids. In their model, a manipulator acquires stock in a firm and then announces a take-over bid. This leads to a price run up of the firm’s stock. The manipulator therefore is able to sell his stock at the higher price. Of course, the bid is dropped eventually. Vila (1989) also presents a case where a manipulator pools with somebody who is purchasing stock prior to a takeover bid in which the value of the firm will be increased.

Trade-based manipulation occurs when a trader attempts to manipulate a stock simply by buying and then selling, without taking any publicly observable actions to alter the value of the firm or releasing false information to change the price, and it is much more difficult to eradicate than information-based and action-based manipulation. Jarrow (1992) showed that, under certain conditions, profitable manipulation is impossible in an efficient market, also showing that profitable speculation is possible if there is price momentum, so that an increase in price caused by the speculator’s trade at one date tends to increase prices at future dates, and also that profitable manipulation is possible if the speculator can corner the market. The author uses investors’ demand functions as exogenous, rather than being derived from expected-utility-maximization behavior, therefore it is not clear whether manipulation is consistent with rationality, while Allen and Gale (1992) developed a model with asymmetric information where all agents have rational expectations and maximize expected utility, showing that it is possible for an uninformed manipulator to make a profit, even though there is no price momentum and no possibility of a corner, provided investors attach a positive probability to the manipulator being an informed trader, as investors are uncertain whether a large trader who buys the share does so because he knows it is undervalued, because he might expect future announcements that will affect the value of the stock, because he might intend to control the company, or because he intends to manipulate the price. Kumar and Seppi (1992) developed a model of trade-based manipulation, in which the manipulator initially takes a position in the futures market when it is known that everybody is uninformed, and then pools with an informed trader on his trades in the stock market and influences the stock price, gaining more on the futures market than the loss registered in the spot market.

Types of manipulation	Some Examples
Information-based manipulation	<i>Pump and Dump with rumors</i> - spreading of false rumors <i>Trading pools</i> – buy stock, spread favorable rumors, sell stock
Action-based manipulation	<i>Actions taken by managers</i> – that change the actual or perceived value of the assets of the firm; purchase a stock before a takeover bid to increase the value of the corporation
Trade-based manipulation	<i>Pump and Dump</i> – large buy, price rise, sell stock at a higher price <i>Bear raids</i> – large selling, price falls, buy back stock at a lower price <i>Corners</i> – corner the supply of stock in order to inflate the price, it happens when the speculator controls the supply of the securities <i>Squeezes</i> – takes place when the large trader calls in the short sellers to return securities they have sold short <i>Wash sale</i> – a group of traders trade among themselves to create an upward trend

Tabel 1. Examples of Stock Market Manipulation

The empirical characteristics of trade-based manipulation and how to detect and evaluate it are poorly understood, as price manipulation is illegal and represents a sensitive issue for the stock exchange markets and for the regulators, therefore making very difficult to obtain the necessary data. Manipulation is difficult to detect and can be more difficult to prosecute.

The hereto paper considers only trade-based manipulation in which the manipulator simply buys and sells the stock without taking a position in other markets. The stock market manipulation is seen as a strategic signaling game with asymmetric information, between the truthful investor and the large trader who possesses market power and can manipulate the market price. We develop a model which involves a single asset and two players, the truthful investor and a large trader, which maximize the expected utility of their final wealth. We also analyze how truthful investors react to the possibility of a price manipulation, given their beliefs regarding the probability for a large trader to be a manipulator. We can then decide if a regulatory intervention is welcomed and in what circumstances. Understanding trade-based manipulation and being able to detect and measure it is of great importance to stock exchange markets and regulators around the world.

Signaling Game review

A signaling game is a dynamic game of incomplete information involving two players, in which *Nature* selects a game to be played according to a commonly known distribution, in which the *first player* is informed of that choice and sends a message (sender), and the *second player* receives the message from the large trader (receiver) and chooses an action without knowing *Nature's* choice. The informed player's strategy set consists of signals contingent on information and the uninformed player's strategy set consists of actions contingent on signals. More generally, a signaling game includes any strategic setting in which players can use the actions of their opponents to make inferences about hidden information. An interesting property of signaling games is that although sender has privileged information, it may not always be to his advantage to exploit it, because by exploiting the advantage, he is actually telling to the receiver what game is being played and therefore losing his advantage. Thus, in some cases, the sender can receive a higher payoff by ignoring his information. The earliest work on signaling games was Spence's model of educational signaling and Zahari's model of signaling by animals. During the 1980s researchers developed the formal model and identified conditions that permitted the selection of unique equilibrium outcomes in leading models (Sobel). The three most important applications in the signaling games have been that of Spence (1973) which modeled job-market signaling, Myers and Majluf's (1984) model of corporate investment and capital structure and Vickers's (1986) model of monetary policy. It is well known that signaling games typically admit a large multiplicity of Bayesian equilibrium, as proven by Laffont and Maskin (1989). Signaling games have proved to be very important to recent work in theoretical microeconomics, and can model the current setting from this paper as a Bayesian game between a large trader and an investor, in which *Nature* chooses the type of the large trader, namely a *manipulator* or *not a manipulator*.

We proceed as follows. In Section 1, we describe the notions regarding the signaling game, while in Section 2 we present the model with two types of traders (investors and large traders) and three-period asset market. Section 3 discusses possible Perfect Bayesian Equilibrium in which profitable trade-based manipulation occurs. A numerical example is presented in Section 4, and a discussion of the model and results is revealed in Section 5, while concluding remarks can be found in Section 6.

1. The Model

Our objective in this article is to analyze how truthful investors react to the possibility of a price manipulation, given their beliefs regarding the probability for a large trader to be a manipulator. In order to do this, we develop a model with asymmetric information where both agents have rational expectations and maximize expected utility. Also, we work in a finite horizon framework, ruling out bubbles formation.

Although the model is not intended to be a realistic description of an actual stock market, it provides a possible scenario for stock price manipulation, as it involves substantial amount of incomplete information about the opponent's payoff. In this model, two types of traders exist. The first type of trader is represented by a *large trader*, which could be a single trader or a coalition of traders acting in a concerted manner. A large trader is one whose trades change prices, because of size or because the other investors on the market believe that the large trader is informed. The assumption that the manipulator is a large trader is conventional in the literature on trade-based manipulation, because otherwise he could not affect the demand or supply curves of the market, therefore the market price. In order to move the market with strategic trading, the manipulator must have the power to influence the price, see Jarrow (1992) and Allen and Gale (1992). The second type of trader is a truthful investor.

All traders maximize the expected utility of their final wealth. In the case of large traders, this means wealth at moment 2 or at moment 3, depending on their message. The large trader is risk neutral, while the investor is risk averse and his risk preferences are represented by a von Neumann-Morgenstern utility function U , continuously differentiable, strictly increasing, and strictly concave. The large trader enters the market at moment 1, purchasing shares, while at moment 2 he will signal his type by choosing from selling the shares or not. The increase in the price is limited by the possibility that the large trader is a manipulator.

1.1. The timing of the game

The timing of the game is as follows:

- at **moment 1** the large trader acquires a significant amount of stock, influencing the price
 - nature draws a type for the large trader from a set of feasible types $T=\{t_B$ (*bad large trader: manipulator*), t_G (*good large trader: not a manipulator*), according to a probability distribution π representing the probability that a large trader to be a manipulator, and $1-\pi$ representing the probability that the large trader not to be a manipulator
 - at **moment 2** the large trader observes his type and then chooses a message $m_j=\{m_B$ (*sells at mom 2*), m_G (*does not sell at moment 2*)
 - when the investor chooses an action q in response to the message m , he does so on the basis of a posterior probability assessment $\mu(t_i | m_j)$ over the set T of types of large trader who might have sent the message $\sum_{t \in T} \mu(t_i | m_j) = 1$
- In order to simplify the notation, the probabilities will be marked as follows:

$\mu(t_i | m_j)$	Represents
$\mu(t_B | m_B) = \gamma$	The investor believes that the large trader which chose to sell at moment 2 is a manipulator
$\mu(t_G | m_B) = 1 - \gamma$	The investor believes that the large trader which chose to sell at moment 2 is not a manipulator
$\mu(t_B | m_G) = \delta$	The investor believes that the large trader which chose not to sell at moment 2 is a manipulator
$\mu(t_G | m_G) = 1 - \delta$	The investor believes that the large trader which chose not to sell at moment 2 is not a manipulator

- the investor observes the message, but not the type of the large investor, and then chooses an action $q_I = \{q_H, q_L\}$ which represents the buy order of the investor
- payoffs are given by $U_I(t_i, m_j, q_I)$ and $U_{LT}(t_i, m_j, q_I)$; they are computed at **moment 3**, when the true value of the stock is revealed $P_3 = \{v_H, v_L\}$, $v_H > v_L$

1.2. The extensive form of the signaling game

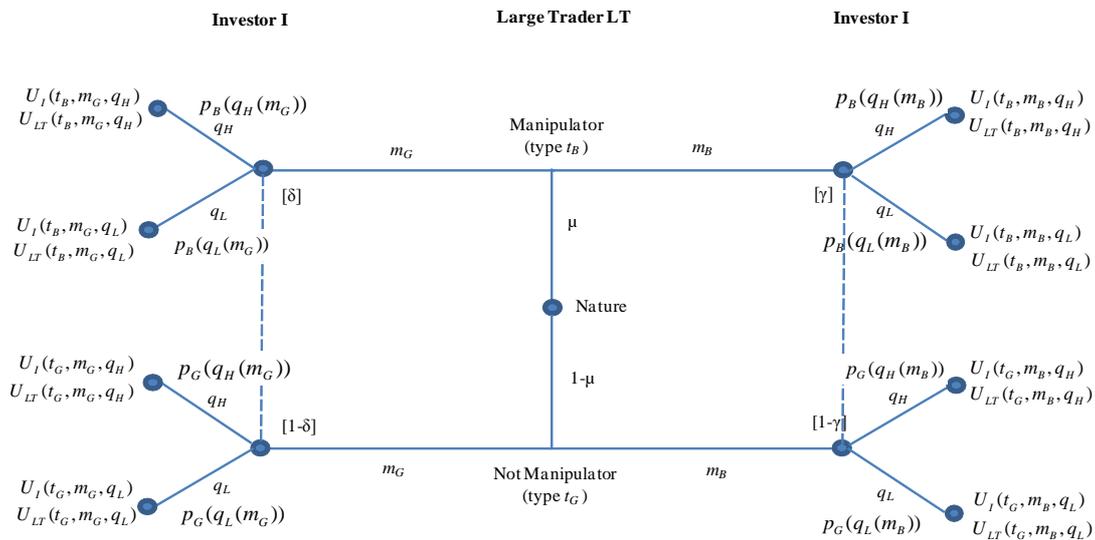


Figure 1. Signaling game in extensive form

2. Perfect Bayesian Equilibrium in the signaling game

There are four possible pure-strategy perfect Bayesian equilibria, which are:

The large trader's pure-strategies:

LT strategy 1: Play m_B if nature draws t_B and play m_B if nature draws t_G (pooling on m_B)

LT strategy 2: Play m_B if nature draws t_B and play m_G if nature draws t_G (separation)

LT strategy 3: Play m_G if nature draws t_B and play m_B if nature draws t_G (separation)

LT strategy 4: Play m_G if nature draws t_B and play m_G if nature draws t_G (pooling on m_G)

The investor's response:

I strategy 1: Play q_H if the LT chooses m_B and play q_H if LT chooses m_G

I strategy 2: Play q_H if the LT chooses m_B and play q_L if LT chooses m_G

I strategy 3: Play q_L if the LT chooses m_B and play q_H if LT chooses m_G

I strategy 4: Play q_L if the LT chooses m_B and play q_L if LT chooses m_G

The first and fourth strategies are called *pooling strategies* because each type send the same message, and the second and third *separating strategies* because each type sends a different message. If the large trader's strategy is pooling or separating then the equilibrium is called pooling or separating, respectively.

Signaling requirement 1: After observing a message m_j from M, the investor must have a belief about which types could

have sent m_j . We denote this belief by the probability distribution $\mu(t_i | m_j) \geq 0$ and $\sum_{t_i \in T} \mu(t_i | m_j) = 1$

Signaling requirement 2: For each message m_j , the investor's action $q^*(m_j)$ must maximize the investor's expected utility, given the belief $\mu(t_i | m_j)$ about which type could have sent m_j . Therefore, the best response of the investor if he

has posterior assessment $\mu(t_i | m_j)$, is $q^*(m_j)$ which solves:

$$q^*(m_j) = \arg \max_{q_i} \sum_{t_i \in T} U_i(t_i, m_j, q_i) \mu(t_i | m_j)$$

For each t_i in T , the large trader's message $m^*(t_i)$ must maximize the large trader's utility, given the investor's strategy $q^*(m_j)$, therefore $m^*(t_i)$ solves

$$m^*(t_i) = \arg \max_{m_j \in M} U_{LT}(t_i, m_j, q^*(m_j))$$

Signaling requirement 3: Given the large trader's strategy $m^*(t_i)$, for each m_j in M, if there exists t_i in T such that

$m^*(t_i) = m_j$ then the investor's belief at the information set corresponding to m_j must follow from Bayes' rule and the large trader's strategy:

$$\mu(t_i | m_j) = \frac{\mu(t_i)}{\sum_{t_i \in T} \mu(t_i)}$$

A pure-strategy perfect Bayesian equilibrium in a signaling game is a pair of strategies $m^*(t_i)$ and $q^*(m_j)$ and a belief $\mu(t_i | m_j)$ satisfying the *Signaling Requirements* mentioned above. Note that a pure strategy for the large trader is a function $m(t)$ specifying which message will be chosen for each type that nature might draw, and a pure strategy for the investor is a function $q(m)$ specifying which action will be chosen for each message that the large trader might send.

$$\text{Equilibrium for the investor: } \max_{q_i(m_j)} U_i(t_i, m_j, q_i) = \max_{q_i(m_j)} \left\{ \sum_{t_i \in T} [p_3 - p_t(q_i(m_j))] q_i(m_j) \mu(t_i | m_j) \right\}$$

a) When he sees the **message m_B** :

- **If his response is q_H** then his utility function is:

$$U(t_i, m_B, q_H) = q_H(m_B) \{ p_3 - [p_G(q_H(m_B))(1 - \gamma) + p_B(q_H(m_B))\gamma] \}$$

- **If his response is q_L** then his utility function is:

$$U(t_i, m_B, q_L) = q_L(m_B) \{ p_3 - [p_G(q_L(m_B))(1 - \gamma) + p_B(q_L(m_B))\gamma] \}$$

b) When he sees the **message m_G** :

- **If his response is q_H** then his utility function is:

$$U(t_i, m_G, q_H) = q_H(m_G) \{ p_3 - [p_G(q_H(m_G))(1 - \delta) + p_B(q_H(m_G))\delta] \}$$

- If his response is q_L than his utility function is:

$$U(t_i, m_G, q_L) = q_L(m_G) \{ p_3 - [p_G(q_L(m_G))(1 - \delta) + p_B(q_L(m_G))\delta] \}$$

Equilibrium for the large trader:

$$\max_{m_j} U_{LT}(t_i, m_j, q_i^*(m_j)) = \max_{m_j} \{ [p_i(q_i^*(m_j) - p_1)] \cdot q_i^*(m_j) + [p_3 - p_1] \cdot [q_1 - q_i^*(m_j)] \}$$

If the large trader is a **manipulator t_B** :

$$\max_{m_j} U_{LT}(t_B, m_j, q_i^*(m_j)) = \max_{m_j} \{ [p_B(q_i^*(m_j) - p_1)] \cdot q_i^*(m_j) + [p_3 - p_1] \cdot [q_1 - q_i^*(m_j)] \}$$

If the large trader is an **honest trader:**

$$\max_{m_j} U_{LT}(t_G, m_j, q_i^*(m_j)) = \max_{m_j} \{ [p_G(q_i^*(m_j) - p_1)] \cdot q_i^*(m_j) + [p_3 - p_1] \cdot [q_1 - q_i^*(m_j)] \}$$

The pooling equilibrium in m_B , when both the large trader who is a manipulator and the one who is not a manipulator choose the same strategy, to sell at moment 2, will be convenient firstly for the large trader, while the investor will choose to buy a low quantity of the stock in this case. Furthermore, this pooling equilibrium in m_B can be the solution only if γ is lower than 1, meaning that the investor is not sure that the large trader is a manipulator, while on the contrary when the investor is sure that the large trader is a manipulator, the pooling equilibrium domain will be void.

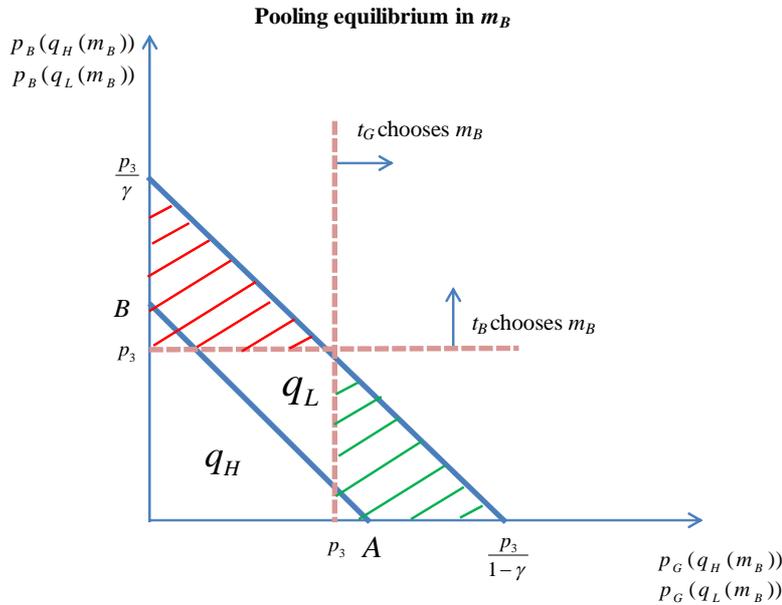


Figure 2. Pooling equilibrium in m_B

The pooling equilibrium in m_G , when both the large trader who is a manipulator and the one who is not a manipulator choose the same strategy, not to sell at moment 2, will be convenient for all the players as you can see in the figure below, and the investor will choose the quantity of the stock that he will buy depending on the price of the stock.

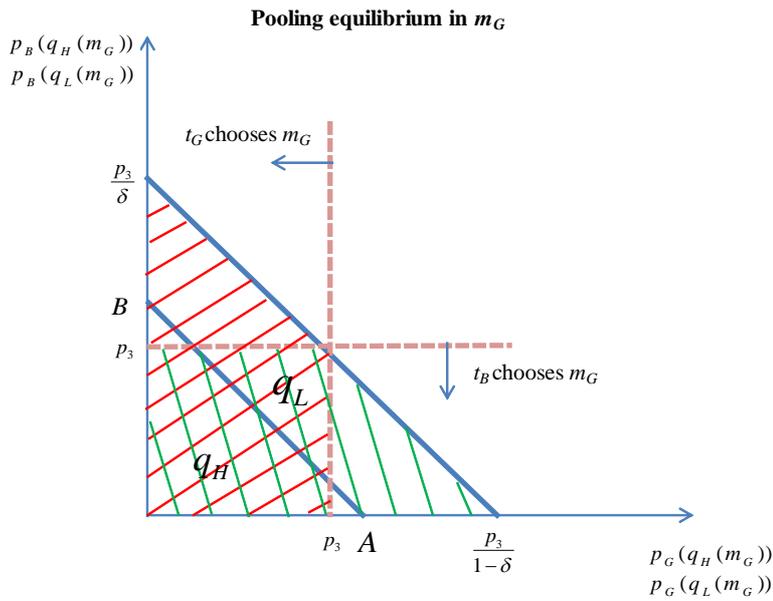


Figure 3. Pooling equilibrium in m_G

In the separating equilibrium with t_G choosing m_G and t_B choosing m_B , each type of the large trader chooses the message most suitable for him, meaning that the large trader reveals its type to the investor. Thus, as you can see in the Figure below, the manipulator will gain nothing by playing this strategy, therefore he will never choose this strategy, and this equilibrium will never be a solution.

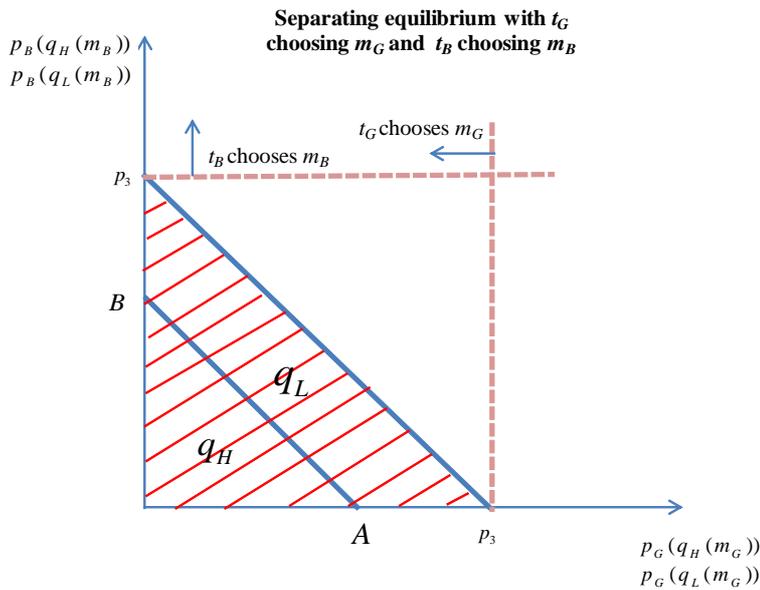


Figure 4. Separating equilibrium with t_G choosing m_G and t_B choosing m_B

In the separating equilibrium with t_G choosing m_B and t_B choosing m_G , each type of the large trader chooses the message most suitable for the other player, meaning that both players lie regarding their type. Thus, as you can see in the Figure below, the large trader who is not a manipulator but chooses to sell at moment 2 will gain nothing by playing this strategy, therefore he will never choose this strategy, and this equilibrium will never be a solution.

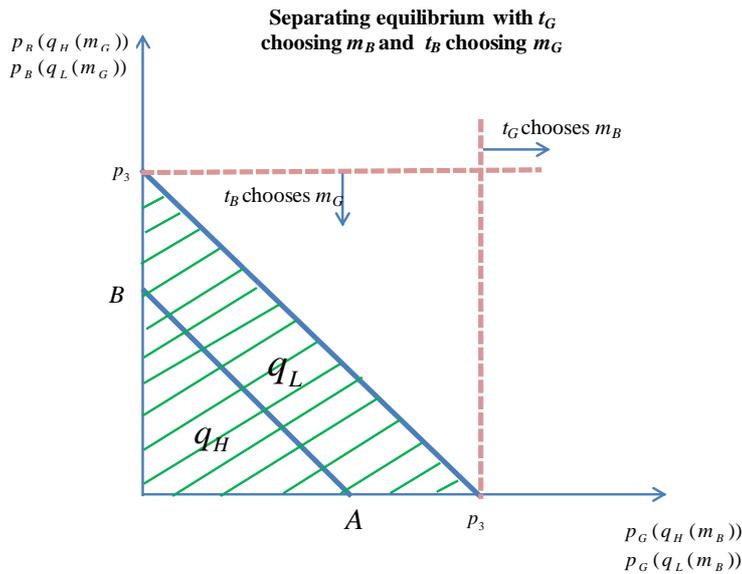


Figure 5. Separating equilibrium with t_G choosing m_B and t_B choosing m_G

Conclusions

The most important conclusion derived from the analysis in this paper which is based on a signaling game between an investor and a large trader which can be of two types (the one that manipulates and the one that does not manipulate), developed by us, is the fact that the large trader of type bad (manipulator) will never be tempted to reveal its type, because in this way he gains nothing, and he will choose to pool with the truthful large trader, in order to trick the investor and to achieve gains. Therefore, the pooling equilibrium in the strategy of not manipulating is best for all the agents, as the manipulator will never reveal its type as in the separating equilibrium, and the investor will bid high only when the volatility of the stock is low, otherwise he will bid low, suspecting manipulation.

We also observe that signaling games are a natural way to model these kinds of interactions, or communications, between the traders on the stock market, providing a good framework for developing the analysis of the manipulation process. As an important measure, regulatory intervention represents a good extension of this model, in order to counter manipulation.

An important problem is that it is very hard to make the distinction between a speculator and a manipulator, and to distinguish between normal and manipulative market power, which are based on the definitions of normal and artificial demand or prices, which the literature has not yet provided.

As an extension to this model, the market regulator will be incorporated, as well as the effect of his investigation, such as the fines charged for manipulating the market. A mechanism design problem will also be developed based on the model described in this paper, in order to introduce incentive constraints which discourage the large trader from manipulating. The testing of the extended model will be done with the help of agent-based modeling techniques.

Acknowledgment

This work was co-financed from the European Social Fund through Sectorial Operational Programme Human Resources Development 2007-2013, project number POSDRU/107/1.5/S/77213 „Ph.D. for a career in interdisciplinary economic research at the European standards“.

Bibliography

- Aggarwal, R. And Wu, G. (2006). Stock market manipulation. *The Journal of Business*, 79, 1915–1953.
- Allen, F., Gale, D. (1992). Stock-Price Manipulation. *The Review of Financial Studies*, 5(3), 503-529.
- Bagnoli, M. and Lipman, B. (1996). Stock price manipulation through takeover bids. *RAND Journal of Economics*, 27, 124–147.
- Cho, I. and Kreps, D. (1987). Signaling Games and Stable Equilibria. *The Quarterly Journal of Economics*, 102(2), 179-221.
- Gibbons, R. (1992): *Game Theory for Applied Economist*. Princeton, New Jersey. Princeton University Press.
- Guiso, L., Sapienza, P., Zingales, L. (2008). Trusting the Stock Market. *The Journal of Finance*, 63(6), 2557-2600.
- Jarrow, R. A., (1992). Market Manipulation, Bubbles, Corners and Short Squeezes. *Journal of Financial and Quantitative Analysis*, 27(3), 311-336.
- Laffont, J-J., Maskin, E.S. (1989). Rational Expectations with Imperfect Competition: A Bertrand-Edgeworth Example. *Economic Letters*, 30, 269-274.
- Domm, P. (2010). Investors Lack Confidence in Regulators to Fix Markets. CNBC First in Business Worldwide, http://www.cnbc.com/id/39154764/Investors_Lack_Confidence_in_Regulators_to_Fix_Markets
- Sobel, J. (2007): Signaling Games. http://www.econ.ucsd.edu/~jsobel/Paris_Lectures/20070527_Signal_encyc_Sobel.pdf
- Spence, M. (1973). Job Market Signaling. *Quarterly Journal of Economics*, 87, 355-374.
- Mei, J., Zhou, C. (2003). Behavior Based Manipulation. Finance Working Paper Series of NYU Stern Department. <http://eco.sdu.edu.cn/jrtzx/uploadfile/pdf/empiricalfinance/38.pdf>

“Do Mutual Fund Investors Still Trust Standard Risk-Adjusted Performance Measures?”

Laurent Bodson (HEC Management School, University of Liege, Belgium)

Arnaud Cave (University of Rochester, United States)

Danielle Sougne (HEC Management School, University of Liege, Belgium)

We study the relationship between the past performance of mutual funds and their capital flows (i.e. their subscriptions and redemptions). Testing the most traditional risk-adjusted performance measures, we identify the ones which best explain the flows of US equity mutual funds. The risk-adjusted performance measures which have the highest explanatory power are Jensen's alpha, the Sharpe ratio, and the M-squared. We observe that the average excess return carry more or less the same explanatory power than the previous measures. We may conclude that fund managers who want to maximize their assets under management must mainly focus their efforts on improving these standard performance measures. In the same time, they must pay attention to their raw performance as well as their tracking error. Furthermore, we demonstrate that, even in a period of turbulent markets, the flow-performance relation remain convex, leading fund managers to shift risks at the end of the year in order to finish among the top performers.

“The Efficient Market Hypothesis for the Botswana Stock Exchange”

N Chiranga (Tshwane University of Technology, South Africa)

Oscar Chiwira (Centre for Research, Enterprise and Project Management, BA ISAGO University College, Botswana)

Abstract:

The Botswana Stock Exchange (BSE) has 31 market listings (20 Domestic and 11 Foreign) and 3 stock indices: the Domestic Company Index (DCI), the Foreign Company Index (FCI) and the All Company Index (ACI) which is a weighted average of the DCI and FCI. The study used Random Walk Model to examine evidence for weak form efficiency by employing the Dickey-Fuller (DF) test to check for unit roots making use of the ACI. Using both the monthly and weekly data, the null hypothesis of random walk was rejected at 5 % level of significance.

Key Words: Stock Exchange, Dickey-Fuller, Weak Form Efficiency, All Company Index.

1. Introduction

The Botswana Stock Exchange started operating from 1995. It is governed by the Botswana Stock Exchange Act 1994. Currently the BSE has 31 market listings (20 Domestic and 11 Foreign) and 3 stock indices: the Domestic Company Index (DCI), the Foreign Company Index (FCI) and the All Company Index (ACI) which is a weighted average of the DCI and FCI. The DCI and the FCI are the principal [stock indices](#) of the BSE. Each is calculated from the [weighted averages](#) of the values of their category of stock. The ACI is derived from a weighted average of the two indices. Private investors are estimated to account for less than 10% of the total market capitalisation.

Various theoretical propositions and empirical models have been extensively developed with highly restrictive assumptions to determine and predict the stock prices across economies. The Random Walk model is one of the tests used to determine whether stock prices follow a random walk (Fama, E.F 1965). If they follow a random walk, past stock prices can not be used to predict future prices. The conclusion will be that the market is efficient. If the stock prices do have memory, past prices can be used to predict future prices, then trend analysis can be used to make abnormal profits. The market will be said to be not efficient.

This study will differ from previous studies since it is using different sample intervals and also that it covers the period when there was a change in the exchange rate regime. Since 2005, the Botswana economy has been implementing the crawling band exchange rate mechanism that is aimed at maintaining international competitiveness of domestic producers. The exchange rate is adjusted in a crawling peg arrangement rather than in discrete steps, and the spread between the buy and sell rates of ± 0.125 , to encourage further development of the interbank market for foreign exchange. There has been also new listed counters and change in regulations that governs the operations of the BSE.

2. Literature Review

There are three types of market efficiency, the weak form, semi-strong and the strong market efficiency, (Fama, E., 1970). The weak form asserts that all past market prices and data are fully reflected in securities prices. In other words, technical analysis, to try and take advantage of the market is of no use. Security prices exhibit no serial dependencies, meaning that there are no "patterns" to asset prices. This implies that future price movements are determined entirely by information not contained in the price series. Hence, prices follow a random walk. A weakly efficient market is essentially a refutation of technical analysis which asserts that market prices do not follow a random process, data has memory: expected price changes are not independent of past price changes nor are distributions of rates of returns independent from past distributions. The semi-strong form asserts that all publicly available information is fully reflected in securities prices. It is implied that share prices adjust to publicly available new information very rapidly and in an unbiased fashion, such that no excess returns can be earned by trading on that information. This is a refutation of the fundamental analysis. The strong form asserts that all information is fully reflected in securities prices. In other words, even insider information is of no use because the market is unbeatable.

According to (Cootner, P.H 1962) if securities markets are efficient in weak form, one need to show that successive price changes are independent. A number of studies have established that, the sample serial correlation coefficients computed for successive price changes were extremely close to zero, implying that successive changes in prices are independent, (Kendall, M.G 1953). The variance-ratio test was used to examine random walks in Taiwan's stock prices, (Chang, K.P. and Ting, K.S 2000). The empirical results showed that with weekly value-weighted market index, the null hypothesis of

random walk is rejected. The study also finds that the random walk hypothesis cannot be rejected with monthly, quarterly and yearly value-weighted market indexes.

A test for major 14 major stock markets over the period was conducted between 1988 to 1990, (Chan, K. C. and Lai, P 1993). This study uses unit root and cointegration tests to examine the relationships among the stock markets in Hong Kong, South Korea, Singapore, Taiwan, Japan, and the United States. All the stock prices were analyzed both individually and collectively to test for international market efficiency. Unit roots in stock prices were found. Pairwise and higher-order cointegration tests indicate that there is no evidence of cointegration among the stock prices. The findings suggest that the stock prices in major Asian markets and the United States are weak-form efficient individually and collectively in the long run, (Chan, K. C., Gup, B. E. and Pan, M 1992).

There has been some evidence on the efficiency of stock markets in developing countries was extended by Dickinson J. P Muragu K (1994), using data from the Nairobi Stock Exchange (NSE). Evidence is provided that small markets such as the NSE may provide empirical results consistent with weak-form efficiency. This evidence holds for the NSE irrespective of whether bid-, ask-, or market-price series are used in conducting the study. Triangulation econometric approach was employed to assess the predictability of daily return series of BSE and to test the null hypothesis of random walk model. The empirical results reject the null hypothesis of random walk model for the daily return series of BSE for the period of 1989 to 2005 and evidenced serial autocorrelation of return series, which clearly indicate predictability and volatility of security prices of Botswana market, (Mollah, A. S 2007).

Some studies were done in some other emerging stock markets. Evidence from Bangladesh, the study seeks evidence on whether the return series on Bangladesh's Dhaka Stock Exchange (DSE) is independent and follows the random walk model (Mobarek, A., Mollah, A.S. and Bhuyan, R 2008). The study focuses on assessing if the DSE deviates from idealised efficiency. The sample primarily includes all the listed companies on the DSE daily price index over the period 1988 to 2000. The results of both non-parametric (Kolmogrov—Smirnov: normality test and run test) and parametric test (Auto-correlation test, Auto-regressive model, ARIMA model) provide evidence that the security returns do not follow the random walk model and the significant auto-correlation coefficient at different lags reject the null hypothesis of weak-form efficiency.

3.1 Data and Methodology

The study made use of the ACI, which is the weighted average of the two indices namely DCI and the FCI. The data was collected from the BSE in the form of daily reports for the sample period January 2006 to December 2010. Monthly and weekly data were extracted and made use of in the study. These were the last calculated indices for the month and for the week for the sampling intervals monthly and weekly respectively. The ACI was used so as to include all the counters at the BSE since both domestic and foreign counters were actively traded over the sample period.

The study uses Random Walk Model to examine evidence for weak form efficiency by employing the Dickey-Fuller (DF) test to check for unit roots.

3.2 Dicky-Fuller (DF) unit root test

OLS is used to run the regression on the following models and check whether $\rho=1$, or $\delta=0$ is statistically significant.

3.2.1 Testing regressions

	Level	First-difference	
(No constant and trend)	$P_t = \rho P_{t-1} + e_t$	$\Delta P_t = \delta P_{t-1} + e_t$	(1)
(With constant)	$P_t = \alpha + \rho P_{t-1} + e_t$	$\Delta P_t = \alpha + \delta P_{t-1} + e_t$	
(With constant & trend)	$P_t = \alpha + \beta t + \rho P_{t-1} + e_t$	$\Delta P_t = \alpha + \beta t + \delta P_{t-1} + e_t$	(2) (3)

Where:

P_t	is the ACI
ΔP_t	is the first difference of ACI given by $(P_t - P_{t-1})$
α	is the drift term
t	is the deterministic time trend
P_{t-1}	is the previous ACI
e_t	is the error term, which is a white noise process
α, β, ρ and δ	are coefficients $\delta = (\rho - 1)$

3.3 Hypothesis

The hypothesis testing is based on the significance of ρ or δ at 5%.

$$\begin{array}{l} H_0: \quad \rho = 1 \quad \text{or} \quad \delta = 0 \\ H_1: \quad \rho \neq 1 \quad \text{or} \quad \delta \neq 0 \end{array}$$

By failing to reject the null hypothesis means that the stock prices follow a random walk and shocks to the system will tend to be explosive. This will confirm that the future stock prices can not be predicted from past stock prices, which would imply that the BSE is weakly efficient. Alternatively, rejecting the null hypothesis would imply that stock prices do not follow a random walk and economic agents can predict future prices from past prices. The conclusion will be that the market is not weak form efficient. The null hypothesis that P_t is a random walk can be rejected if the calculated test statistic (t- value) is greater than the tabulated critical values which have been tabulated by Dickey & Fuller on the basis of Monte Carlo simulations.

4. Presentation and Discussion of Results

Tables 1, 2 and 3 show the results of Dickey – Fuller tests for the monthly data with drift and trend, drift no trend and no drift no trend respectively. Tables 4, 5 and 6 show the results for the weekly data with drift and trend, drift no trend and no drift no trend respectively.

Considering Table 1, based on model (1) with both the drift and the trend for monthly data, the ACI (t-1) is significant as evidenced by the t-probability and is also close to one. The calculated test statistic (t- value) is greater than the tabulated critical value, implying that the null hypothesis of random walk is rejected at 5%. The DW is 1.92, close to 2, indicating that there is no autocorrelation between successive error terms. It can be concluded that the BSE does not follow a random walk implying that it is weak form inefficient. Technical Analysts or Chartist can make use of their investment techniques and outperform the market in returns since stock prices do have memory. The trend, since it is insignificant will be dropped from the model and use model (2), (Karemera, D, Ojah, K. and Cole, J.A 1999). Table 2 is based on model (2). The null hypothesis was rejected implying that the BSE do not follow a random walk. That is, it not weak form efficient. The ACI (t-1) is significant. The DW is 1.89 suggesting that the successive error terms are not related no autocorrelation between successive error terms. The Drift being insignificant was dropped from the model (2) and use made of model (3).

The null hypothesis was further rejected using model (3) with both no Drift and Trend with the ACI (t-1) being significant at 5%. The DW statistic of 1.91 suggested that the successive error terms are not autocorrelated since it is close to 2. Using weekly data, the results as shown in tables, 4, 5, 6 rejected the null hypothesis of weak form efficiency just like the monthly data. The calculated test statistics (t- value) are greater than the tabulated critical values.

Previous results done for developing stock markets including the BSE concluded that the BSE does not follow a random walk. The null hypothesis of random walk was rejected implying that the stock exchange was not weak form efficient except for the Johannesburg Stock Exchange (JSE) All- Share index which failed to reject the null hypothesis, implying that it is weak form efficient, (Jefferis, K. R 1995). Triangulation econometric approach was employed to assess the predictability of daily return series of the BSE and to test the null hypothesis of random walk model. The empirical results reject the null hypothesis of random walk model for the daily return series of BSE for the period of 1989 to 2005 and evidenced serial autocorrelation of return series, which clearly indicate predictability and volatility of security prices of the market (Smith, G., Jefferis, K. and Ryoo, K. 2002).

5. Conclusion and policy recommendations

The results indicate that the random walk hypothesis can be rejected using both weekly and monthly data of the BSE from the period 2006 to 2010. This essentially means that the BSE is not weak form efficient. This has made the bourse more prone to opportunistic behavior by investment analysts who get inside information and be able to outperform the market. From the study conclusions some policy recommendations can be suggested. There is need for information dissemination that is coordinated from the Botswana Stock Exchange. If the stock exchange can work hand in glove with other stakeholders then information can reach stakeholders timorously.

There is also need for the adoption of an electronic trading system. This helps in accurate record keeping and also improves on speed in making investment decisions. The stock market should re-align their trade such that they meet worldwide benchmarks on trading. This will further improve efficiency and transparency thus cutting costs and time.

6. Tables

Table 1 : EQ (3) Modeling ACI by OLS (using Data1). The estimation sample is: 0 to 58 (MDT)

	Coefficient	Std.Error	t-value	t-prob	Part.R^2
Constant	86.4907	66.47	1.30	0.198	0.0294
Trend	-0.589555	4.579	-0.129	0.898	0.0003
ACI(t-1)	0.963758	0.1067	9.03	0.000	0.5929
Sigma	200.085	RSS	2241897.29		
R ²	0.927034	F(2,56)	355.7 [0.000]**		
Log-likelihood	-394.804	DW	1.92		
No. of observations	59	no. of parameters	3		
Mean (ACI)	1603.2	var (ACI)	520770		
MDT – Monthly with Drift and Trend					

Table 2: EQ (2) Modeling ACI by OLS (using Data1).The estimation sample is: 0 to 58 (MDNT)

	Coefficient	Std.Error	t-value	t-prob	Part.R^2
Constant	89.4213	61.90	1.44	0.154	0.0353
ACI (t-1)	0.950808	0.03534	26.9	0.000	0.9270
Sigma	198.351	RSS	2242560.81		
R ²	0.927013	F (1, 57)	724 [0.000] **		
Log-likelihood	-394.812	DW	1.89		
No. of observations	59	no. of parameters	2		
Mean (ACI)	1603.2	var (ACI)	520770		
MDNT – Monthly with Drift and No Trend					

Table 3: EQ (1) Modeling ACI by OLS (using Data1). The estimation sample is: 0 to 58 (MNDNT)

	Coefficient	Std.Error	t-value	t-prob	Part.R^2
ACI (t-1)	0.997200	0.01488	67.0	0.000	0.9873
Sigma	200.201	RSS	2324654.99		
Log-likelihood	-395.873	DW	1.91		
No. of observations	59	no. of parameters	1		
Mean (ACI)	1603.2	var (ACI)	520770		
MNDNT – Monthly with No Drift and No Trend					

Table 4: EQ (3) Modeling ACI by OLS (using Data2) The estimation sample is: 0 to 258 (WDT)

	Coefficient	Std.Error	t-value	t-prob	Part.R^2
Constant	8.89956	9.287	0.958	0.339	0.0036
Trend	-0.249743	0.1160	-2.15	0.032	0.0178
ACI (t-1)	1.01685	0.01221	83.3	0.000	0.9644
Sigma	60.3087	RSS	931107.181		
R ²	0.992836	F (2,256)	1.774e+004	[0.000]	**
Log-likelihood	-1427.76	DW	1.44		
No. of observations	259	no. of parameters	3		
Mean (ACI)	1564.06	var (ACI)	501831		
WDT – Weekly with Drift and Trend					

Table 5: EQ (2) Modeling ACI by OLS (using Data2) the estimation sample is: 0 to 258 (WDNT)

	Coefficient	Std.Error	t-value	t-prob	Part.R^2
Constant	13.4306	9.109	1.47	0.142	0.0084
ACI(t-1)	0.993156	0.005310	187.	0.000	0.9927
Sigma	60.7334	RSS	947956.653		
R ²	0.992707	F(1,257)	3.498e+004	[0.000]**	
Log-likelihood	-1430.08	DW	1.38		
No. of observations	259	no. of parameters	2		
Mean (ACI)	1564.06	var(ACI)	501831		
WDNT – Weekly with Drift and No Trend					

Table 6: EQ (1) Modeling ACI by OLS (using Data2) the estimation sample is: 0 to 258 (WNDNT)

	Coefficient	Std.Error	t-value	t-prob	Part.R^2
ACI(t-1)	1.00028	0.002205	454.	0.000	0.9987
Sigma	60.8714	RSS	955974.823		
Log-likelihood	-1431.17	DW	1.38		
No. of observations	259	no. of parameters	1		
Mean (ACI)	1564.06	var (ACI)	501831		
WNDNT – Weekly with No Drift and No Trend					

References

- Chang, K.P. and Ting, K.S. (2000). A variance ratio test of the random walk hypothesis for Taiwan's stock market. *Applied Financial Economics*, 10 (5), 525-530.
- Cootner, P.H. (1962). Stock Prices, Random vs. Systematic Changes, *Industrial Management Review* 3, 24-45.
- Dickinson, J.P. and Muragu, K. (1994). Market efficiency in developing countries: A case study of Nairobi Stock Exchange. *Journal of Business Finance and Accounting*, 21(1), 133 – 150.
- Fama, E.F. (1965). The Behavior of Stock Market Prices. *The Journal of Business*, 38, 34-105.
- Gallagher, I. and Taylor, M. (2002). Permanent and Temporary Components of Stock Prices. *Evidence from Assessing Macroeconomic Stocks Southern Economic*, 69, 345-362.
- Jefferis, K. R. (1995). The Development of stock markets in Sub-Saharan Africa. *South African Journal of Economics, Economics Society of South Africa*, 63(3), 192-201.
- Kendall, M.G. (1953). The Analysis of Economic Time Series. *Journal of the Royal Statistical Society* 96, 11-25.
- Lo, A. W., and MacKinlay, A. C. (1997). Stock Market Prices Do Not Follow Random Walks: Market Efficiency. *Stock Market Behaviour in Theory and Practice* 1, 363 – 389.
- Mobarek, A., Mollah, A.S. and Bhuyan, R. (2008). Market Efficiency in Emerging Stock Market: Evidence from Bangladesh. *Journal of Emerging Market Finance*, 7(1), 17-41.
- Mollah, A. S. (2007). Testing Weak-Form Market Efficiency in Emerging Market: Evidence from Botswana Stock Exchange. *International Journal of Theoretical and Applied Finance*, 10, 1007-1094.

“Renyi's information transfer between financial time series”

Petr Jizba (Czech Technical University, Czech Republic)

Jan Korbela (Czech Technical University, Czech Republic)

In this presentation I will review our recent work [1]. There we quantify the statistical coherence between financial time series by means of the Renyi entropy. With the help of Campbell's coding theorem I will show that the Renyi entropy selectively emphasizes only certain sectors of the underlying empirical distribution while strongly suppressing others. This accentuation is controlled with Renyi's parameter q . To tackle the issue of the information flow between time series I will formulate the concept of Renyi's transfer entropy as a measure of information that is transferred only between certain parts of underlying distributions. This is particularly pertinent in financial time series where the knowledge of marginal events such as spikes or sudden jumps is of a crucial importance.

I will further apply the Renyan information flow to stock market time series from 11 world stock indices as sampled at a daily rate in the time period 02.01.1990 - 31.12.2009. A detailed discussion of the transfer entropy between the DAX and S&P500 indices based on minute tick data gathered in the period from 02.04.2008 to 11.09.2009 will be also provided.

The outlined analysis shows that the bivariate information flow between world markets is strongly asymmetric with a distinct information surplus flowing from the Asia-Pacific region to both European and US markets. An important yet less dramatic excess of information also flows from Europe to the US. This is particularly clearly seen from a careful analysis of Renyi information flow between the DAX and S&P500 indices.

“Credit Risk Management through Securitization: Effect on Loan Portfolio Choice”

Neil Adrian S. Cables (University of Bologna, Italy)

Executive Summary¹³

One of the distinct steps in the securitization process is the transfer of the pool of loans from the asset-originating bank to the Special Purpose Entity (SPE). This point is special because it is at this stage where securitization plays its well-known credit risk management role. Securitization performs the function mentioned by providing banks with a vent for risk. To illustrate, when the loans are transferred to the SPE during securitization, the loans leave the asset-originating bank's balance sheet. This results to the securitizing bank being no longer exposed to the risk on the securitized loans or, in other words, isolated from the said risk.

A number of studies have shown that banks may have attempted to take advantage of this credit risk management property of securitization. Minton, Sanders & Strahan (2004), Pais (2005), Bannier & Hänsel (2007) and Affinito & Tagliaferri (2010) have all shown that banks with more risky assets tend to securitize more, to address such high risk exposures. Meanwhile, Sakrisyan, Casu, Clare & Thomas (2009) and Panetta & Pozzolo (2010) have found that banks that securitize have less risky profiles, resulting from the removal of risk in the securitization process. In this paper, we extend the discussion on securitization as a risk management tool, by looking at how such role of securitization may affect the bank's loan portfolio. More specifically, we investigate how securitization (as a vent for risk) may affect the composition and size of the loan portfolio of the bank. At the same time, we also examine what does such changes in the loan portfolio imply on the risks and returns that the bank eventually faces.

Given the data on Securitization Activity¹⁴ for 129 member-banks of the Federal Deposit Insurance Company (FDIC) from 2004-2010, we begin our analysis by looking at how engagements in securitization may affect the composition of the bank's loan portfolio. To do this, we first group our banks according to the intensity of their securitization activities. We create three bank groups namely the High, Mid and Low-Securitizers¹⁵. For each bank group, we take the mean portfolio share of the major loans classes that our sample banks can hold¹⁶. These loans classes are; Real Estate, Commercial and Industrial (C&I), Consumer, Farm and Others¹⁷. The clear observation we make from the above exercise is that the portfolio share of Consumer Loans (Real Estate Loans) is bigger (smaller), as banks get into more securitization engagements (see Table 1). This gives us the impression that the portfolio holdings of Consumer Loans increases with securitization activity, while that of Real Estate Loans decreases. In addition, given that Real Estate Loans are the most securitized loans by banks, while Consumer Loans are securitized less (see Figure 1), we consider that banks may have increased their Consumer Loans holdings (as observed above), through the securitization of Real Estate Loans.

Subsequently, we take a look at the effect of securitization activity on loan portfolio size. We do this by taking the mean Total Loans/Assets ratio of each of our banks groups. We observe that banks that securitize more (i.e. banks with medium to high levels of securitization activity) have relatively bigger loan portfolio size, than those that securitize less (see Table 1). We may trace such larger loan portfolio size, among the more-intense securitizing banks, from their increased portfolio holdings of Consumer Loans observed earlier.

Our above findings may be attributed to the attempt among banks of managing their credit risk exposures, as they take in Real Estate Loans and Consumer Loans, and with securitization as the means for such risk management. To see this point more clearly, we can begin by considering that banks may want to exploit economies of scope in borrower screening and monitoring, and they do so by offering Real Estate Loans (i.e. Mortgages) and Consumer Loans, as a bundle to each of their clients¹⁸. As a bank adopts this practice, what the bank may then need to ultimately decide on, is how many of the bundles it will offer. Given that Real Estate Loans and Consumer Loans have a high positive covariance of risk (see Table 2

¹³ A full version of the paper may be accessed at <https://sites.google.com/site/nascables/>

¹⁴ We measure our sample banks' securitization activity as the total reported Bank Assets Sold & Securitized normalized to Total Assets. All balance sheet data for this study are taken from the Call Reports that are submitted by our sample banks on a quarterly basis with the FDIC.

¹⁵ See Note 1 of Table 1 for details on the groupings of the sample banks.

¹⁶ i.e. Portfolio share of Loans Class X = Amount of Loans Class X/Total Loans

¹⁷ The loans class "Others" refers to the Acceptances and Receivables Discounted by banks.

¹⁸ This may actually have been done in practice as it is common to see banks offering its clients a combination of loans or credit. Examples of such are: a Housing Loan bundled with a Car Loan, a Mortgage that also comes with a Credit Card plan and a combination of a Home Equity Loan and Personal Loan.

for evidence), Value-at-Risk Constraints puts a limit on the amount of bundles that the bank can sell. However, if the bank can lower some of the risk in each bundle, it may be able to offer more bundles. This is possible through the securitization of one of the loans that forms part of the bundle. That is, by securitizing the Real Estate Loan which partially comprises the bundle¹⁹, the bank gets to tone down the risk of the bundle, allowing it sell more bundles. As the bank sells more bundles, the bank then ends up with more Consumer Loans in its loan portfolio and this holding of more Consumer Loans increases the size of the bank's loan portfolio.

Given these points from our preliminary analysis, we may then consider the idea that as the bank securitizes for credit risk management purposes²⁰, it ends up with a portfolio that has more holding of Consumer Loans. At the same time with more Consumer Loans in the bank's loan portfolio, the bank, as it securitizes, may also experience an increase in loan portfolio size.

To test this inference, we implement two sets of empirical estimations. First, we look at the relationship between securitization and the portfolio share of Consumer Loans²¹ to verify the point that securitization (used for risk unloading) may lead to more holdings of Consumer Loans. Employing the data on our 129 FDIC member banks, we find such confirmation, through a positive relationship between securitization activity and the portfolio share of Consumer Loans (see Table 3 Panel 1). Next, we check if this increase in the holding of Consumer Loans, through securitization, may also lead to a larger loan portfolio. Our results establish this point, as it shows that securitization is as well positively related to loan portfolio size²² (see Table 3 Panel 2).

As a bank's risk profile and the returns it gains are determined by the composition and the size of its loan portfolio, the changes in the banks' loan portfolios, through securitization, may also then have some impact on the banks' risk profiles and their returns. This may especially be the case given that, as observed, banks get to hold more Consumer Loans with securitization, and that Consumer Loans are the riskiest loans class that the banks can hold (see Figure 2 for evidence). To see the impact of securitization on the overall loan portfolio risk of the bank, we estimate the securitization activity of each of our banks against their loan defaults (serving as indicators for loan portfolio risk)²³. We find that securitization has a positive effect on the overall loan portfolio risk of our sample banks (see Table 4). This points out that although securitization may have been used to unload risk, it still leads to the bank having more credit risk exposures, through the increase in risky Consumer Loans holdings that it brings about. Given this finding of increased risk, we examine if such may reward the bank of higher returns. To do so, we take our sample banks' Return on Assets (ROA) and Return on Equity (ROE) and estimate it against securitization activity. With securitization being positively related to both the ROA and the ROE (see Table 5 Panels 1&2), we come to find that the increased risk exposures of the bank brought about by securitization may present the bank with more returns.

However, we also find that the above returns, though high, are volatile. We draw this after observing a positive effect by securitization on the volatilities of the ROA and that of the ROE²⁴ (see Table 5 Panels 3&4). The implication of this finding is that although the higher risk exposures are accompanied by high returns, the instability of such returns may pose a concern to the bank. This concern could sequentially compromise the bank's interest in continuing to engage in securitization. In such a situation, a certain windfall that would convince the bank to sustain its securitization activities may be necessary. We find this windfall as we look into the diversification effects of securitization.

¹⁹ We note that the banks may opt to unload the Real Estate Loans (which forms part of the bundle) because Real Estate Loans are easier to securitize than that of Consumer Loans (which forms the other part of the bundle). The ease of securitizing Real Estate Loans comes from its collateralization. Since Real Estate Loans have collateral (i.e. the property), an investor in a securitization deal may find such a loan more appealing as an underlying asset, compared to one that has no collateral (e.g. a Consumer Loan). This is because should the loan (serving as underlying asset in the securitization transaction) be unable to successfully pay-off, the investor may still have some value from the deal through the collateral. It thus follows that a Real Estate Loan is easier to securitize, relative to the uncollateralized Consumer Loan.

²⁰ More specifically, to unload Real Estate Loans so that it is able lower the risk on the bundles it offers and gets to sell more of them.

²¹ i.e. Consumer Loans/Total Loans

²² i.e. Total Loans/Assets

²³ i.e. Non-Performing Loans/Total Loans (NPLs), Loans Charged-off/Total Loans (Charge-Offs), SD NPLs, SD Charge-offs

²⁴ i.e. Standard Deviations of the ROA and the ROE

With our earlier result that securitization can lead to the increase in the portfolio share of Consumer Loans, we also consider that following securitization, the diversification of the bank's loan portfolio may have also changed. Using a modified Herfindahl-Hirschman Index (*HHI*)²⁵ as an indicator for loan portfolio diversification, we observe that securitization activity is positively related to loan portfolio diversification or that securitization can make a bank's loan portfolios more diversified (see Table 6 Row 1). Further analysing this point leads us to find that the alteration of the loan portfolio composition towards more diversification, may also allow the bank to enjoy the beneficial effects of diversification, namely reduced overall loan portfolio risk and less volatile returns (see Table 6, Rows 2-7). Through these positive side-effects, the concerns on increased risk and unstable returns found earlier could be offset. As such, a bank may be motivated to continue and conveniently use securitization for credit risk management purposes, and enjoy the accompanying high returns that such strategy brings.

Given our findings, we conclude in our study that the usage of securitization for credit risk management goes beyond the mere offloading of credit risk. While we find that securitization has indeed been used to manage credit risk, it has not been used as a means for absolute risk unloading²⁶, but actually as a means to be effectively more exposed to risk and enjoy the higher returns that accompany such move.

Our study makes a number of contributions to the discussion on securitization. First, our work builds up on earlier studies that view securitization as a tool for banks to increase their loans holdings²⁷ and/or risk-taking²⁸. Our study goes further on this point by showing that securitization may not only increase the size of the bank's loan portfolio, but may also change its composition towards risky loans and increased diversification²⁹. Second and more importantly, our study adds to the literature on securitization as a risk management tool, where it shows that securitization may not necessarily be a means for total risk isolation (as generally believed). Instead, our study points out that securitization is a risk management tool in the sense that it can be used by banks to take on higher risk in pursuit of high yields. In addition, our study also contributes to the ongoing debate on the value of securitization. Following its involvement in the recent financial crisis, securitization has had an unfavourable reputation. By showing that securitization has risk-taking, profit-augmenting and diversification effects, our study points out that securitization may still have some significance.

²⁵ The HHI is a measure of industry concentration/dispersion calculated through the share of each firm's output in an industry to the aggregate output. The higher (lower) the HHI, the more concentrated (dispersed) is an industry. We employ the concept of the HHI in our study as a loan portfolio diversification indicator by calculating it using the share of each loans class to the loan portfolio of the bank. To make our analysis easier, we take the inverse of the HHI (i.e. 1-HHI), such that the higher (lower) is the 1-HHI, the more diverse (concentrated) is the bank's loan portfolio.

²⁶ As what theory may expect and earlier empirical evidence may have shown

²⁷ Such as Cantor & Demsetz (1993), Altunbas, Gambacorta & Marquez-Ibanez (2007), Goderis, Marsh, Costello & Wagner (2007), Loutskina & Strahan (2008) and Gambacorta & Marques-Ibanez (2011)

²⁸ Such as Dione & Harchaoui (2003), Cebenoyan & Strahan (2004) & Loutskina (2011)

²⁹ We note that a positive relationship between loan portfolio diversification and securitization has also been found by Pavel & Phillis (1987) and Panetta & Pozzolo (2010). However, our work differs from the two earlier studies as we define diversification in terms of loans classes instead of loans categories (e.g. Mortgages, Leases and Other Loans).

References

- Affinito, M. & E. Tagliaferri. 2010. Why do (or did?) banks securitize their loans? Evidence from Italy. *Journal of Financial Stability*, 6-4.
- Altunbas, Y., L. Gambacorta, Marques-Ibanez, D. 2007. Securitization and the Bank Lending Channel. European Central Bank (ECB) Working Papers, No. 838.
- Bannier, C.E. & D.N. Hänsel. 2007. Determinants of Banks' Engagement in Loan Securitization. Conference on the Interaction of Market and Credit Risk.
- Cantor, R. & R. Demsetz. 1993. Securitization, Loan Sales and the Credit Slowdown. Federal Reserve Bank of New York Quarterly Review, Summer 1993, 27-37.
- Cebenoyan, A.S. and P. Strahan. 2004. Risk Management, Capital Structure and Lending at Banks. *Journal of Banking and Finance*, 28, 19-43.
- Dione, G. And T.M. Harchaoui. 2003. Banks' Capital, Securitization and Credit Risk: An Empirical Evidence for Canada. HEC Montreal Working Paper No. 03-01.
- Gambacorta, L. & Marques-Ibanez, D. 2011. The bank lending channel: Lessons from the crisis. BIS Working Papers, No. 345.
- Goderis, B., I.W. Marsh, J.V. Castello & Wagner, W. 2007. Bank behaviour with access to credit risk transfer markets. Bank of Finland Research Discussion Papers 4.
- Kamp, A., A. Pflingsten, C. Memmel and Bher, A. 2007. Diversification and the Banks' Risk-Return Characteristics-Evidence from Loan Portfolios of German Banks. Deutsche Bundesbank Discussion Paper Series 2, 5.
- Kamp, A., A. Pflingsten and D. Porath. 2006. Do banks diversify loan portfolios? A tentative answer based on individual bank portfolios. Deutsche Bundesbank Discussion Paper Series 2, 3.
- Loutskina, E. 2011. The Role of Securitization in Bank Liquidity Funding and Management. *Journal of Financial Economics*, 100, 663-684.
- Loutskina, E. & P. Strahan. 2008. Securitization and the Declining Impact of Bank Financial Condition on Loan Supply: Evidence from Mortgage Acceptances. Financial Cycles, Liquidity and Securitization Conference Proceedings, International Monetary Fund (IMF).
- Martin-Oliver, A. & J. Saurina. 2008. Why do banks securitize assets? International Forum on Research in Finance.
- Minton, B., A.B. Sanders & Strahan, P.E. Securitization by Banks and Finance Companies: Efficient Financial Contracting or Regulatory Arbitrage? Mimeo.
- Pais, A. 2005. The Role of Securitization in the Capital Structure of Banks. Massey University, Department of Finance, Banking and Property, Working Paper.
- Panetta, F. and A.F. Pozzolo. 2010. Why do banks transfer credit risk? Bank-level evidence from over one hundred countries. Mimeo.
- Pavel, C. & Phillis, D. 1987. Why commercial banks sell loans: An empirical analysis. Federal Reserve Bank of Chicago, Economic Perspectives.
- Pennacchi, G.G. 1988. Loan Sales and the Cost of Bank Capital. *The Journal of Finance*, Vol. 43, No. 2, 375-396.
- Sakrisyan, A. B. Casu, A. Clare & Thomas, S. 2009. Securitization and Bank Performance. Cass Business School, Working Paper.
- Stiroh, J. 2004. Do Community Banks Benefit from Diversification? *Journal of Financial Services Research*, 25(2), 135-160.

Table 1. Summary Statistics

Volume of Bank Assets Sold & Securitized/ Total Assets (Securitization)			
Sampling Period: 2001:4-2010:4, No. Of Banks: 129, No. of Banks in Each Group: 43	Low-Securitizers (Sec \leq 33rd Percentile)	Mid-Securitizers (33rd Percentile < Sec \leq 67th Percentile)	High-Securitizers (67th Percentile < Sec)
	1	2	3
Real Estate Loans/Total Loans	62.434	57.585	45.991
C&I Loans/Total Loans	23.668	20.940	17.047
Consumer Loans/Total Loans	8.230	9.637	26.774
Farm Loans/Total Loans	0.554	0.425	0.588
Other Loans/Total Loans	5.185	11.441	9.633
Total Loans/Assets	59.929	64.019	64.126
Log of Assets	16.338	16.674	17.522
CAR	10.266	11.401	12.374
Core Deposits/Assets	58.062	51.734	43.220
1-HHI	0.433	0.454	0.453
NPLs/Total Loans	1.310	2.106	2.025
SD NPLs	0.290	0.523	0.369
Charge-Offs/Total Loans	0.563	0.920	1.667
SD Charge-Offs	0.168	0.218	0.205
ROA	0.880	0.769	1.180
SD ROA	0.200	0.425	0.394
ROE	9.809	7.613	10.576
SD ROE	2.039	3.830	3.692

1. High-Securitizers are banks whose average securitization activity (Securitization) for the entire sample period, rank above the 67th percentile among the 129 sample banks. Mid-Securitizers are banks whose average securitization activity rank between the 33rd and 67th percentile. Low-Securitizers are banks whose average securitization activity, rank below the 33rd percentile.

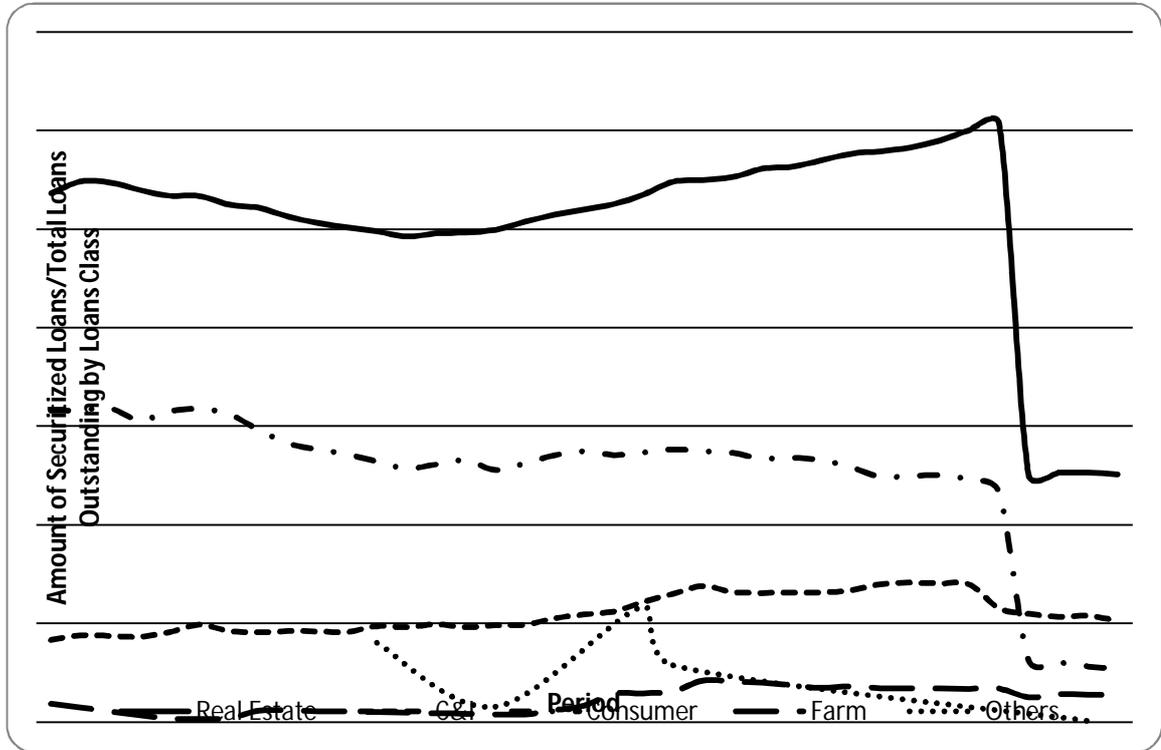
2. Table 1 shows, that the portfolio share of Real Estate Loans is decreasing with securitization activity, while that of Consumer Loans is increasing with securitization activity. This implies that the holding of Real Estate Loans may be negatively related to securitization, while the opposite case applies to that of Consumer Loans. At the same time, it can also be observed that High-Securitizers and Mid-Securitizers exhibit a larger loan portfolio size (Total Loans/Assets) than Low-Securitizers. This indicates a positive relationship between securitization and loan portfolio size.

3. 1-HHI is the inverse of the Herfindahl-Hirschman Index, serving as indicator for loan portfolio diversification (see Footnote 12 for further explanation).

4. The standard deviations (SDs) are calculated for each year using quarterly values.

5. Balance sheet data are taken from the FDIC Quarterly Call Reports.

Figure 1. Share of Securitized Loans to Total Loans Outstanding by Loans Class



1. The share of Securitized Loans to Total Loans Outstanding of each Loans Class is calculated as the ratio of the Amount of Securitized Loans of each Loans Class to the Total Volume of Loans of each Loans Class (e.g. Shared of Securitized Real Estate Loans = Amount of Real Estate Loans Securitized/Total Real Estate Loans Outstanding).
2. Figure 1 shows that the loans class that is predominantly securitized is Real Estate Loans and that the Consumer Loans are securitized much less. In fact, during the periods when securitization was highly practiced by financial institutions (2004-2007), the securitization of Real Estate Loans have experienced a rise, while that of Consumer Loans has been falling. It is also worth noting that since the decline in securitization activities in 2009, Real Estate Loans is still the loans class that is mostly securitized.
3. Data used for the calculation of figures plotted above are taken from the Flow of Funds Account of the United States, Federal Reserve Board.

Table 2. Covariance Matrix of Defaults among Different Loans Classes

	Farm	C&I	Consumer	Others
Real Estate	0.1436186	0.0604956	0.1908590	0.0314621
Farm		0.0389255	0.0779504	0.0036428
C&I			0.0361855	0.0029371
Consumer				0.0127283

1. The covariances are calculated using the default rates of each loans class taken as the ratio of the Amount of Loans that is in Default to the Total Amount of Loans of each Loan Class (e.g. Default Rate of the Real Estate Loans=Real Estate Loans in Default/Total Amount of Real Estate Loans).

2. Table 2 shows that the pair of loans classes with the highest positive covariance of defaults is Consumer Loans and Real Estate Loans. This implies that simultaneously holding both loans classes may be difficult for banks as their respective risks move closely in the same direction.

Table 3. Securitization and the Bank's Loan Portfolio

	Dependent Variable			
	Consumer Loans/Loans _t		Total Loans/Assets _t	
	1		2	
Sampling Period: 2001-2010	FE	IV	FE	IV
Independent Variables				
Securitization _{t-1}	0.428*** (32.356)	0.475*** (36.663)	0.081*** (8.706)	0.086*** (6.950)
Log of Assets _{t-1}	-0.001 (-0.523)	0.001 (0.015)	-0.047*** (-20.243)	-0.038*** (-6.696)
CAR _{t-1}	0.354*** (12.870)	0.805*** (14.003)	0.476*** (13.961)	0.628*** (11.481)
Core Deposits/Assets _{t-1}	-0.058*** (-11.312)	-0.091*** (-5.742)	-0.001 (-0.071)	0.019 (1.259)
Local Bank Dummy	Yes	Yes	Yes	Yes
Foreign Bank Dummy	Yes	Yes	Yes	Yes
No. of Observations	3982	3982	3982	3982
No. of Banks	129	129	129	129
R-Squared	0.435	0.426	0.378	0.167

1. The dependent variable in Panel 1 is the portfolio share of Consumer Loans, measured as ratio of Consumer Loans to Total Loans.
2. The dependent variable in Panel 2 is Loan Portfolio Size, measured as the ratio of Total Loans to Total Assets.
3. The main independent variable for all sets of estimations is Securitization, measured as the Total Bank Assets Sold and Securitized normalized to Total Assets.
4. Control variables are included in the estimations for Panels 1 & 2 to account for bank-specific factors that may have an influence on the dependent variable/s. These are: Log of Assets (Bank Size), Capital to Assets Ratio or CAR (Bank Capitalization), Core Deposits/Assets (Bank's Traditional Funding Base), Local Bank Dummy Variable=1, if the bank does not have nationwide branching and =0, otherwise (Bank's Geographic Coverage) and, Foreign Bank

Dummy Variable=1, if the bank is owned by a foreign Bank Holding Company and =0, otherwise (Bank's affiliation to a foreign entity).

5. FE refers to Bank Fixed Effects estimation results.
6. IV refers to Panel Instrumental Variables estimation results. In the IV estimations, the instruments used are the previous period's (i.e. two-period lag) Securitization, Log of Assets, CAR, Core Deposits/Assets, Total Amount of Subordinated Securitization Retained by the Bank/Total Bank Assets Sold and Securitized, Lines of Credit on Securitized Loans/Total Bank Assets Sold and Securitized and, Total Amount of Securitized Loans in Default/Total Bank Assets Sold and Securitized.
7. Items in parenthesis report the t-statistics.
8. * denotes significance at the 10% level, ** at the 5% level and, ***at the 1% level. All regressions include an intercept.

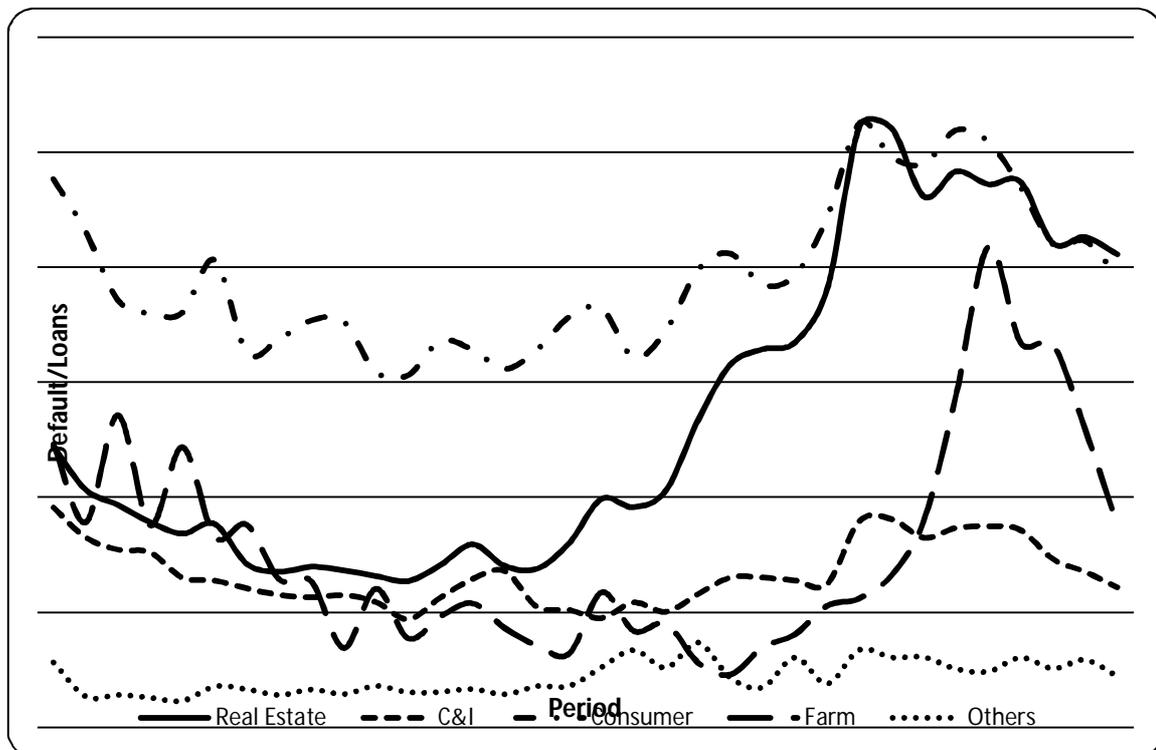


Figure 2. Default Rates by Loans Class

1. The default rate of each Loans Class is calculated as the ratio of the Amount of Loans that is in Default to the Total Amount of Loans of each Loan Class (e.g. Default Rate of the Real Estate Loans=Real Estate Loans in Default/Total Amount of Real Estate Loans).
2. Figure 2 shows that the loans class with the highest default rates from 2001-2010, is Consumer Loans (followed by Real Estate Loans). This implies that Consumer Loans is the riskiest loans class that the bank can hold.
3. The default rates are calculated based on the aggregate values for the entire Commercial and Thrift Banking System under the FDIC. Data on aggregate values for the Commercial and Thrift Banking System are accessible through the Statistics on Depository Institutions available at the FDIC website.

Table 4. Securitization and Loan Portfolio Risk

	Dependent Variable			
	NPLs _t	Charge-Offs _t	SD NPLs _t	SD Charge-Offs _t
Sampling Period: 2001:4-2010:4	1	2	3	4
Independent Variables				
Securitization _{t-1}	0.786*** (10.624)	0.917*** (8.240)	0.141*** (4.003)	0.023 (0.887)
Log of Assets _{t-1}	0.917*** (22.872)	0.326*** (17.296)	0.100*** (5.400)	0.021*** (2.709)
CAR _{t-1}	1.670*** (5.409)	0.366 (1.503)	0.723*** (4.746)	0.092 (0.907)
Loans/Assets _{t-1}	1.045*** (9.145)	0.882*** (12.561)	0.108* (1.698)	0.046 (1.503)
Real Estate Loans/Loans _{t-1}	1.276*** (9.181)	0.224*** (3.025)	0.145* (1.913)	0.047 (1.293)
C&I Loans/Loans _{t-1}	1.099*** (7.304)	0.745*** (7.165)	0.156* (1.681)	0.154*** (3.428)
Consumer Loans/Loans _{t-1}	0.369** (2.445)	2.579*** (20.083)	-0.135* (-1.648)	0.218*** (4.964)
Farm Loans/Loans _{t-1}	4.463*** (4.678)	-0.236 (-0.279)	0.841 (1.609)	0.296 (0.819)
Local Bank Dummy	Yes	Yes	Yes	Yes
Foreign Bank Dummy	Yes	Yes	Yes	Yes
No. of Observations	3982	3982	971	971
No. of Banks	129	129	129	129
R-Squared	0.230	0.317	0.092	0.071

1. The dependent variables in Panels 1-4 stand as indicators for overall loan portfolio risk. The dependent variable in Panel 1 is Non-Performing Loans normalized to Total Loans (NPLs). NPLs are loans that have been past due for 90 days plus loans that have been in non-accrual status. The dependent variable in Panel 2 is Charge-Offs normalized to Total Loans (Charge-offs). Charged-Offs are loans that have been delinquent for the past 120 days. In Panel 3, the dependent variable is the standard deviation (SD) of NPLs, while in Panel 4, the dependent variable is the SD Charge-Offs. The respective SDs are calculated for each year using quarterly values.
2. Control variables are included in the estimation to account for bank-specific factors that may have an influence on overall loan portfolio risk. These are: Log of Assets (Bank Size), CAR (Bank Capitalization) and, Loans/Assets (Bank's Loan Portfolio Size). The Local and Foreign Bank Dummy Variables have also been included.
3. Control variables for the portfolio share of each loans class have also been added in the estimations to account for the respective risk implications of each loans class on overall loan portfolio risk.
4. Items in parenthesis report the t-statistics.
5. * denotes significance at the 10% level, ** at the 5% level and, ***at the 1% level. All regressions include an intercept.

Table 5. Securitization and Bank Returns

	Dependent Variable			
	ROA _t	ROE _t	SD ROA _t	SD ROE _t
Sampling Period: 2001:4-2010:4	1	2	3	4
Independent Variables				
Securitization _{t-1}	0.858*** (9.264)	4.935*** (6.208)	0.251*** (4.640)	1.672*** (4.371)
Log of Assets _{t-1}	-0.285*** (-16.017)	-2.875*** (-15.165)	-0.008 (-0.737)	-0.031 (-0.265)
CAR _{t-1}	-1.177*** (-4.581)	-67.438*** (-30.092)	0.098 (0.572)	-9.307*** (-7.489)
Loans/Assets _{t-1}	0.346*** (4.514)	5.053*** (6.207)	0.236*** (4.843)	0.649 (1.413)
Real Estate Loans/Loans _{t-1}	-0.817*** (-8.100)	-11.627*** (-11.518)	-0.357*** (-4.445)	-2.589*** (-3.817)
C&I Loans/Loans _{t-1}	-0.148 (-1.123)	-7.164*** (-5.213)	-0.239** (-2.340)	-3.570*** (-4.014)
Consumer Loans/Loans _{t-1}	0.371*** (3.102)	-0.901 (-0.818)	-0.222** (-2.461)	-1.381** (-1.992)
Farm Loans/Loans _{t-1}	-2.211*** (-3.316)	-18.823*** (-2.877)	-0.792 (-1.533)	-1.222 (-0.444)

Local Bank Dummy	Yes	Yes	Yes	Yes
Foreign Bank Dummy	Yes	Yes	Yes	Yes
No. of Observations	3982	3982	971	971
No. of Banks	129	129	129	129
R-Squared	0.178	0.301	0.098	0.096

1. The dependent variables in Panels 1 & 2 stand as indicators for bank returns. The dependent variable in Panel 1 is the ROA, while in Panel 2, the dependent variable is the ROE.
2. The dependent variables in Panels 3 & 4 stand as indicators for bank returns volatility, measured as the standard deviations of the ROA and the ROE. The respective SDs are calculated for each year using quarterly values.
3. The control variables included in the estimations for Table 5 are the same as that of Table 4.
4. Items in parenthesis report the t-statistics.
5. * denotes significance at the 10% level, ** at the 5% level and, ***at the 1% level. All regressions include an intercept.

Table 6. Securitization, Loan Portfolio Diversification, Risk and Returns

	Independent Variables		No. of Obs.	No. of Banks	R-Squared
	1-HHI _{t-1}	Securitization _{t-1}			
Sampling Period: 2001:4-2010:4	1	2			
Dependent Variables					
1-HHI _t	0.855*** (107.307)	0.019*** (3.832)	3982	129	0.976
NPLs _t	-0.782*** (-4.098)	0.286*** (4.576)	3982	129	0.263
Charge-Offs _t	-0.125** (-2.465)	1.730*** (13.965)	3982	129	0.219
SD NPLs _t	-0.094* (-2.428)	-0.017 (-0.502)	971	129	0.042
SD Charge-Offs _t	-0.051* (-1.787)	0.080*** (2.978)	971	129	0.043
SD ROA _t	-0.160*** (-4.786)	0.278*** (5.558)	971	129	0.111
SD ROE _t	-2.129***	1.981***	971	129	0.137

(-5.254)

(5.401)

-
1. The dependent variables are on the first column (leftmost panel) of Table 6.
 2. 1-HHI is the indicator of loan portfolio diversification, measured as the inverse of the Herfindahl-Hirshcman Index (HHI) (see Footnote 12 for further explanation).
 3. For brevity, only the independent variables of interest, $1-HHI_{t-1}$ (in Panel 1) and $Securitization_{t-1}$ (in Panel 2) are reported. However, all estimations in Table 6 include the control variables used in the earlier estimations (i.e. Tables 3-5).
 4. Items in parenthesis report the t-statistics.
 5. * denotes significance at the 10% level, ** at the 5% level and, ***at the 1% level. All regressions include an intercept.

Session C

"Relative Technical Efficiency in Government Spending in Nigeria"

Michael Nyong (Covenant University, Nigeria)

Abstract: Nigeria operates a fiscal federalism structure. Fiscal Federalism means that the different tiers of government (Federal, States and Local Governments) have different functions, assignments and spending responsibility towards meeting the overall goal of development. There are six (6) geopolitical regions, thirty-six(36) state governments and seven hundred and seventy-four (774) local governments for effective administration of the country. This paper attempts to provide an evaluation of the relative technical and scale efficiency of the 36 states and Abuja(FCT) in reengineering socioeconomic economic development through their respective spending profiles (productive and protective expenditure). Results for two periods 2004 and 2010 based on data envelopment analysis(DEA) are presented. The empirical evidence reveals high levels of inefficiency among the states of the Federation. The mean efficiency scores were about 66.7 % (technical efficiency) and 69.8% (scale efficiency) in 2004 and 75.1 % (technical efficiency) and 78% (scale efficiency) in 2010. Inefficiency varies from 77% (0.223) Delta State on the high side to 3%(0.971) Gombe State on the low side in 2004 and between 72.6 % (0.274) Bayelsa State on the high side to 2%(0.978) Zamfara State on the low side in 2010. The dynamics of the transition show that states that were efficiency in 2004 could not maintain their efficiency in 2010. Only two states, Niger and Oyo, were technically and scale efficient cocsistently with an efficiency score of 1.00 throughout the two periods. Overall, the results show high level of waste in resources of about N289.798 billion Naira(\$2.4 billion) in 2004 and about 695.425 billion Naira (\$4.627 billion) in 2010. Factors accounting for the widespread inefficiency among the state were identified to include literacy rate, cost of living, HIV/AIDs prevalence rate and 'accountability index'. These factors were consistently statistically significant across the two periods. Consequently, institutional and structural impediments cannot be ignored in policies to promote efficiency and reduce waste in Nigeria.

Introduction

Nigeria operates a fiscal federalism structure. Fiscal Federalism means that the different tiers of government (Federal, States and Local Governments) have different functions, assignments and spending responsibility towards meeting the overall goal of development. There are six (6) geopolitical regions, thirty-six(36) state governments and seven hundred and seventy-four (774) local governments for effective administration of the country. The six geopolitical regions include North- East, North- West, North- Central, South- East, South- West and South -South.

Successive national developments plans of Nigeria as well as the national economic emancipation and development strategy (NEEDS) have always stressed the commitments of governments at all levels to promote rapid economic growth and poverty reduction. To achieve these and other goals of governments the Federal and State governments including local governments allocated and spent substantial amount of money. For instance in 2000 the total amount of spending by Federal Government was about seven hundred and one billion, sixty million Naira (N701.06billion) state governments five hundred and ninety-six billion, nine hundred and sixty million Naira (N596.96 billion) and local government two hundred and twenty-two billion, six hundred and seventy million Naira (N22.67 billion). By 2004 the amount has risen to about N1,426.2 billion by Federal Government the value in 2004 was about double the spending by all levels of government. By 2010 the total amount of spending by the Federal government has risen to about N4,194.6 billion or six times the value in 2000 while the spending by states rose to about N2,871.5 billion (about 5 times the value in 2000) and by local governments to N1,356.7 billion or 8.8 times the value in 2000. Overall the consolidated total spending of all the three tiers of government in 2010 was about N8,422.76 billion or about 5.8 times the combined expenditure at N1,451.9 billion in year 2000. Despite the huge expenditure by the Federal State and local governments, the incidence of poverty (69.0% in 2010) is still high creating serious doubts on the prospects of achieving the Millenium Development Goals (MDGs) by 2015.

Specifically, the huge government expenditure provokes a number of fundamental questions. How well have the resources been spent in promoting economic growth, reducing unemployment and the high incidence of poverty in the country? Could more have been achieved with the level of spending or could the same level of development been achieved with lower amount of government spending? What is the level of output growth, improvement in employment, and reduction in poverty levels not realized or lost as a results of inefficiency, if any? These questions provides the motivations for this study.

Given the fact that the state governments are closer to the people than the Federal government, and more usable data are available at the state level than at the local government level, this paper attempts to evaluate the relative efficiency of the 36 states and Abuja (Federal Capital Territory) in reengineering economic growth, minimizing income inequality, reducing the incidence of poverty using theoretically more defensible framework *a la* data envelopment analysis (DEA). Additionally, the study determines the factors accounting for the observed differentials in their level of efficiency (inefficiency).

The rest of the paper is structured in four sections. Section I has been the introduction. Section II provides a brief review of the literature. In section III we articulate the research methodology. We present the empirical results in section IV. Section V summarizes the main findings and concludes.

II Literature Review

In spite of the huge public spending by both the Federal, State and local governments in Nigeria the country has recorded rather low level of performance in all the major socioeconomic indicators (see Table 2.1). The level of real GDP growth is low at 6.0 in 2008, life expectancy at birth is low at 54 years, infant mortality is high at 96.14 per 1,000 in 2010. Unemployment rate is also high at 13.4 percent in 2004 and 21.1 percent in 2010, an increase of about 7.7 percent (see Table 2.2). Moreover, in 2010 the incidence of poverty was high and widespread at about 69 percent (NBS 2011). With a population of about 168 million this translates into about 116 million Nigerians who are poor in 2010. Table 2.1 shows trends in government spending by various tiers of governments in Nigeria. The results show that government spending by all the three tiers of government varied between 16 percent of GDP at the low end (1996) to about 38 percent of GDP on the high side (2001) with an average of about 27.8 percent of GDP. It is important to note that none of these years were election years. Table 2.2 indicates the performance of the economy in terms of some basic socioeconomic aggregates between 1996 and 2010. The data present disturbing prospects. All the indicators are poor. The incidence of poverty at 69 percent in 2010 means that with a population of about 163 million people in 2010 about 112.5 million Nigerians have slipped into poverty class. Infant mortality rate is also alarming and shows a worsening trend. From 96.14 per 1,000 in 1996 the infant mortality rate has been increasing reaching a peak level of 128.5 per 1,000 in 2010. The performance of the economy in terms of unemployment had been dismal. At 7.4 % in 1996 the unemployment rate rose to 13.1 % in 2000 and by 2010 it has risen uncontrollably to 21.1 %. These disturbing socioeconomic performance questions the commitment of government to improve the living conditions of its citizenry. When viewed against the high economic growth rate of about 7.9% in 2010 (see Table 2.2), the high level of unemployment and incidence of poverty suggests the fallacy or bankruptcy of the trickled-down effect of macroeconomic policy to reduce poverty with growth. It is clear that high-growth and high incidence of poverty is a paradox in Nigeria.

Table 2.3 provides a break-down of socioeconomic performance among the six geopolitical regions and among the 36 states and Abuja (FCT). From the table it is clear that all the states in general performed poorly on the basic socioeconomic indicators and their performance mirrors the performance at the national level.

Table 2.3 shows disturbing levels of unemployment and wide income inequality among the states. The incidence of poverty is very high in seven states. These states recorded poverty rates above 80 percent. They include Sokoto 86%, Katsina 82%, Bauchi 83.7%, Adamawa 80.7 %, Kebbi 80.5%, Ebonyi 80.4%, and Zamfara 80.2%. With respect to unemployment rate in 2010 we found high recorded rates of unemployment in Zamfara at 33.4%, Sokoto 32.4%, Imo 29.9% and Bauchi 29.7% and lowest and single digit in Lagos at 7.6%, Oyo 8.8% and Ogun state 9.9%.

Income Inequality presents a different picture altogether. In spite of high levels of unemployment and relative poverty among the states, income inequality was low in three states Kebbi (0.326), Bayelsa (0.337) and Nassarawa (0.34) and highest in five states namely Taraba (0.524), Yobe (0.523), Abuja/FCT(0.512), Ekiti (0.483) and Delta (0.47) as reflected in Table 2.3.

Figure 2.1 show the dynamics of the incidence of poverty among the 36 states between 2004 and 2010. The Figure reveals that the incidence of poverty actually increased in 28 states and fell in 9 states. Whereas the highest increase in relative poverty were observed in Anambra (47.8%), Enugu(40.98%) and Abia States (40.7%), significant declines in relative poverty were observed in Niger (-20.3%), Jigawa (-16.07%) and Kogi (-15.08%). Figure 2.2 shows the distribution of changes in unemployment rates among the states. Whereas higher levels of increase in unemployment rate were recorded in Yobe (28.35%), Sokoto (27.9) and Borno states (22.95) where unemployment rates were higher than the national average at 21.1%, significant declines in unemployment rate were also recorded in some states namely Zamfara (-27.9), Lagos (-8.45) and Enugu(-6.95).

Figure 2.3 presents distribution in changes in income inequality among the states. Income inequality fell in 10 states but increased in 27 states. Highest increase in income inequality were recorded in Yobe (19.47), Taraba (15.8) and Delta (11.2) and highest declines were recorded in Niger (-20.3), Jigawa (-16.07) and Kogi(-15.08).

Overall, the high level of unemployment and the incidence of poverty at the state level is embarrassing indicating poverty in the midst of plenty in an oil resource-rich country (Ekpo, 2012). The interest in public spending efficiency is motivated largely by the need to reduce waste and inefficiency. The focus is on how to improve spending efficiency so as to achieve more outcomes with minimum use of resources particularly in resource-scarce economies.

A careful review of the literature reveals that studies on government spending efficiency in reengineering socioeconomic development are several and varied. Radmar (2011) investigates the impact of quality of institutions on the effectiveness of government spending for 83 rich and poor countries in the year 2000. The study indicates that economic freedom exert positive and statistically significant impact on public spending across the countries under review. Specifically the study shows that "quality of institution, legal structure and security of property rights" are critical factors in spending efficiency. Observing that a key requirement for improvement of the quality of public finances is the efficiency of transformation of inputs (government spending) into outputs (socioeconomic outcomes), Ebeje and mandl (2009) examine efficiency of public spending in Malta using full disposal hull (FDH) and data envelopment analysis (DEA). Their findings indicate that public spending in Malta is relatively efficient at the primary and secondary levels but highly inefficient at the tertiary levels. They concluded that there is scope for rationalizing tertiary education and healthcare spending without compromising outcomes.

Perhaps, a far more comprehensive study was undertaken by Hauner and Kyobe (2008) who assembled a large cross-section of 114 countries on all income levels from 1980 to 2004. Their results reveal that "efficiency trended upwards" in each of the three groups (advanced countries, developing countries and all two groups combined). Their findings also suggest that high public spending as proportion of GDP does not necessarily leads to improved efficiency but that in

general lower level of efficiency is associated with higher spending. They also found that institutional quality and demographic factors contribute significantly to the observed differentials in efficiency level among the countries.

Similarly Herrera and Pang (2005) investigate public spending efficiency in a cross section of 140 developing countries from 1996 to 2002 using a combination of free disposal hull (FDH) and data envelopment analysis (DEA). The objective is to measure efficiency given that developing countries "spend between 15 and 30 percent of their GDP" on the attainment of government objectives. The interest was on examining whether government was achieving adequate value for the money spent. The study finds large level of inefficiency among the countries under investigation. According to them "countries with higher expenditure levels register lower efficiency scores". They found that income inequality, the degree of urbanization and prevalence of HIV/AIDs epidemic are some of the critical factors that account for the observed differentials in inefficiency level.

In a related study but focusing on health provision among 30 OECD countries, Afonso and Aubyn(2005) examine the relative efficiency of public spending during the period 2000-2003. Using a combination of DEA and Tobit regression analysis and input measures such as doctors, nurses, beds and magnetic resonance imagers (MRI) units and output measures which include life expectancy, infant survival rate, potential years of life not lost, they presented very interesting results. From their results they concluded that the countries would have increased their performance by about 40 percent if they were technically efficient. The second stage analysis reveals that environmental factors (wealth or GDP per head, level of education attained in a country, smoking habits and obesity) explain much of the efficiency variations among the 30 OECD countries. Consequently, they insisted that environmental factors cannot be ignored in policies to promote efficiency and reduce waste.

Ventelou and Bry(2006) investigates public spending efficiency in economic growth using data envelopment analysis. Classifying public spending into productive spending and protective spending rather than the traditional accounting classification into capital and recurrent spending, they examine the spending efficiency of 15 OECD countries in stimulating economic performance. They found that: (i) There is wide variations in efficiency among the countries which modified their potential to achieve faster economic growth. While Australia, United States, Greece, and Japan were the most efficient countries, the poor performing countries with low efficiency scores include France at 0.52, Sweden at 0.55 and Austria at 0.6096. (ii) The deviations from efficiency frontier may not be indicative of "pure misallocation" of resources but may be connected with an "index of social wellbeing". They concluded that "public spending is not the problem, the way it is used could be".

Given the resource abundance of some countries, Devarajan et al (2010) investigates the public spending efficiency of oil-rich economies from the theoretical and empirical perspectives. They found in general these countries are low on efficiency but that citizens' scrutiny over government expenditure could enhance public spending efficiency. They also found that accountability is stronger in those countries that are dependent on direct taxation to finance public spending.

In Nigeria one can explicitly cite two studies. Ichoku (2011) examines the relative efficiency of health spending using data envelopment analysis (DEA). He investigates the technical and scale efficiency of 200 hospitals in Southeastern Nigeria in March 2009. The results show wide variations in hospital efficiency with efficiency level varying between 59 percent under constant returns to scale and 72 percent under variable returns to scale. The results imply a high level of underutilization of resources and that greater improvement in health care services would have been achieved if the hospitals were efficient, both in technical and scale efficiency.

Aruwa (2010) was more concerned with appropriate classification of government spending. Following the procedure in Aschauer (1989) and Ventelou and Bry(2006) he classified government expenditure into productive and protective components rather than the accounting method of capital and recurrent expenditures. Using data from 1979 to 2008 and econometric method, he found that based on unit root test, Engle-Granger cointegration and vector error correction model public spending(productive and protective) is determined by growth in GDP (Wagner's law) suggesting that government expenditure " has not been determined based on their productiveness but passively as a fiscal policy instrument . . .". While observing like Devarajan et al (1996) that productive expenditures when used in excess could become unproductive, he insists that "developing countries are misallocating public expenditure in favour of capital expenditures at the expense of current expenditures".

The two studies on Nigeria are informative and underscores the need for further work. Although Aruwa recognized the importance of public spending efficiency in Nigeria he did not pursue the matter further and no attempt was made to evaluate public spending efficiency which is important for the achievement of socioeconomic development and transformation with minimum use of resources. With respect to Ichoku (2011) the study is narrow in conception and execution focusing only on health in Southeastern Nigeria.

From the analysis above it is clear that no study has investigated spending efficiency of lower levels of government particularly in Nigeria in reengineering socioeconomic development and transformation. This is rather surprising given the fact that the lower level of government – the subnational governments or states - are closer to the people than the Federal government. They are better placed to appreciate the problems of the people in their respective states or regions particularly with respect to unemployment, economic growth, inequality and incidence of poverty. These are some of the motivations for this study. It is well known that small changes in efficiency of government spending could have significant effect on poverty reduction and on the attainment of other objectives.

III Analytical Methodology

The approach adopted in this study is rooted in data envelopment analysis (DEA). DEA originates from Farrell (1957) seminal work and was made popular by Charnes, Cooper and Rhodes (1978), Banker et al. (1984). It assumes the existence of a convex production frontier constructed using linear programming methods. The term "envelopment" stems from the fact that the production frontier envelops the set of observations (see Talluri 2000, Boussofiane et al. 1991, Cook et al. 1996, Bowlin 1998, Sengupta 2000, Khumbakar & Lovell 2000, for introductory and advanced treatment). Further treatment of data envelopment analysis is provided in Coelli (1995), Coelli et al. (1998), Thanassoulis (2001), Simar and Wilson (2003). DEA may be input oriented or output oriented. In input orientation, the focus is on evaluating by how much input quantities may be proportionally reduced without changing the output quantities. In the output orientation, the focus is on by how much the output quantities may be proportionally increased without changing the input quantities used.

The efficiency criterion used in this study is more than technical efficiency narrowly defined. We use for each of the 36 states and Abuja protective spending (% total spending) or REC and productive spending (% total spending) or KAP as the indicator of inputs, and Real GDP (LRGDP), unemployment (UNEM), income inequality (INEQ) and incidence of poverty (POV) at the state level as the output measures. Efficiency then reflects not only whether more growth, more employment, more income equality and higher level of prosperity (low poverty incidence) are produced with given level of spending at the state level (output orientation), but also whether the current level of growth and employment as well as wellbeing at the state level are generated by minimum spending (input orientation). We use constant returns to scale DEA. This is necessary to permit the analysis of scale efficiency. A state is considered scale efficient where its size of operations is optimal. Any modification on its size will render it less efficient. A scale efficiency of less than unity indicates decreasing returns to scale and hence that the state is operating above optimal scale. In this scale all the inputs should be reduced proportionally.

The data envelopment analysis model is of the form

$$\text{Min } \theta \quad 4.1$$

Subject to

$$\sum \lambda_i X_i \leq \theta X_0 \quad 4.2$$

$$\sum \lambda_i Y_i \geq Y_0$$

$$\lambda_i \geq 0$$

where λ_i is the weight given to each state i in its efforts to dominate state 0 and θ is the efficiency of state 0; X_i is the vector of inputs into state i , Y_i the corresponding vector of outputs. In the equations above, X_0, Y_0 are vector of inputs and outputs respectively of state 0 for which we want to determine its efficiency. A value of $\theta = 1$ indicates efficiency and lies on the pareto-optimal frontier or production possibility frontier. $\theta < 1$ indicates inefficiency by the amount to which it is less than unity. DEA assumes that the inputs and outputs have been correctly identified. Scale efficiency score was obtained by dividing efficiency score under constant returns to scale by efficiency score under variable returns to scale.

Inputs and Outputs

Two sets of inputs and four sets of outputs are used. The inputs measures used are productive expenditure (CAP) and protective expenditure (REC). The productive expenditure include expenditure on economic, social and community services and protective expenditure include expenditure on administration and transfers. Expenditures on general administration, defence, justice, law and order, and maintenance of State are unproductive (i.e. protective). They are however, necessary for the productive efficiency of the economy. The output measures are real GDP, unemployment rate (UNEM) incidence of poverty (POV) and income inequality (INEQ). To insure the maximization perspective, we modified some of the variables. For unemployment we use 100-UNEM, for Gini income inequality index we use 1-INEQ, and incidence of poverty we use 100-POV.

From the efficiency ratios for each of the 36 states and Abuja calculated from equations 4.1 and 4.2 using Coelli (1996) computer software we run a Tobit regression model to identify the sources of inefficiency in the second stage. The Tobit regression model takes the form

$$\theta_i = \psi_0 + \psi_1 \text{ADLIT}_i + \psi_2 \text{LCPI}_i + \psi_3 \text{HIV/AID}_i + \psi_4 \text{IGRY}_{it} + u_i \quad \dots \quad 4.3$$

where θ_i = efficiency score for a state i , ADLIT = Adult literacy rate or percentage of literate adults (15 years and above) in a state, HIV/AID = HIV/AIDs prevalence rate in state, IGRY = internally generated revenue as percentage of GDP of the state used as accountability index, u_i = stochastic error term. An important innovation in this study is the introduction of HIV/AID and IGRY in the set of explanatory variables which capture environmental and epidemiological conditions as well as accountability factor. The inclusion of environmental condition is to correct for the harshness of the environmental condition in which some of the state operates. The accountability index is informed by other studies (Devarajan et al. 2010) who found that accountability is stronger in those countries that are dependent on direct taxation to finance public spending. The model was estimated by Tobit regression method.

The 36 states and Abuja included in the study are as indicated in Table 2.2. All data were taken from National Bureau of Statistics (various issues), Central Bank of Nigeria Annual Report 2004, 2002, 2001, 2010, Central Bank of Nigeria Statistical Bulletin 2009, 2010 and the Manpower Board. Methodologically, our approach with respect to data envelopment analysis is consistent with Bowlin (1998) rule of the thumb according to which the number of observations should exceed the number of inputs and outputs multiplied by three to avoid the risk of getting too many efficient decision units. In our case we have 37 observations, more than the critical level of 18 (6 outputs and inputs times 3). The analysis is performed for two periods 2004 and 2010.

IV Empirical Results

The empirical results are presented in three tables. The first table (Table 4.1) presents the descriptive statistics of the variables used. Data envelopment analysis efficiency scores for 2004 and 2010 are presented in Table 4.2. The determinants of the observed differential in levels of inefficiency are contained in Table 4.3. Table 4.1a show that although the variability of the output variables measured by standard deviation is rather large, the coefficient of variation is low as seen particularly in the case of income inequality, unemployment and relative poverty (RPOV) where the Jarque Bera statistic test indicates that the sample comes from a normal distribution. In Table 4.1b it is only the percentage of literate adults (PADLIT08) that indicate that the sample has normal distribution. All the other values have large variability. Overall, the data show marked differences in both the input and output measures as well as in the determinants of spending efficiency of the research sample.

Table 4.2 reveals wide variations in the level of spending efficiency achieved by the 36 states and Abuja as reflected in their efficiency scores (overall efficiency CRS, technical efficiency VRS, and scale efficiency SCALE). Drs pertains to decreasing returns to scale. The average efficiency score in 2004 was about 67.7 percent compared to 75.1 percent in 2010, showing that there has been marginal increase in the level of efficiency, an increase of about 7.4 percent. Scale efficiency also increased on the average between the two periods, from 69.8 percent in 2004 to 91.5 percent in 2010, an increase of about 21.7 percent. Efficiency vary between 1.0 on the high side (Adamawa, Edo, Niger, Oyo, Yobe and Abuja) to 0.223 on low side (Delta state, an oil producing state) in 2004. In 2010 the most efficient states were Anambra, Imo, Kebbi, Nassarawa, Niger, Ogun, Osun and Oyo with an efficiency score of 1.0 while the most inefficient states were Bayelsa (0.274), Kaduna (0.314) and Delta (0.321).

Whereas during the two periods, Niger and Oyo states have consistently maintained an efficiency score of unity, Delta State had consistently under performed as its efficiency rating had been abysmal given the resources available. Further analysis indicates that the state were using too much resources that failed to generate the desired output. It is this too much resource usage that translates into waste and possibly corrupt practices. The results are further confirmed by the low level of average scale efficiency which was 0.698 in 2004 and 0.915 in 2010. Giving the decreasing returns to scale evident in the scale efficiency score, the amount of input usage has exceeded the optimal level. With a total spending of about 2781.7 billion Naira and an average efficiency score of 0.751, the total waste in resources is about 695.4 billion in 2010 alone or about \$4.627 billion. Figure 4.1 shows the dynamics or changes in relative spending efficiency among the states between 2004 and 2005, indicating some improvement in overall average efficiency among them. Fifteen (15) states experienced increasing returns (irs) in 2010 suggesting that potential exists for larger output performance if they are efficient.

Given the fact that there are more states in the north than in the South, and more states in the north are inefficient than southern states, there is greater need for commitment by northern governors to deliver democratic dividends on development. Perhaps, this informs the recent formation of **Coalition of Concerned Northern Politicians, Academics, Professionals and Businessmen (CCNPAPB)** to draw attention to the failure of northern governors in promoting development in the region compared to the south.

Table 4.3 indicates the determinants of the observed differentials in inefficiency among the states. The results show that HIV prevalent rate, literacy rate, accountability index and cost of living are the dominant determinants of efficiency differentials among the state. The four variables are consistently significant across the two estimation periods.

Table 4.3a: Determinants of Spending Efficiency 2010

	Coefficient	Std. Error	z-Statistic	Prob.
C	-16.24499	7.517580	-2.160933	0.0307
HIV07	0.007530	0.008243	0.913482	0.3610
PADLIT07	-0.009616	0.002858	-3.364847	0.0008
PADLIT08	0.008351	0.003256	2.564734	0.0103
IGRY08	0.028734	0.011182	2.569591	0.0102
LCPI09	3.675726	1.640949	2.240000	0.0251

Log likelihood = 4.267 Scale Elasticity = 0.1928

Table 4.3b: Determinants of Spending Efficiency 2004

	Coefficient	Std. Error	z-Statistic	Prob.
C	-5.220096	2.452656	-2.128344	0.0333
HIV01	-0.041938	0.019953	-2.101836	0.0356
HIV03	0.043315	0.018869	2.295568	0.0217
PADLIT04	-0.003240	0.001774	-1.826333	0.0678
LCPI02	0.727094	0.295569	2.459978	0.0139
IGRY01	0.079150	0.054846	1.443133	0.1490
IGRY02	-0.164819	0.091886	-1.793728	0.0729

Log Likelihood = 10.227 Scale Elasticity = 0.1835

V Concluding Remarks

In this paper an attempt has been made to assess the relative spending efficiency among the 36 states and Abuja/FCT in reengineering socioeconomic growth and development states and FCT in Nigeria using data envelopment analysis. The results show that wide differentials in the level of efficiency among the states. The average overall efficiency score was about 67.7 percent and scale efficiency of about 69.8 percent in 2004 compared to 75.1 percent in overall efficiency and 91.5 percent in scale efficiency in 2010.

Efficiency score among the states vary between 1.0 on the high side (Adamawa, Edo, Niger, Oyo, Yobe and Abuja) to 0.223 on low side (Delta state, an oil producing state) in 2004. In 2010 the most efficient states were Anambra, Imo, Kebbi, Nassarawa, Niger, Ogun, Osun and Oyo with an efficiency score of 1.0 while the most inefficient states were Bayelsa (0.274), Kaduna (0.314) and Delta (0.321). Whereas during the two periods, Niger and Oyo states have consistently maintained an efficiency score of unity, Delta State had consistently under performed as its efficiency rating had been disappointing given the resources available. Further analysis reveals that the state were using too much resources that failed to generate the desired output. It is this too much resource usage that translates into waste and possibly corrupt practices. The results are further confirmed by the low level of average scale efficiency which was about 0.698 in 2004 and about 0.915 in 2010. Giving the decreasing returns to scale evident in the scale efficiency score, the amount of input usage had exceeded the optimal level. With a total spending of about 2781.7 billion Naira and an average efficiency score of 0.751, the total waste in resources is about 695.4 billion in 2010 alone or about \$4.627 billion. More states in the north were found to be inefficient compared to those in the south.

The factors accounting for observed differences in the level of spending efficiency were identified and quantified using Tobit regression in the second stage. The results show that HIV/AIDS prevalence rate, accountability index, cost of living and adult literacy are the critical variables. These factors were consistently statistically significant across the two periods. Consequently, institutional and structural impediments cannot be ignored in policies to promote efficiency and reduce waste in Nigeria.

References

- Afonso, Antonio and Miguel St Aubyn (2006):Relative Efficiency of Health Provision: a DEA Approach with Non-Discretionary Inputs. *Economic Modelling* 23 (3).
- Aruwa, Suleiman (2010): The Quality of Public Expenditures in Nigeria. Seminar Series III (May) Nigerian Defence Academy, Kaduna.
- Aschauer, D.A. (1989):Is Public Expenditure Productive? *Journal of Monetary Economics*, Elsevier, vol. 23(2) 177-200.
- Banker, R.D., A. Charnes & W.W. Cooper (1984):Some Models for Estimating Technical and Scale Efficiencies in Data Envelopment Analysis. *Management Science* 30(9) 1078-1092.
- Boussofiane, A., R.G. Dyson, E. Thanassoulis (1981):Applied Data Envelopment Analysis. *European Journal of Operational Research*, 52, 1-15.
- Bowlin, William (1998):Measuring Performance: An Introduction to Data Envelopment Analysis (DEA). *Journal of Cost Analysis* (Fall) 3-27.
- Central Bank of Nigeria (CBN) (2010): Statistical Bulletin.
- Central Bank of Nigeria (CBN) (2010): Annual Report and Statement of Account.
- Central Bank of Nigeria (CBN) (2009): Annual Report and Statement of Account.
- Central Bank of Nigeria (CBN) (2008): Annual Report and Statement of Account.
- Central Bank of Nigeria (CBN) (2004): Annual Report and Statement of Account.
- Central Bank of Nigeria (CBN) (2002): Annual Report and Statement of Account.
- Central Bank of Nigeria (CBN) (2001): Annual Report and Statement of Account.
- Charnes, Abraham., William W. Cooper, & Eduardo Rhodes (1978):Measuring the Efficiency of Decision Making Units. *European Journal of Operations Research*, 2, 429-444.
- Chirikos T.N, Sear A.M.(2000): Measuring Hospital Efficiency: A comparison of Two Approaches. *Health Services Research* (6):1389-408.
- Coelli T.(1996): A guide to DEAP version 2.1: a data envelopment analysis (computer) program. New South Wales, Australia. Armidale, (CEPA Working Paper 96/08.
- Coelli T.J. (1995): Recent Developments in Frontier Modelling and Efficiency Measurement. *Journal of Agricultural Economics* 39(3):219-45.
- Coelli, Tim, D.S. Prasada Rao, & George E. Battese (1998):An Introduction to Efficiency and Productivity Analysis. Boston. Kluwer.
- Cook, W.D., M. Kresse, L.M. Seiford(1996):Data Envelopment Analysis in the Presence of Quantitative and Qualitative Factors. *Journal of the Operational Research Society* 45(5) 567-578
- Devarajan, Shantayanan; Helene Ehrhart, Tuan Minh Le, and Gael Rablland(2010):Direct Redistribution and Taxation in Oil-Rich Economies: A Proposal. Center for Studies and Research on International Development. CERDI, University of Auvergne, France.
- Devarajan, Shantayanan; V. Swaroop and H. Zou(1996):The Composition of public expenditure and economic growth. *Journal of Monetary Economics*, vol. 37, 2 (April) 313-344.
- Ebejer, Ivan and Ulrike Mandl(2009): The Efficiency of public expenditure in Malta. *ECFIN Country Focus* Vol. 6, issue 2,
- Ekpo, Akpan (2012): High-growing Nigeria and the paradox of poverty. <http://www.telling.com/index.php?option>. Accessed march 22nd, 2012.
- Farrell MJ.(1957): The Measurement of Productive Efficiency. *Journal of the Royal Statistical Society Series A* ;120(3):253-78.
- Gupta, S; K. Honjo; M.Verhoeven (1997): The Efficiency of Government Expenditure: Experiences from Africa. Washington International Monetary Fund, (IMP Working Paper No.WP/97/15.)
- Gupta, S, M. Verhoeven, and E. Tiongson (1999):Does Higher Government Spending Buy Better Results in Education and Health Care? IMF Working Paper 99/21.
- Kumbhakar S.C, Lovell C.A.K.(2000) *Stochastic Frontier Analysis*. Cambridge: Cambridge University Press.
- Hauner, David and Annette Kyobe (2008): Determinants of Government Efficiency. IMF Working Paper 228, 1-25.
- Herrera, S. and G. Pang(2005): Efficiency of public spending in developing countries: an efficiency frontier approach. Policy research working paper no. 3645, World Bank, Washington, DC.
- National Bureau of Statistics (NBS) (2010): Nigeria Poverty Profile 2010.
- National Bureau of Statistics (NBS)(2004): Nigeria Poverty Profile 2004
- National Bureau of Statistics(NBS)(2010): National Manpower Stock and Employment Generation Survey 2010.
- National Bureau of Statistics (2009): Annual Abstract of Statistics 2009
- National Bureau of Statistics (2009): Social Statistics in Nigeria 2009
- Radmar, Hossein (2011): Institutional Quality and Public Spending Efficiency: A Non-Parametric Approach.
- Sengupta, Jati (2000):Dynamic and Stochastic efficiency Analysis: Economics of Data Envelopment Analysis. Singapore.
- Simar, Leopold and Paul Wilson (2003):Efficiency Analysis: The Stochastic Approach.
- Talluri, Srinivas (2000):Data Envelopment Analysis: Models and Extension Decision Line (May). Pennsylvania State University.
- Thanassoulis, Emmanuel(2001):Introduction to the Theory and Application of Data Envelopment Analysis:A Foundation Text with Integrated Software, Kluwer Academy Publishers. Boston, USA.
- United Nations Development Programme (UNDP) (2011):World Population Prospects Report 2011 United Nations Population Division.
- Ventelou, Bruno and Xavier Bry (2006): The role of public spending in economic growth: Envelopment methods. *Journal of Policy Modeling* 28, 403-413.

“Foreign Aid and Public Sector in Costa Rica”

Mariola Gozalo-Delgado³⁰ (University of Burgos, Spain)

Fernando Rueda-Junquera (University of Burgos, Spain)

Abstract

After the 2005 Paris Declaration and the 2008 Accra Agenda for Action, aid effectiveness has turned into a priority. The lack of predictability and the inconsistent fiscal behaviour are two important factors for improving aid effectiveness. In this context, understanding the way through recipient governments adjust to shortfall and windfalls aid becomes a relevant issue. This article develops and estimates a fiscal response model with anticipated aid, being Costa Rica the case study selected. The main assumption is that aid can be anticipated by the government in its budgetary plans. Model estimation suggests that aid is used to reduce borrowing and face up the stabilization problem.

Key words: Aid Effectiveness, Fiscal Response, Costa Rica.

1. Introduction

In the current global financial crisis, the improvement of aid effectiveness has become a crucial challenge for both donors and recipient countries. The principles of the 2005 Paris Declaration on Aid Effectiveness –endorsed again by the 2008 Accra Agenda for Action– acquire a renewed importance. The Paris Declaration Action Plans are trying to influence on the main factors which affect aid effectiveness, among them two in particular (OECD-DAC, 2008 and 2010): first, the rise in predictability of aid flows pledged by donors in order to facilitate the budgetary planning of recipient governments; and second, the strengthening of recipient governments’ capacity for managing efficiently these aid flows as additional sources of financing their public budgets. In this context, it is pertinent to analyse the aid impact on the fiscal behaviour of recipient governments, given that allows to study the two aforementioned factors (Gupta *et al.*, 2004; Heller *et al.*, 2006; IMF, 2007; Celasun and Walliser, 2008).

The utilization of aid flows by recipient governments has been investigated mainly through fiscal response models. Following the seminal paper of Heller (1975), variations on his initial model have been drawn up in an attempt to adapt it to the realities of less developed countries (LDCs) and the available data and econometric techniques (Mosley *et al.*, 1987; Gang and Khan, 1990 and 1999; Khan and Hoshino, 1992; White 1994 and 1995; Franco-Rodriguez, *et. al.*, 1998; McGillivray and Ahmed, 1999; Mavrotas, 2002; McGillivray and Ouattara, 2005; Mavrotas and Ouattara, 2006a and 2007; Feeny, 2007; Ezemenari *et al.*, 2008; Feeny and McGillivray, 2010). The purpose of this paper is to contribute to this literature through the theoretical and empirical development of a fiscal response model with anticipated aid, which uses Costa Rica as a case study. In comparison with others Central American countries, Costa Rica represents a successful example of economic development in which the public policies have played an essential role. For that, it is important to assess the aid contribution to this performance through its influence on the government fiscal behaviour. Furthermore, the scant empirical research available on the fiscal impact of aid on this country justifies the need to examine this field in greater depth (Franco-Rodriguez, 2000; Mavrotas and Ouattara, 2006b).

When donors make their decisions over the concession of foreign aid, they are able to select the amount of aid to be allocated and the time period for its transfer, and they may even decide not to fulfil their aid commitments. The recipient governments wield no influence over the aid allocated, but they can take it into account when preparing their budgetary plans. This is the basic assumption of the model proposed by White (1995). Contrary to the more generalized assumption that all aid is unanticipated, this model considers that aid is an exogenous variable part of which may be anticipated by recipient governments, which can therefore influence their budgetary planning. This assumption substantially enriches the investigation into the fiscal effects of aid and, in consequence, was chosen as the foundation for the theoretical and the empirical research.

In order to adapt the aforementioned model to the research undertaken in Costa Rica, it was broadened and improved through four contributions. In the first place, a new endogenous variable was incorporated in the utility function of the recipient government: the variable on the payment of external public debt, which appeared separately from the rest of recurrent government expenditure. The incorporation of this new variable is justified by its importance for the majority of LDCs that are recipients of aid. In second place, two improvements were made to the definition of the target equations set by the recipient government for its public variables, by taking account of explanatory variables identified in economic theory and the need to include expectations to model government anticipation of part of the aid. Finally, the variable ‘total aid’ was disaggregated into its two principal components: grants (non-repayable aid) and loans (repayable aid). This

³⁰ This paper is part of the research project approved by the *Consejería de Educación* of the *Junta de Castilla y León* with the reference number BU007A10-1. The title of the research project is “Claves y retos de la actual cooperación para el desarrollo con América Latina”, and the principal researcher is Dr. Juan José Martín Arribas.

breakdown allowed analysing not only the impact of total aid, but also the impact of the two categories of aid on the public variables of expenditure, revenue and borrowing. The hypothesis underlying this distinction is based on differences in the fiscal behaviour of the recipient government according to whether or not the funds received will have to be repaid.

The theoretical model resulting from the incorporation of the four above-mentioned contributions was used to simulate three scenarios of aid increase that the recipient government might have to face. These scenarios were drawn up by considering the presence or absence of aid increase expectations held by the recipient government, as well as the fulfilment or non-fulfilment of aid commitments on the part of the donors.

The outline of the rest of the article is as follows. Section 2 presents the theoretical model on the basis of which the three scenarios of aid increase are established. Section 3 justifies the database and the estimation method, following which it discusses the econometric results obtained for each of the three scenarios in Costa Rica. Section 4 ends the article with the summary of the main findings and the conclusions drawn from them.

2. Theoretical Model

This section presents the theoretical model used in the research. After specifying the model (section 2.1), three theoretical scenarios for the fiscal government behaviour are derived (section 2.2). As previously justified, the model analyzed the impact of total aid as well as each of the two different types of aid allocated. In order to examine the specific fiscal effects of each type of aid, three versions of the theoretical model were developed: one for total aid and a further two in which it was assumed that all the aid flows were respectively in the form of either grants or loans. For the sake of simplicity, only the version corresponding to the impact of total aid is included in this section, as the specification of the theoretical model in the other two cases is similar.

2.1 Model specification

Following the standard approach in the fiscal response literature, a model was developed assuming that public sector decision makers act in a rational manner. The model is focused on the decision that an aid recipient government has to take when allocating public financing from three sources –government revenue, non-aid borrowing and foreign aid– among three categories of government expenditure –investment, consumption and external debt payment–. This decision is taken through the resolution of an optimization problem in which the government maximizes a utility function subject to a budgetary constraint.

The utility function (U) of the aid recipient government is represented as a quadratic loss function with non-linear terms, in which the government sets a series of targets for the public variables, such that the utility decreases when these variables deviate from their targets. This utility function is expressed as follows:

$$U = -\left(\frac{\alpha_1}{2}\right)(I_g - I_g^*)^2 - \left(\frac{\alpha_2}{2}\right)(T - T^*)^2 - \left(\frac{\alpha_3}{2}\right)(G - G^*)^2 - \left(\frac{\alpha_4}{2}\right)(B - B^*)^2 - \left(\frac{\alpha_5}{2}\right)(D_p - D_p^*)^2 \quad (1)$$

where, I_g is capital government expenditure or government investment; T is tax and non-tax government revenue; G is recurrent government expenditure or government consumption; B is non-aid borrowing; D_p is external public debt payment.

The asterisks denote the targets set by the recipient government for its public variables. The parameters α_i are defined as greater than zero ($\alpha_i > 0$ for all of i). These parameters represent the relative weight that the recipient government attaches to the convergence of the public variables with their respective targets. From this perspective, the utility loss for the government will be the weighted sum of each deviation from the targets. This functional form ensures the principle of diminishing marginal utility for each of the variables.

The recipient government has to maximize the utility function subject to the following budgetary constraint:

$$I_g + G + D_p = T + B + A \quad (2)$$

where all the variables except A , denote the respective public variables presented earlier in the utility function equation. Variable A represents total foreign aid disbursed to the government. The underlying assumption of this budgetary constraint is that the recipient government maintains a budgetary balance, that is, all of the government expenditure – investment, consumption and external debt payment–, must be financed by government revenue, non-aid borrowing and aid flows.

The Lagrangean is applied to solve the problem of maximization that confronts the government. Supposing that λ is the Lagrange multiplier, the following expression is obtained:

$$L = -\left(\frac{\alpha_1}{2}\right)(I_g - I_g^*)^2 - \left(\frac{\alpha_2}{2}\right)(T - T^*)^2 - \left(\frac{\alpha_3}{2}\right)(G - G^*)^2 - \left(\frac{\alpha_4}{2}\right)(B - B^*)^2 - \left(\frac{\alpha_5}{2}\right)(D_p - D_p^*)^2 + \lambda(I_g + G + D_p - T - B - A) \quad (3)$$

By taking the first derivatives and solving on the basis of first-order conditions, a simultaneous equation model is obtained expressing the mutual interrelation between the economic variables under consideration. This yields the following system of structural equations:

$$I_g = \left(\frac{1}{\alpha_1\phi}\right)(T^* + B^* + A - I_g^* - G^* - D_p^*) + I_g^* \quad (4)$$

$$G = \left(\frac{1}{\alpha_3\phi}\right)(T^* + B^* + A - I_g^* - G^* - D_p^*) + G^* \quad (5)$$

$$D_p = \left(\frac{1}{\alpha_5\phi}\right)(T^* + B^* + A - I_g^* - G^* - D_p^*) + D_p^* \quad (6)$$

$$T = -\left(\frac{1}{\alpha_2\phi}\right)(T^* + B^* + A - I_g^* - G^* - D_p^*) + T^* \quad (7)$$

$$B = -\left(\frac{1}{\alpha_4\phi}\right)(T^* + B^* + A - I_g^* - G^* - D_p^*) + B^* \quad (8)$$

$$\phi = \frac{1}{\alpha_1} + \frac{1}{\alpha_2} + \frac{1}{\alpha_3} + \frac{1}{\alpha_4} + \frac{1}{\alpha_5}$$

where,

The parameters of the structural equations solely express the direct effect of each explanatory variable on the dependent variable. In order to capture both the total effect of aid on the fiscal behaviour of the recipient government, it is necessary to obtain the reduced form equations. With this aim in mind, the targets for the public variables in the structural equations are defined.

Economic theory provides the basis for identifying the set of explanatory variables to be taken into account in the definition of the targets. Moreover, the inclusion of expectations in many of these explanatory variables is used for modelling that part of the aid can be anticipated by the recipient government when drawing up its budgetary planning. The expected levels of these explanatory variables are expressed as lagged values, with the exception of the expected level of government revenue and of aid. The expected value for government revenue coincides with its target, whereas the expected value for aid is captured by the aid commitments. The target equations for the public variables are expressed as follows:

- a) The target for government investment (I_g^*) is modelled as depending on the expected levels of national income (Y^e), private investment (I_p^e) and foreign aid (A^e):

$$I_g^* = \beta_0 + \beta_1 Y^e + \beta_2 I_p^e + \beta_3 A^e \quad (9)$$

- b) The target for government consumption (G^*) is determined by the prior level of government consumption (G_{t-1}) and by the expected supply of resources available to finance it, in other words, by the expected level of government revenue (T^e) and the aid expected by the government (A^e):

$$G^* = \mu_0 + \mu_1 G_{t-1} + \mu_2 T^e + \mu_3 A^e \quad (10)$$

- c) The target for the payment of external public debt (D_p^*) is expressed as a function of the expected stock of external public debt (D_s^e) and –as for the target set for government consumption– the expected supply of financial resources, in other words, the expected level of government revenue (T^e) and of aid (A^e):

$$D_p^* = \varepsilon_0 + \varepsilon_1 D_s^e + \varepsilon_2 T^e + \varepsilon_3 A^e \quad (11)$$

- d) The target for government revenue (T^*) is determined by the expected levels of national income (Y^e), imports (M^e) and foreign aid (A^e):

$$T^* = \delta_0 + \delta_1 Y^e + \delta_2 M^e + \delta_3 A^e \quad (12)$$

The fact that expected aid is incorporated in the equation allows to take account of the indirect effect of changes in aid expectations on the targets for consumption and the payment of external public debt. This is the case because –as may

be seen in equations (10) and (11)– the expected level of government revenue influences the setting of targets for the two variables relating to government expenditure, and it is not captured by its lagged value, but by its target ($T^e = T^*$).

e) The target for non-aid borrowing (B^*) is established as a residual variable on the basis of the targets set for the other public variables (I_g^* , G^* , D_p^* and T^*) and the expected value of the aid (A^e):

$$B^* = I_g^* + G^* + D_p^* - T^* - A^e \quad (13)$$

Given that the government plans to balance its budget, this formulation maintains the internal consistency of the targets, in other words, it makes possible to satisfy the budgetary constraint.

Substituting the targets of the public variables in the structural equations by expressions (9) to (13) that define them, the reduced form equations of the model are obtained as follows:

$$I_g = \beta_0 + \beta_1 Y^e + \beta_2 I_p^e + \left(\frac{1}{\alpha_1 \phi} \right) A + \left(\beta_3 - \frac{1}{\alpha_1 \phi} \right) A^e \quad (14)$$

$$G = \mu_0 + \mu_2 \delta_0 + \mu_1 G_{t-1} + \mu_2 \delta_1 Y^e + \mu_2 \delta_2 M^e + \left(\frac{1}{\alpha_3 \phi} \right) A + \left(\mu_3 + \mu_2 \delta_3 - \frac{1}{\alpha_3 \phi} \right) A^e \quad (15)$$

$$D_p = \varepsilon_0 + \varepsilon_2 \delta_0 + \varepsilon_1 D_s^e + \varepsilon_2 \delta_1 Y^e + \varepsilon_2 \delta_2 M^e + \left(\frac{1}{\alpha_5 \phi} \right) A + \left(\varepsilon_3 + \varepsilon_2 \delta_3 - \frac{1}{\alpha_5 \phi} \right) A^e \quad (16)$$

$$T = \delta_0 + \delta_1 Y^e + \delta_2 M^e - \left(\frac{1}{\alpha_2 \phi} \right) A + \left(\delta_3 + \frac{1}{\alpha_2 \phi} \right) A^e \quad (17)$$

$$B = \mu_0 + \beta_0 + \varepsilon_0 + (\mu_2 + \varepsilon_2 - 1) \delta_0 + \mu_1 G_{t-1} + (\mu_2 + \varepsilon_2 - 1) \delta_1 Y^e + (\mu_2 + \varepsilon_2 - 1) \delta_2 M^e + \beta_1 Y^e + \beta_2 I_p^e + \varepsilon_1 D_s^e - \left(\frac{1}{\alpha_4 \phi} \right) A + \left\{ \mu_3 + \mu_2 \delta_3 + \beta_3 + \varepsilon_2 \delta_3 + \varepsilon_3 - \delta_3 - 1 + \frac{1}{\alpha_4 \phi} \right\} A^e \quad (18)$$

These five equations clearly show that the total impact of aid on the public variables will depend on the aid expectations of the recipient government. This is so, because the model considers the possibility that the budgetary plans of the government include the availability of aid to finance government expenditure and/or to influence government revenue and borrowing.

2.2 Scenarios

As shown by the reduced form equations of the model, the total impact of aid on the public variables of expenditure, revenue and borrowing will depend on the assumptions over the anticipated aid made by the recipient government. In accordance with these assumptions, different scenarios may be considered to which the recipient government has to face. This section aims at simulating three scenarios of increase in aid. They are drawn up by considering the presence or absence of aid increase expectations held by the recipient government, as well as the fulfilment or non-fulfilment of aid commitments by donors.

The three scenarios under consideration are as follows: first, an anticipated increase in aid ($dA = dA^e \neq 0$); second, an unrealized anticipated increase in aid ($dA = 0; dA^e \neq 0$); and third, an unanticipated increase in aid ($dA \neq 0; dA^e = 0$). Next, the theoretical results of the model are obtained and discussed for each of the three scenarios.

Scenario 1: an anticipated increase in aid ($dA = dA^e \neq 0$)

In the first scenario, the recipient government expects an aid increase, which has been taken into account in the preparation of its budgetary plans. In this case, it is assumed that these aid expectations have coincided with the aid flows received by the government. The reduced form equations of the model indicate that the impact of these anticipated aid flows on the public variables is shown by the following expressions:

$$\frac{dI_g}{dA^e} = \beta_3 \quad (19)$$

$$\frac{dG}{dA^e} = \mu_3 + \mu_2 \delta_3 \quad (20)$$

$$\frac{dD_p}{dA^e} = \varepsilon_3 + \varepsilon_2\delta_3 \quad (21)$$

$$\frac{dT}{dA^e} = \delta_3 \quad (22)$$

$$\frac{dB}{dA^e} = \mu_3 + \mu_2\delta_3 + \beta_3 + \varepsilon_3 + \varepsilon_2\delta_3 - \delta_3 - 1 \quad (23)$$

The effect of an anticipated increase in aid on the three components of public expenditure –investment, consumption and external debt payment– is determined by the parameters of aid expectations in each one of the target equations (β_3 , μ_3 and ε_3) and additionally, in the cases of consumption and external debt payment, by the indirect effect of the aid on government revenue (measured by the terms $\mu_2\delta_3$ and $\varepsilon_2\delta_3$, respectively). The total effect of aid on government revenue will depend on the weighting given to the expected aid in the target for government revenue set by the recipient government (δ_3). The theoretical model considers the sign of all the parameters to be an empirical question, which has to be set through econometric research.

Finally, the effect of an anticipated increase in aid on borrowing is ambiguous. Larger aid flows will augment borrowing if the sum of the parameters ($\mu_3 + \mu_2\delta_3 + \beta_3 + \varepsilon_3 + \varepsilon_2\delta_3 - \delta_3$) is greater than 1 and will diminish it if the sum is less than 1. These parameters capture aid expectations in each one of the target equations (β_3 , μ_3 , ε_3 and δ_3), as well as the additional effect of aid channeled through government revenue on public consumption and external debt payment ($\mu_2\delta_3$ and $\varepsilon_2\delta_3$).

Scenario 2: an unrealized anticipated increase in aid ($dA = 0; dA^e \neq 0$)

As in the former scenario, it is considered that the recipient government includes aid increase expectations in its budgetary plans. However, the second scenario assumes that the government does not receive that anticipated increase in aid because donors do not meet their commitments. In this case, the effects of aid on the five public variables, derived from the reduced form equations, are as follows:

$$\frac{dI_g}{dA^e} = \beta_3 - \frac{1}{\alpha_1\phi} \quad (24)$$

$$\frac{dG}{dA^e} = \mu_3 + \mu_2\delta_3 - \frac{1}{\alpha_3\phi} \quad (25)$$

$$\frac{dD_p}{dA^e} = \varepsilon_3 + \varepsilon_2\delta_3 - \frac{1}{\alpha_5\phi} \quad (26)$$

$$\frac{dT}{dA^e} = \delta_3 + \frac{1}{\alpha_2\phi} \quad (27)$$

$$\frac{dB}{dA^e} = \mu_3 + \mu_2\delta_3 + \beta_3 + \varepsilon_3 + \varepsilon_2\delta_3 - \delta_3 - 1 + \frac{1}{\alpha_4\phi} \quad (28)$$

The results indicate that an unrealized anticipated increase in aid has an ambiguous impact on the public variables, which can only be determined through empirical estimation. It is reasonable to assume that the anticipated increase in aid will lead to an expansion of the three government expenditure variables in the budgetary plans. If the anticipated increase in aid is not disbursed by the donors, this planned expansion may be constrained and therefore, the total effect on government expenditure may not be precisely identified.

Similarly, the effect on public variables for revenue and borrowing is unclear, as the budgetary plans of the recipient government for these two variables included a certain amount of aid that has not been received. This situation will force the government to seek alternative sources of financing and, in principle, the total effect on the two public variables can not be determined. If the budgeted expenditure is not reduced, it is reasonable to expect that the impact of an unrealized anticipated increase in aid will lead to an increase in taxes and/or borrowing.

Scenario 3: an unanticipated increase in aid ($dA \neq 0; dA^e = 0$)

Unlike the two previous scenarios, the third contemplates the situation in which the recipient government does not incorporate any aid increase expectation in its budgetary plans. It is assumed that the government establishes its plans

without taking account of the possibility that it may receive an increase in aid. Based on the reduced form equations of the model, the expressions describing the impact of an unanticipated increase in aid on the public variables are:

$$\frac{dI_g}{dA} = \frac{1}{\alpha_1\phi} \quad (29)$$

$$\frac{dG}{dA} = \frac{1}{\alpha_3\phi} \quad (30)$$

$$\frac{dD_p}{dA} = \frac{1}{\alpha_5\phi} \quad (31)$$

$$\frac{dT}{dA} = -\frac{1}{\alpha_2\phi} \quad (32)$$

$$\frac{dB}{dA} = -\frac{1}{\alpha_4\phi} \quad (33)$$

These expressions show that an increase in unanticipated aid by the recipient government causes an expansion in the three government expenditure variables –investment, consumption and external debt payment–, and a reduction in government revenue and borrowing. The intensity of the effect on each variable will be inversely proportional to its weight in the utility function of the recipient government, which is determined by the corresponding value of the α_i parameter.

The effect of unanticipated aid on government consumption and revenue corroborates the fungibility hypothesis. Nevertheless, the fact that fungibility only clearly appears in this latter scenario, induces to thinking that this is a product of the model rather than an obvious response by the recipient government to aid flows.

3. Model estimation

With the aim of investigating the aid impact on the fiscal behaviour of the Costa Rican government, the model proposed in the preceding section was estimated for the three scenarios under consideration. This section details the empirical research undertaken. In the first place, the database and the estimation methodology used in the study are justified (section 3.1). Subsequently, the econometric results obtained from the model are presented for discussion (section 3.2).³¹

3.1 Data and estimation procedure

The model estimation for Costa Rica in the three scenarios required the construction of a database with fifteen variables, covering the period 1972-2000. Faced with the impossibility of obtaining a homogeneous database from local and regional sources, it was necessary to resort to two supra-regional sources: the World Bank and the Organisation for Economic Co-operation and Development's Development Assistance Committee (OECD-DAC). The fifteen variables used in the research were expressed in millions of constant 1995 US dollars.

The data for the public variables –capital government expenditure (I_g), recurrent government expenditure (G), external public debt payment (D_p) and total government revenue (T)– were obtained from the *World Development Indicators (WDI) Online* of the World Bank. Non-aid borrowing (B) was calculated as a residual variable of the budgetary constraint (2) of the model.

The six aid variables were derived from data on aid disbursements and commitments provided by *International Development Statistics Online* of the OECD-DAC. The three variables that captured the aid flows received by the Costa Rican government –total aid (A), grants (A_g) and loans (A_l)– were constructed with the respective data on aid disbursements made by the donors. The three other variables that covered anticipated aid by the Costa Rican government –total anticipated aid (A^e), anticipated grants (A_g^e) and anticipated loans (A_l^e)– were approximated using the data on aid commitments made by donors.

Alongside the public variables and aid variables already set out, a further four variables were incorporated to estimate the targets: national income (Y), imports (M), the stock of external public debt (D_e) and private investment (I_p). The data for

³¹ For expositional convenience, this section only reports the main findings of the empirical research. Full details of the data and all estimations reported here are available from the authors on request.

the first three variables were obtained from *WDI Online*. In the case of private investment, it was not possible to find a complete data series. Hence, it was decided to define it as the difference between gross fixed capital formation and public investment (that is, the capital government expenditure), using the data offered by *WDI Online* for these two variables.

With regards the estimation of the model, it was necessary previously to arrive at an approximation of the targets in each of the scenarios. The model assumes the availability of the information on the targets for the public variables, which enables a solution to be found to the optimization problem faced by the Costa Rican government. Unfortunately, neither the recipient government nor any of the international institutions provide such information. Thus, the approximation of the targets for each scenario was made following the proposal of Franco-Rodriguez (2000), by estimating them in terms of cointegration relationships. In those cases where it was impossible to identify a cointegration relationship, an auto-regressive process was used. Finally, the model was estimated using the nonlinear three-stage least squares method, given that the equation system was simultaneous and contained cross-equation restrictions with respect to the parameters.

3.2 Empirical results

The fiscal response model was estimated to simulate the three scenarios of aid increase faced by the Costa Rican government. Three versions of the model were estimated for each scenario to take the specific fiscal effects into account of the three types of aid under consideration: total aid, grants (non-repayable aid) and loans (repayable aid). In this section, the results of the estimations are examined for each of the scenarios: an anticipated increase in aid (scenario 1), an unrealized anticipated increase in aid (scenario 2) and an unanticipated increase in aid (scenario 3).³²

Scenario 1: an anticipated increase in aid ($dA = dA^e \neq 0$)

The first scenario simulates the effect of an increase in aid flows when those flows coincide with the aid expectations of the Costa Rican government, which have been taken into account in the preparation of its budgetary plans. In this case, the aid disbursements correspond to the donor commitments. Table 1 summarises the main results of the model estimation for this scenario.

For every additional unit of anticipated total aid, there is a reduction of 0.0882 units in capital government expenditure, 0.0659 units in the payment of external public debt and 1.2319 units in borrowing (see table 1). Similarly, an additional unit of anticipated grants, leads to a drop of 0.1125 units in capital government expenditure, 0.0205 units in the payment of external public debt and 1.1482 units in borrowing; whereas an additional unit of anticipated loans causes a diminution of 0.1417 units in capital government expenditure, 0.0793 units in the payment of external public debt and 1.8313 units in borrowing

On the contrary, an additional unit of anticipated total aid conduces to an expansion of 0.3061 units in recurrent government expenditure and 0.3838 units in government revenue (see table 1). Equally, an additional unit of aid in the form of anticipated grants results in a growth of 0.7596 units in recurrent government expenditure and 0.7747 units in government revenue. In the case of loans, this pattern of impact is slightly altered: an additional unit of aid in the form of anticipated loans also brings about an increase of 0.3772 units in government revenue, but it leads to a reduction of 0.2331 units in recurrent government expenditure.

³² The econometric results showed that the majority of the coefficients were statistically significant at the 5-10 per cent level. Most coefficients signs corroborated what is foreseen by the economic theory. The analysis of the adjusted R-squared revealed a reasonable goodness of fit for the model's equations. In short, the econometric results for the three scenarios led to conclude that the estimates were statistically acceptable. Full details of all estimations are available from the authors on request.

Table 1. Scenario 1: results of model estimation with an anticipated increase in aid

Total impact of an anticipated increase in aid ($dA = dA^e \neq 0$)			
	Total aid (A)	Grants (A_g)	Loans (A_l)
Capital government expenditure (I_g)	$\frac{\partial I_g}{\partial A^e} = -0,0882$	$\frac{\partial I_g}{\partial A_g^e} = -0,1125$	$\frac{\partial I_g}{\partial A_l^e} = -0,1417$
Recurrent government expenditure (G)	$\frac{\partial G}{\partial A^e} = 0,3061$	$\frac{\partial G}{\partial A_g^e} = 0,7596$	$\frac{\partial G}{\partial A_l^e} = -0,2331$
Public debt payment (D_p)	$\frac{\partial D_p}{\partial A^e} = -0,0659$	$\frac{\partial D_p}{\partial A_g^e} = -0,0205$	$\frac{\partial D_p}{\partial A_l^e} = -0,0793$
Government revenue (T)	$\frac{\partial T}{\partial A^e} = 0,3838$	$\frac{\partial T}{\partial A_g^e} = 0,7747$	$\frac{\partial T}{\partial A_l^e} = 0,3772$
Borrowing (B)	$\frac{\partial B}{\partial A^e} = -1,2319$	$\frac{\partial B}{\partial A_g^e} = -1,1482$	$\frac{\partial B}{\partial A_l^e} = -1,8313$

Sources: Calculations based on model results.

This empirical evidence suggests that the Costa Rican government earmarks the increase in aid for reducing borrowing and to a lesser extent, for increasing recurrent government expenditure. Likewise, this anticipated aid does not lead to an expansion of capital government expenditure nor does it finance external public debt nor does it substitute tax revenue. In a country with a rigid recurrent government expenditure –in many cases, fixed by law– and with a frequent public deficit, it is necessary to increase tax revenue for financing the greater recurrent government expenditure and to reduce public investment for facilitating the control of public deficit. The sign of these effects is unaffected by the category of aid under consideration, except for the case of recurrent expenditure.

With respect to the magnitude of the described effects, it tends to slightly vary according to the modality of aid received. This is particularly evident in the effects of aid on tax revenue and borrowing. The increase in tax revenue is greater when aid takes the form of grants, whereas the reduction in borrowing is larger when aid takes the form of loans.

In sum, the results indicate that when the Costa Rican government receives an increase in aid anticipated in its budgetary plans, it uses it basically to cope with the serious problem of financing of its public deficit. Although aid also contributes to finance the increase of recurrent expenditure, the magnitude of this effect is much smaller than the previous one and it does not appear in all aid modalities under consideration. Moreover, the interpretation of the results with respect to other expenditure categories is more complex, as it was not possible to obtain a homogeneous time series for central government in the estimation period using separately development expenditure (education, health...) and non-development expenditure. A breakdown of this sort would allow obtaining more precise conclusions regarding to the effects of aid on poverty reduction and the achievement of development in Costa Rica.

Scenario 2: an unrealized anticipated increase in aid ($dA = 0; dA^e \neq 0$)

Unlike the preceding scenario, the second one simulates the impact of an increase in aid that is anticipated by the Costa Rican government in its budgetary plans, but which is not disbursed. For each one of the three types of aid taken into account –total aid, grants and loans–, this scenario explores the effects of unfulfilled aid commitments made by donors. The main results of the model estimation for this scenario are given in Table 2.

An unrealized anticipated increase in total aid has a negative sign impact on all the public variables, except for external debt payment and tax revenue. The non-fulfilment of aid commitments forces the Costa Rican government to cut public investment (-0.1391) and recurrent expenditure (-0.0879), and also to look for alternative sources of financing, slightly increasing tax revenue (0.075). In this way, it can continue to maintain its external debt payment (0.4333) and to reduce its borrowing (-0.365).

Table 2. Scenario 2: results of model estimation with an unrealized anticipated increase in aid

Total impact of an unrealized anticipated increase in aid ($dA = 0; dA^e \neq 0$)			
	Total aid (A)	Grants (A_g)	Loans (A_l)
Capital government expenditure (I_g)	$\frac{\partial I_g}{\partial A^e} = -0,1391$	$\frac{\partial I_g}{\partial A_g^e} = 0,326$	$\frac{\partial I_g}{\partial A_l^e} = -0,2041$
Recurrent government expenditure (G)	$\frac{\partial G}{\partial A^e} = -0,0879$	$\frac{\partial G}{\partial A_g^e} = 0,4366$	$\frac{\partial G}{\partial A_l^e} = -0,6998$
Public debt payment (D_p)	$\frac{\partial D_p}{\partial A^e} = 0,4333$	$\frac{\partial D_p}{\partial A_g^e} = 1,5652$	$\frac{\partial D_p}{\partial A_l^e} = 0,3683$
Government revenue (T)	$\frac{\partial T}{\partial A^e} = 0,075$	$\frac{\partial T}{\partial A_g^e} = -0,2715$	$\frac{\partial T}{\partial A_l^e} = 0,871$
Borrowing (B)	$\frac{\partial B}{\partial A^e} = -0,365$	$\frac{\partial B}{\partial A_g^e} = 1,8733$	$\frac{\partial B}{\partial A_l^e} = -1,0338$

Sources: Calculations based on model results.

When grants are considered, the sign of their impact is positive for all the public variables, except for tax revenue (see table 2). Confronted by the loss of anticipated grants, the Costa Rican government chooses to finance total government expenditure –capital expenditure (0.326), recurrent expenditure (0.4366) and external debt payment (1.5652)– through an increase in borrowing (1.8733) without rising tax revenue (-0.2715).

The impact of an unrealized anticipated increase in loans is positive on external debt payment and tax revenue, and is negative on the other public variables (see table 2). Faced with unfulfilled loan commitments, the Costa Rican government reacts by diminishing investment (-0.2041) and recurrent expenditure (-0.6998), without modifying its debt payment obligations (0.3683). Unlike what happens with an unrealized anticipated increase in grants, the government compensates for the undisbursed loans with an increase in tax revenue (0.871) without an augmentation in borrowing (-1.0338).

The empirical evidence suggests that there are certain differences in the fiscal response of the Costa Rican government with respect to the latter scenario. In the first scenario –an anticipated increase in aid that is received–, the sign of the impact on the public variables is the same for all three aid modalities, except for recurrent government expenditure. On the contrary, in this second scenario –an unrealized anticipated increase in aid– the sign only remains unchanged for the impact on external debt payment. It is probable that this effect is capturing the fact that a part of the unrealized anticipated aid took the form of debt relief and hence, had a positive impact on external debt payment.

Scenario 3: an unanticipated increase in aid ($dA \neq 0; dA^e = 0$)

In the two previous scenarios it is assumed that the Costa Rican government expects to receive an increase in aid flows and, in consequence, includes it in its budgetary plans. In the first case, this anticipated increase is received (scenario 1) and in the second, it is not received (scenario 2). In the third and final scenario, the simulated situation is one in which the Costa Rican government does not take account of an increase in aid flows in its budgetary plans because it does not expect any. Nevertheless, this increase does in fact take place. Table 3 presents the main results for the model estimation with an unanticipated increase in aid.

Table 3. Scenario 3: results of model estimation with an unanticipated increase in aid

Total impact of an unanticipated increase in aid ($dA \neq 0; dA^e = 0$)			
	Total aid (A)	Grants (A_g)	Loans (A_l)
Capital government expenditure (I_g)	$\frac{\partial I_g}{\partial A} = 0,0593$	$\frac{\partial I_g}{\partial A_g} = 0,0691$	$\frac{\partial I_g}{\partial A_l} = 0,0401$
Recurrent government expenditure (G)	$\frac{\partial G}{\partial A} = -0,2214$	$\frac{\partial G}{\partial A_g} = -0,3478$	$\frac{\partial G}{\partial A_l} = -0,3174$
Public debt payment (D_p)	$\frac{\partial D_p}{\partial A} = 0,283$	$\frac{\partial D_p}{\partial A_g} = 0,5165$	$\frac{\partial D_p}{\partial A_l} = 0,6307$
Government revenue (T)	$\frac{\partial T}{\partial A} = 0,2894$	$\frac{\partial T}{\partial A_g} = 0,572$	$\frac{\partial T}{\partial A_l} = -0,4222$
Borrowing (B)	$\frac{\partial B}{\partial A} = -1,3178$	$\frac{\partial B}{\partial A_g} = -1,6351$	$\frac{\partial B}{\partial A_l} = -2,6357$

Sources: Calculations based on model results.

When the Costa Rican government does not consider the possibility of receiving an increase in total aid, the sign of the impact of this unanticipated increase is positive on capital government expenditure, external debt payment and government revenue, and is negative on recurrent government expenditure and borrowing (see table 3). The unanticipated aid flows are allocated especially to reduce borrowing (-1.3178) and to a lesser extent, to finance public investment (0.0593) and external debt payment (0.283). Likewise, these aid flows do not increase the recurrent government expenditure (-0.2214) nor substitute tax revenue (0.2894).

The fiscal response of the government in receipt of unanticipated grants is quite similar to that described in the case of total aid. The sign of the effects remains unaltered and its magnitude is a bit greater (see table 3). Capital government expenditure (0.0691) rises slightly and external debt payment (0.5165) and tax revenue (0.572) expand larger; whereas recurrent government expenditure (-0.3478) and above all, borrowing (-1.6351) are more reduced.

In the case of an unanticipated increase in loans, some differences are observable in the sign and the magnitude of the impact on the public variables: particularly, on the sign of the impact on government revenue (negative) and on the magnitude of the impact on borrowing (much bigger). As in the two earlier cases, the government uses the unanticipated loans to finance capital expenditure (0.0401) and external debt payment (0.6307), as well as to reduce recurrent government expenditure (-0.3174) and borrowing (-2.6357). However, in this case loans are devoted to reduce tax revenue (-0.4222); in other words, the Costa Rican government substitutes the public financing via taxes and especially, via borrowing, for unanticipated loans.

These econometric results indicate that the unanticipated aid flows are earmarked for reducing borrowing and to a lesser extent, for financing public investment and external debt payment. In addition, these flows do not promote the expansion of recurrent expenditure and with the exception of unanticipated loans, neither replace tax revenue, what questions the fungibility hypothesis of aid. In spite of the fact that government receives an unanticipated increase in aid, the pressure for reducing the public deficit along with the rigidity of public expenditure might explain this rise in tax revenue.

The interpretation of the negative impact on recurrent government expenditure is limited by the impossibility of obtaining a homogeneous time series for central government in the estimation period using separately development expenditure and non-development expenditure. Without this breakdown, it is not possible to identify the type of expenditure reduced. However, it is reasonable to consider that the largest negative impact corresponds with the non-development expenditures, since Costa Rica has maintained high levels of development expenditure, particularly on education and health.

To sum up, the fiscal behaviour of Costa Rican government in this scenario reveals a quite similar pattern, regardless of the unanticipated aid modality. The sign of the fiscal response of government only differs in the case of tax revenue: it is positive with total aid and grants, but negative with loans.

In comparison to the pattern of fiscal response to aid that is both anticipated and received (scenario 1), this pattern presents some clear differences in the impact on the expenditure variables and several coincidences in the impact on the financing variables. The Costa Rican government uses the anticipated aid basically to finance recurrent expenditure, and

the unanticipated aid to finance capital expenditure and to deal with the external debt payment. Likewise, the government employs the aid –anticipated and unanticipated– as an alternative source of financing of its high public deficit, reducing borrowing and in general, giving up the replacement of tax revenue.

4. Conclusions

The channels through which aid can affect LDCs are complex and are influenced by very heterogeneous factors, notable among which is the role played by the recipient government responsible for taking fundamental political decisions, such as those on fiscal policy. In consequence, understanding the way in which aid influences the fiscal variables of recipient governments becomes an essential aspect in the debate over its effectiveness. With this objective in mind, a fiscal response model with anticipated aid was developed to simulate the fiscal effects of an increase in aid in a LDC. Costa Rica was the case study selected for the model estimation, since it has been an example of recipient country which has achieved important advances in its development level. The model used is a simplification of the complex Costa Rican reality and hence, the results of its estimation have to be cautiously interpreted.

The results of the simulations show that the aid received by the Costa Rican government is fundamentally earmarked to reduce borrowing. This allocation is the unique that is common to the scenarios for aid received (anticipated and unanticipated) regardless of the type of aid considered. The serious problem of borrowing arising from fiscal imbalance explains why a significant part of the increases in aid is dedicated to alleviate the public financing needs of the country.

In addition to contributing to fill the gap between government expenditure and revenue, another potential use of the aid flows is the reduction of tax revenue. However, this response –quite standard in the fiscal response literature– is not corroborated in the empirical estimation for Costa Rica. The decreasing in tax revenue is only observed in the case of an unanticipated increase in loans. It is probable that the Costa Rican government's leeway to reduce taxes has been limited by the insufficiencies of its tax system, as well as by the obligations set up legally to allocate tax revenue for financing fixed public expenditure categories. According to this result, in LDCs with an insufficient tax system and with a rigid public expenditure, it does not necessarily have to be assumed that aid will substitute tax revenue.

The financing of the government expenditure is another possible aid allocation identified by the fiscal response literature. The research results for Costa Rica point out that this is not always the case. If the donors' objective was to promote capital government expenditure, it has hardly been accomplished. The public investment expansion is only noticed in the case of an unanticipated increase in aid, being the magnitude of the positive effect not much significant. This result confirms that investment has been the main expenditure category sacrificed by the Costa Rican government.

In the case of recurrent government expenditure, the anticipated aid flows (first scenario) have a considerable positive impact on its financing, whereas the unanticipated ones (third scenario) have a negative impact on this variable. The interpretation of this result is complex, as it was not possible to obtain a homogeneous time series for recurrent expenditure disaggregating it into development expenditure and non-development expenditure for the whole estimation period. However, the fact that aid does not always earmark for increasing the recurrent expenditure neither –as it was explained above- for reducing tax revenue, may call into question the hypothesis of aid fungibility.

The aid received is also assigned to deal with another problem of the Costa Rican economy: the external public debt. The unanticipated increase in aid leads to a rise of this debt payment. When this increase is anticipated, the impact on external debt payment is negative, although its magnitude is quite small.

With regard to the fiscal impact of the aid modalities, the results of the simulations allow to identify some differences. Loans have a larger impact on the reduction in borrowing, whereas grants tend –although not in all the cases- to promote the financing of government expenditure to a greater extent.

The empirical estimation of the fiscal behaviour of Costa Rican government was not only limited to simulate scenarios with received aid (anticipated and unanticipated), but also it was extended to the case of an unrealized anticipated increase in aid. In this scenario, the results indicate that the non-fulfilment of donor commitments causes important negative impacts on the expenditure variables of Costa Rican government (consumption and especially, investment).

In short, the foreign aid received by the Costa Rican government is basically earmarked to support the stabilization function of fiscal policy, alleviating the needs of public financing in the country. From this perspective, the aid flows contribute to establishing a favourable environment for economic growth. In fact, Costa Rica is an example in which aid has resulted in a positive impact on domestic economy without generating problems such as fungibility and aid dependency (the country has already left most of the lists of major aid recipients). This case study does not only suggest that it is advisable an effective management of aid by the recipient government, but also a greater effort on the part of donors to diminish the volatility and uncertainty of aid flows, providing the recipient government with a stable framework in which to take its budgetary decisions.

Bibliography

- Celasun, O. and J. Walliser (2008). "Predictability of Aid: Do Fickle Donors Undermine Aid Effectiveness?". *Economic Policy*, Vol. 23 (55), 545-594.
- Ezemenari, K., E. Kebede, and S. Lahiri (2008). The Fiscal Impact of Foreign Aid in Rwanda: A Theoretical and Empirical Analysis. *World Bank Policy Research Working Paper* 4541. Washington, D.C. World Bank.
- Feeny, S. (2007). "Foreign Aid and Fiscal Governance in Melanesia". *World Development*, Vol. 35 (3), 439-453.
- Feeny, S. and M. McGillivray (2010). "Aid and Public Sector Fiscal Behaviour in Failing States", *Economic Modelling*, 27, 1006-1016.
- Franco-Rodriguez, S. (2000). "Recent Developments in Fiscal Response with an Application to Costa Rica". *Journal of International Development*, Vol. 12 (3). 429-441.
- Franco-Rodriguez, S., O. Morrissey, and M. McGillivray (1998). "Aid and the Public Sector in Pakistan: Evidence with Endogenous Aid". *World Development*, Vol. 26 (7), 1241-1250.
- Gang, I.N. and H.A. Khan (1990). "Foreign Aid, Taxes, and Public Investment". *Journal of Development Economics*, Vol. 34 (1-2), 355-369.
- Gang, I.N. and H.A. Khan (1999). "Foreign Aid and Fiscal Behaviour in a Bounded Rationality Model: Different Policy Regimes". *Empirical Economics*, Vol. 24 (1), 121-134.
- Gupta, S., B. Clements, and G. Inchauste (2004). *Helping Countries Develop: The Role of Fiscal Policy*. Washington, D.C. International Monetary Fund.
- Heller, P.S. (1975). "A Model of Public Fiscal Behaviour in Developing Countries: Aid, Investment and Taxation". *American Economic Review*, Vol. 65 (3), 429-445.
- Heller, P.S., M. Katz, X. Debrun, T. Thomas, T. Koranchelian, and I. Adenauer (2006). Making Fiscal Space Happen: Managing Fiscal Policy in a World of Scaled-Up Aid. *IMF Working Paper* WP/06/270. Washington, D.C. International Monetary Fund.
- IMF (International Monetary Fund) (2007). *Fiscal Policy Response to Scaled-Up Aid: Macro-Fiscal and Expenditure Policy Issues*. Washington, D.C. Fiscal Affairs Department, IMF.
- Khan, H.A. and E. Hoshino (1992). "Impact of Foreign Aid on the Fiscal Behaviour of LDC Governments". *World Development*, Vol. 20 (10), 1481-1488.
- Mavrotas, G. (2002). "Foreign Aid and Fiscal Response: Does Aid Disaggregation Matter?". *Weltwirtschaftliches Archiv*, Vol. 138 (3), 534-559.
- Mavrotas G. and B. Ouattara (2006a). "Aid Disaggregation, Endogenous Aid and the Public Sector in Aid-Recipient Economies". *Review of Development Economics*, Vol. 10 (3), 434-451.
- Mavrotas G. and B. Ouattara (2006b). Do Aid Transfers Reduce Recipient Government's Incentives to Mobilise Domestic Resources? Time-Series Evidence from Costa Rica, Pakistan and The Philippines. *Working Paper in Economics*, SBE-E/2006/05. School of Business and Economics, Swansea University.
- Mavrotas, G. and B. Ouattara (2007). "Aid Modalities and Budgetary Response: Panel Data Evidence". *Weltwirtschaftliches Archiv*, Vol. 143 (4), 720-741.
- McGillivray, M. and A. Ahmed (1999). "Aid, Adjustment and the Public Sector in the Philippines". *Journal of the Asia-Pacific Economy*, Vol. 4 (2), 381-391.
- McGillivray, M. and B. Ouattara (2005). "Aid, Debt Burden and Government Fiscal Behaviour in Côte d'Ivoire". *Journal of African Economies*, Vol. 14 (2); 247-269.
- Mosley, P., J. Hudson, and S. Horrell (1987). "Aid, the Public Sector and the Market in Less Developed Countries". *Economic Journal*, Vol. 97 (387); 616-641.

OECD-DAC (Organisation for Economic Co-operation and Development's Development Assistance Committee)-a. International Development Statistics Online Database. Available at <http://www.oecd.org/dataoecd/50/17/5037721.htm>

OECD-DAC (2008). *2008 Survey on Monitoring the Paris Declaration: Making Aid More Effective by 2010*. Paris. OECD.

OECD-DAC (2010). *2010 OECD Report on Aid Predictability Survey on Donors' Forward Spending Plans 2010-2012*. Paris. OECD.

White, H. (1994). "Foreign Aid, Taxes and Public Investment: A Further Comment". *Journal of Development Economics*, Vol. 45 (1), 155-163.

White, H. (1995). "Developing Country Fiscal Behaviour and Aid Inflows: The Case of India". Paper presented to Development Studies Association Annual Conference, September 7th-9th. Dublin.

World Bank-a. World Development Indicators Online. Available at <http://www.worldbank.org/data/onlinedatabases/onlinedatabases.html>

“Ecological Factor in the States Economic Strategies”

(Ph.D.) V.G. Merzlikin

Department of Physics. Moscow State Technical University MAMI

Department of Technological Innovations. Plekhanov Russian University of Economics

V.A. Yurga

Financial University under the Government of the Russian Federation

(Ph.D.) V.Y. Garnova

Department of Economics and Business Organization. Plekhanov Russian University of Economics

(P.G.) A.V. Abramova

Department of Economic Theory. Moscow State Engineering University (MAMI)

Abstract

The set of connected problems which are caused by growing ecology influence on economy is considered. They are: technogene human impact upon the nature, climate anomalies of technogene origin, economy of nature anomalies. Sustainable development is based by now on the top-priority consideration of ecology in economic strategies. Hence there are tendencies in development of new resources preserving technologies including energy generation and in the basic principles of energy supply too. The permanent growth of ecology restrictions in economies of EU countries, US, and Japan designs the necessity for Russia of energy doctrine revision, economic infra-structure re-structurization, and ecology standards approaching to international ones under the state approval too. All these objects are to be denote in the state economic strategy.

Key words: ecology, sustainable development, climate anomaly, technogene impact, nature, ecological policy, economic strategy.

Introduction

The effects of mankind influence on nature increases with increasing intensity, and to beginning of the twenty-first century they have become planetary. This impact gives rise to irreversible changes in the environment which, in turn, makes the state of ecological and economic systems (EES) unstable. It is noted that in recent decades the growth of the frequency of abnormal phenomena in the environment increases. Over the past 15 years the a number of severe weather events in Russia has tripled, with new phenomena are not observed, the number and extent of the usual increases. Surely, there is a close relationship between climate change and the increasing intensity of the industrial impact of mankind on the environment (Krass, 2010).

Technogenic climate anomalies

Recently man-made disasters associated with environment intensive pollution are caused by the exploration and transport of large volumes of hydrocarbons (oil in particular). As an example, the physical interpretation of the results obtained by means of calculating of the change of heat flux on the surface of ocean model as a result of the spill-2010 at the BP oil platform in the Mexico Gulf of more than 1 million tons of crude oil (Krass, et al, 2011, Krass, Merzlikin, 2011). Disturbance of the boundary conditions of heat exchange caused by this disaster led to the sharp fall in the evaporation on the polluted water surface of Gulf Stream. Instead of cyclones over the Mexico Gulf began to emerge often from multiple hurricanes and tornadoes, and over the Atlantic of the northern hemisphere extensive anticyclones (maintenance of the heat in the middle and upper troposphere caused the thermodynamic conditions of their origin). Anticyclones appearance on plains of Europe contributed to formation there of abnormally hot weather – anticyclonic weather. There were stable in space and time zones with high atmospheric pressure preventing cyclones advancement from the North Atlantic and the Arctic Ocean. However, the deeper layers of the Atlantic Ocean began to cool. Gulf Stream by now is not only cool, but disappears too, which may cause global climate change in the northern hemisphere (Zangary, 2010).

Economy of natural anomalies

A set of physical and mathematical models allows to prove estimation of water and heat balance on the water-atmosphere boundary at the formation of pollution in the subsurface layer for different climatic regions. Now are possible:

- a) development of quantitative and qualitative conclusions about the degree of influence of anthropogenic factors pollution of the oceans and inland seas of Russia to the changes of heat fluxes and water balance for various parts of its territory;
- b) an analysis of the impact of anthropogenic factors on the regional level for estimation of different scenarios of climate anomalies probability and risks. This information can be used as a basis for forecast the economic consequences of climate anomalies, their risks of origin, and the scales of possible extreme situations (ES).

Admissible strategies and technologies

One can argue that any technology is a homomorphism and implement a series of strategies of man. Therefore, admissible technologies correspond to acceptable strategies for a definite interim. At sustainable development of EES presence of environmental restrictions entails requirements for the set of man strategies limiting. In turn, this means the emergence of technological limitations in his activities. We show this in the case of known balance models of economic dynamics (Krass, 1976).

Consider the technology with pollutions (waste). Let there be s kinds of pollution from this production, which are defined by the pollution intensities matrix C_p

$$C_p = \| \| c_{ij} \| \|, \quad i = 1, 2, \dots, s; \quad j = 1, 2, \dots, n, \quad (1)$$

where $c_{ij} \geq 0$ is the amount of i -th pollution kind produced under issuing units of j -th product. Then the pollution vector \bar{z} is defined by formula

$$\bar{z}^T = C_p \bar{x}^T, \quad (2)$$

where \bar{x} is the output line vector. Then, in accordance with the model formalization, vector of products \bar{y} at time t is spent on the production of two vectors at time $t+1$: vector \bar{x} and vector-contamination issue \bar{z} . The vectors belong to the positive orthants of Euclidean spaces of dimensions $n(t)$, $n(t+1)$ и $s(t+1)$ respectively:

$$\bar{y} \in E_+^{n(t)}, \quad \bar{x} \in E_+^{n(t+1)}, \quad \bar{z} \in E_+^{s(t+1)}. \quad (3)$$

Model M describes the state of EES under the technogenic influence determined with vector \bar{z} . A control the technological process can be used as a set of restrictions on "issue" pollutions \bar{z} . We shall use as the restriction of environmental regulations \bar{z}^* vector of $s(t+1)$ dimension - valid or limit - on all kinds of pollution produced by the vector \bar{y} of initial products:

$$\bar{z} \leq \bar{z}^*, \quad \bar{z}^* \in E_+^{s(t+1)}. \quad (4)$$

Here the vector \bar{z}^* (a control of pollution) is assumed to be a priori given. In this case, a set of technologies in the model the "the product expenditures - the output of production and pollution" (by analogy with the formalism of "input - output") is defined as the relation of states of the model M at time t and $t+1$:

$$Z_t^* = \{ \bar{r} : \bar{r} = (\bar{x}', \bar{y}', \bar{z}, \bar{z}^*) \} \subset E_+^{n(t)+n(t+1)+s(t+1)}, \quad (5)$$

where the vector (\bar{x}', \bar{y}') defines the process that satisfies to limitation on the amount of pollution (4).

The introduction of environmental regulations and restrictions will result in models of technological processes in a significant restriction of output production, and a technology set (5) is clearly different from the technology set Z_t for the model without environmental constraints. Therefore, the projection (5), belong to the positive orthant

$$E_+^{n(t)+n(t+1)+s(t+1)}$$

and to a technological cone Z_t (Krass, 2010).

Environmental constraints (4) make the set (5) significant different in comparison with the process cone Z_t . They mean the appearance of the inner surfaces, which cut off the cone Z_t some of his "side of" and "undercut" its top (see Fig.1).

The more "dirty" technologies (large components of the vector \bar{z}) and more restrictions of pollution (the components of the vector \bar{z}^*), the greater the restriction of acceptable technologies, and, therefore, less allowable release. Constraint (4) is enough tough, with expenditure and "dirty" technologies so it can reduce the amount of the issue that the manufacturing process becomes economically impractical. In this case, the continuation of the process (continuation of a strategies set for human) with violation of the restrictions (4) will inevitably lead to a risk of violation of the natural equilibrium with all its consequences for human habitation in the area. New technologies now appear in developed countries by means of hard environmental legislation, and its standards are permanently tightening.

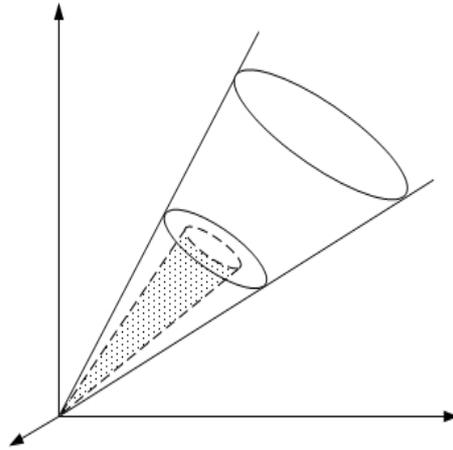


Fig. 1. Cone technology narrowing

Only such strategy, will lead to the achievement of the greatest successes in the economy according to M.Porter opinion expressed more than 20 years ago.

Sustainable development

Sustainable development involves the distinction between the concepts of growth and development. The purpose of the economic system is its quantitative growth for a long time: an increase in the volume of goods and services by increasing the amount of natural resources used. In contrast to the growth process, the development process involves a qualitative transformation of the system and increase of the efficiency of production at constant or even decreases the amount of resources used.

The question of measures to achieve sustainable development rises. There is here the concept of critical natural capital as necessary for life natural goods that can not be replaced by means of artificial goods. They include landscapes, rare kinds of flora and fauna, the ozone layer in the upper part of the earth's atmosphere, global climate, etc. This critical natural capital N^* must be maintained under all scenarios of economic development. The rest of the natural capital can be replaced by artificial one: renewable and some of the non-renewable natural resources (eg, natural energy resources can be replaced by solar energy, one percent of which would be enough to provide all the needs of modern humanity). Sustainable development can be supplemented by a restriction on the exhaustion of the time value of N^* . For non-decreasing with time t of the production function F , whose arguments are aggregated variables capital K , labor L and N the natural resource

$$F_t(K, L, N) \leq F_{t+1}(K, L, N) \quad (6)$$

it is necessary to observe the conditions of non-decreasing value N^* in time

$$N_t^* \leq N_{t+1}^* \quad (7)$$

as well as the condition of partial substitution of natural capital N on artificial N_s (or non-renewable resources for a renewable resource)

$$N_t = N_t^* + N_s^* \quad (8)$$

Transition EES in the state of sustainable development is characterized by the dominant view of environmental constraints that limit the aggregate amount of the load on the environmental subsystem, and a gradual reductions of anthropogenic impacts to the maximal permissible level at which the risk of catastrophic and critical phenomena will be minimal. System of constraints (6) - (8) is the basic criterion for sustainable development (Sidorenko, 1998).

Environmental factor in the economy strategies

The problems of mankind vital activity securing define new approaches to economic strategies and economic policy in the formation time of the information society. The first of all it is necessary to keep balance between technologies and the environmental equilibrium. The main standard of economic efficiency become implemented new knowledges. In this regard, The ecology and environment are on the forefront and becomes the most important economic resource of the state (Bobylev, Khodzhaev, 2004).

Developed countries aware of this position already, and therefore their economic policies in the field of power generation and energy supply now varies considerably. It should be noted that nuclear power was not safe, including its waste utilization. According to calculations of the French statistics D.P.Loti-Viaud the disaster risks from a few hundred nuclear

power plants in the world are of the order of 10^{-3} (instead of 10^{-7} - 10^{-8} estimated Rosatom), because it is necessary to take into account the risks from energy and communications exposed to impact of nature cataclysms. Tragedy in March 2011 in Japan clearly showed the vulnerability of nuclear power plants to natural disasters and high risks of long-term negative consequences of their exploration. The present and future damage of Fukushima disaster is estimated to be of \$260 bln approximately.

Recently, first Norway and later Germany canceled the construction of projected nuclear power plants. Germany intends to abandon the high-cost nuclear power plants exploration since 2023. Improvement of plant safety will cost for the EU at least 60 bln euros. Therefore, preference is given there to much cheaper and more reliable sources of energy generation: 1) mini-thermal power of a few Megawatts (in the Nordic countries are also a mini-hydro) linked directly to the consumers, and 2) technologies that use alternative renewable energy resources - especially solar energy and wind energy.

Environmental factor in the economic strategy of Russia

In Russia the need to respect the principles of "green economy" are fully aware: the effective use of natural resources and conservation and growth of natural capital, reduce of environmental pollution, reduce of emissions into atmosphere, preservation of ecosystem services and biodiversity, the growth of income and employment of population.

Russia's contribution to the stability of the global nature is estimated to be of 10%, much higher than in other major countries which provide global ecosystem services: 7.06% in Brazil, 6.52% in Australia, 5.25 in Canada, 5, 22% in the U.S., 4.93% in China (Bobylev, Khodzhaev, 2004). These estimations represent the important role played by Russia in the global ecosystem management, preservation of biodiversity, the maintenance of the stability of the biosphere and the economic benefits to the global community as a whole.

The natural wealth of the country and the considerable human potential, on the one hand, identify good perspectives for the realization of the ideas of "green economy" in Russia, for the country's development, well-being and quality of life. On the other hand, exports of natural resources implemented by way of development of the economy, which was formed as a result of social and economic crisis of the 1990th, and favorable world prices for energy in 2000th. Thus, the average export price for Russian oil and gas have increased by 4-5 times in 1995-2010. This way of development is based on the exploitation of natural capital and the sale of raw materials. It leads to deadlock because the economy has become dependent on the world energy market conjuncture and to rapid depletion and degradation of natural resources of the country.

However, there is a need to develop an integrated system of energy efficiency measures and a more complete extraction of hydrocarbons from producing fields. This will reduce the economic risks and significantly improve the efficiency of energy production.

The positive trend in the economy of Russia is a significant reduction of energy of industry energy intensity (in 2010 at 69.8% compared to 2000 and 74.7% compared to 1990). In this connection energy intensity and resource intensity reduce. It is assumed the widespread use of various renewable energy sources, the use of innovative approaches to modernization of exploration.

The greatest energy intensity decrease occurred in the pre-crisis 2000-2008. During this period, energy consumption was reduced by 35%, which was largely due to the rapid growth of GDP. This is one of the best indices in the world. However, the crisis has led to an increase of energy intensity in 2009 and 2010.

Conclusion

Currently Russia's energy intensity by an average of 2-3 times higher than in developed countries of the EU. The first of all this is due to complex climatic conditions of Russia. The largest share of energy consumption in Russia is her life conditions component (it reaches 65% of the generated volume). For instance, winter temperature Yakutia reach -60°C , and the maximum absolute amplitude is $107,1^{\circ}\text{C}$.

It is necessary to efficient use mini-and renewable sources of cheap energy of virtually zero energy losses and small extent communications. Stocks of renewable energy reserves in Russia are endless; so, Kamchatka has not smaller reserves of hydrothermal water energy than Iceland, but their share in energy production in the region is almost zero. We would like to note that the successful implementation of the ideas of economic modernization, improving of its energy efficiency, sustainable development also depends on the active position in life within the community. Thus, a significant role in determining of directions and specific problems of modernization of the economy to ensure sustainable development must play a civil society in Russia including the various youth groups and community organizations, and other institutions of civil society in our country too.

Bibliography

- Bobylev S.N., Khodzhaev A.Sh. (2004) *Environmental economics*. Moscow, Publ. INFRA-M, 501 pp.
- Krass M.S.(2010). *Modeling of ecological and economic systems*. Moscow, Publ. INFRA-M, 272 pp.
- Krass, M.S., Merzlikin V.G., Sidorov O.V.(2011). Modeling anthropogenic causes short-climate anomalies. *Bulletin of the Tomsk. University, Ser. "Earth Sciences"*, 349, 193-199; 350, 200-203.
- Krass M.S., Merzlikin V.G. (2011) Technogene climate anomalies and strategic planning. *Economical strategies*, 4, 6-17.
- Krass M.S., Yurga V.A. (2011). The model of expended Russia economy. *Oeconomia, Aerarium, Jus*, 1(01), 31-36.
- Krass I.A. (1976). *Mathematical models of economic dynamics*. Moscow, "Soviet Radio", 280 pp.
- Towards a "green" economy of Russia (review)*. Institute for Sustainable Development of the Public Chamber of the Russian Federation (2012). Center for Russian Environmental Policy. - Moscow.
- <http://www.nat-geo.ru>
- <http://ru.wikipedia.org/wiki/windenergy> power #
- Sidorenko V.N. (1998). *System dynamics*. Moscow, Publ. TEIS.
- Zangari, G. Risk of Global Climate Change by BP Oil Spill. National Laboratories (LNF) National Institute of Nuclear Physics (INFN). Italy. (2010). [Available online from [http://www. Associazionegeofisica. it / oilspill.pdf /](http://www.Associazionegeofisica.it/oilspill.pdf/)], 20.06.2010.

“Finance, Growth and Threshold Effects in Developing and Emerging Countries”

Jean-Pierre Allegret (University of Paris Ouest Nanterre La Défense, France)

Sana Azzabi (University of Tunis El Manar, Tunisia)

We test the relationship between financial development and growth building on the work of Aghion et al. (2004).

Estimates are performed with GMM dynamic panel data techniques for 112 emerging and developing countries over the period 1975-2007. As predicted by literature, the very low level of financial development seems to explain the inability of countries to converge to frontier growth rate. But the higher the level of financial development, the lower its positive effect on steady-state per-capita GDP. Finally, the presence of financial development threshold effect between financial development and steady-state growth rate is not confirmed.

Keywords: financial development, economic growth, convergence, threshold effects, Generalized Method of Moments, dynamic panel.

JEL Codes: C23, E44, O16.

“The Effect of Monetary Policy Tool in the Very Low Interest Rate Environment”

Boontham Rajitpinyolert (Kasetsart University, Thailand)

Under the severe depressed economic times when unemployment rate in the U.S. was skyrocketed to nearly 10 percent in 2010, in order for unconventionally accommodative monetary policy to take effect, the assets purchased by the Federal Reserve, so called Quantitative Easing (QE), are relatively more effective than Open Market Operations did. On the other hand, QE from the U.S. will also be likely to create inflationary pressure on the emerging markets. This paper has an objective to quantify the magnitude of interest rate reduction from QE operations in the U.S. for creating the wealth effect toward the future and to measure the likely effect of interest rate increase in Thailand.

For short-term maturity (3 month – 1 year) bonds, under the lag period of 6 months between asset purchase and interest rate change, the decrease in interest rate from QE2 agency debt purchase of \$50.85 billion will approximately be 0.25-0.4 percent. For intermediate-term maturity (2 year – 7 year) bonds, under the contemporaneous relationship between asset purchase and interest rate change, the decrease in interest rate from QE2 Mortgage-Back Securities (MBS) purchase of \$236.4 billion will be approximately 0.25-0.75 percent.

For the impact on Thailand, if the Federal Reserve's QE3 has the same size as that of QE2 (\$600 billion), interest rate level in Thailand will rise by approximately 4.8 percent from the fund flowing into South East Asian region. Finally, while the cost of inflation would be higher during QE period than that under normal economy for approximately 6 times, the cost of fluctuation in output will be higher during QE period than that under normal economy around 20 percent.

Regarding to the recommendation for the Federal Reserve in the next round of unconventional accommodative monetary policy, while the lower yield in short-term (3 month – 1 year) and long term (more than 7 years) could effectively be accomplished through the purchase of agency debt, the lower yield in short-term (2-7 year) maturity bond could be achieved through the purchase of MBS.

“Application of SABR model to strategies of accumulation of reserves of Central Bank in Mexico”

Guillermo Sierra Juárez (Universidad de Guadalajara, Mexico)

Abstract

The purpose of this paper is to calibrate the SABR volatility model in order to obtain the volatility of foreign currency (US dollar) in Mexican market and applied the model to the valuation O_c option premium specifically for the case of international reserves accumulation of the Central Bank on Mexico. It was found that the estimation of volatility and the premium O_c when use historical and implied volatilities are different respect the SABR volatility case, principally when forward price is not the same from strike price.

Introduction

Since Black-Scholes original paper (1973) plain vanilla options have been valued using market parameters and financial assumptions. However later it was discovered that Black-Scholes model estimated the same volatility for different strike prices, a fact not observed in the real world, in other words at different strike prices produce different volatilities, this behavior is observed in the market and it is known as skew or volatility smile.

Market volatilities smiles and skews³³ are usually managed by using local volatility models. It was discovered that the dynamics of the market smile predicted by local volatility models is opposite of observed market behavior. When the price of the underlying decreases, local volatility models predict that the smile shifts to higher prices; when the price increases, these models predict that the smile shifts to lower prices. Due to this contradiction between model and market, hedges derived from the model can be unstable and may perform worse than Black-Scholes hedges. The concept of local volatility was developed simultaneously by Dupire (1994) and Derman and Kani(1994). This idea represents the greatest advance in the understanding and calibration of the smile and volatility skew. In another direction, an important approximation of stochastic volatility was proposed by Hull and White(1987) and other model was the volatility model proposed by Heston and Loewentein W, (1993). Finally it is specially important for this work the contribution of Hagan, Kumar, Lesniewski and Woodward (2002) on SABR model and of course mention the version of SABR of Labordere (2009)

The local volatility model is consistent with smiles and volatility skews and also free arbitrage. However it has been observed in the market, according to Hagan Lesniewski and Woodward (2002), that dynamic behavior of volatility smiles and skews predicted by the local volatility model are opposite to the real observed behavior, SABR model volatility try to correct that fails of Hagan Model.

The most outstanding consequence of this result on the local volatility is that in the Hagan model (2002) the hedging often is worse than the Black-Scholes model hedge as they are actually inconsistent with the movement of the smile of the market, so that the SABR model is considered better model that the local volatility. In the original work of Hagan Lesniewski and Woodward (2002) and Lieke de Jong (2010) used perturbation theory to valuate the price of SABR model and its associated implied volatilities.

The main themes discussed in the following sections are: In section 2 we present the introduction of volatility models and the most important results of the SABR model. In section 3, the paper made a review of the issue of international reserves in the case of Mexico. In section 4 this paper proposed a review of the purchase of foreign exchange model using put options (Banxico O_c option) and its adjustment in volatility with the model SABR, at the end there are the results and conclusions of this work.

SABR model to strategies of accumulation of reserves of Central Bank in México

Antecedents (Black-Scholes and Volatility)

One option is a financial contract that giving to the holder the right, but not the obligation to buy or sell a certain asset at an agreed price at some future time. In particular, a european (an option that could be exercised only one time) call option with strike price K and maturity T on an underlying S is a contract that giving the right to buy or sell the underlying asset at a price K at time T .

The Black-Scholes equation was published 1973 and was derived by Fischer Black and Myron Scholes (and simultaneously Merton). This equation assumes that the underlying behavior associated with the derivative term can be modeled by a stochastic brownian motion and its derivation makes use of at least two basic concepts of finance: the hedging and arbitrage.

³³ The smile of volatility of foreign currency and the skew of volatility of equities could be explained by the difference between real and lognormal theoretical distribution.

For the derivation of the Black-Scholes model is considered the following assumptions: there is a risk-free rate and variance (both constants), the market is liquid for the asset underlying and the derivative, there are no transaction costs, It can be lent and borrowed at the same rate, no dividends are paid and there are no arbitrage opportunities.

Volatility is a measure of dispersion of information about the mean plus a measure of uncertainty in returns and typically is related to the standard deviation of an asset. The volatility varies over time and high volatility persists for long periods before reaching a long-run equilibrium, an effect known as clustering. Moreover, the volatility increases more than proportionally when yields increase when lower yields and this property is known as leverage. There are different ways of modeling the volatility as: parametric estimation, the historical moving average, using time series (ARMA, GARCH), the stochastic process with Brownian motions and implied and local volatilities.

For the parametric method volatility is a parameter that not changes over time and maintains the same value for the entire sample of size n corresponds to the sample variance or standard deviation. The main disadvantage of this model is that the volatility forecast is based in information of the past.

The moving average historical volatility opens a window of size n . Unlike the previous case, volatility is not a parameter but a process that evolves over time. By using the moving average of a sample of size n for each variance estimate is added a new observation at the end of the series and simultaneously eliminates the former. Some of the disadvantages of this method is its sensitivity to the number of observations moving average or the size of the window and on the other hand the weight to each observation receives is the same regardless of whether the information can be recent or distant.

The ARMA model (an autoregressive and Moving Average) considers that the average yield has a value of zero and models the variance of returns or squared returns using a linear regression with the square of the returns from previous periods. This model can be thought of as a generalization of the previous case where the coefficients or weights are determined through a process of regression. This methodology has the advantage of being able to make predictions of the intertemporal structure of volatility and reduce the clustering effect estimate and exploit the leverage effect.

The objective of the GARCH (Generalized Autoregressive Conditional Heteroskedasticity) is to estimate the conditional variance of returns on financial assets. The simplest model GARCH (1.1) by linear regression assumes that the conditional variance as a function of a term independent of the prior period error and variance of the previous period corresponding to the autoregressive term. to be stationary in model requires that the estimators or regression coefficients are positive (including the constant term) and the sum of the first two is less than or equal to one. To estimate the variance of the mean is required which in turn is also estimated using a regression where the current period is explained by the performance of the previous period plus a random term. The main advantage of this model is to allow forecast volatility in any future period and thus build the term structure of volatility.

The stochastic volatility model proposed a brownian geometric motion, the behavior of the variance consists of a drift term and a stochastic term. This model use the Ito calculus in the derivation.

Several of the above models are based on historical information and in general in the predictions do not incorporate structural changes, extreme events o are far from reality. To correct this you must include the information in implied volatility in the price of options.

The model implied volatility takes prices of options contracts traded on the market and calculate the volatility on the market. This model uses the option pricing Black-Scholes method and numerical approaches (such as Newton or Newton-Raphson) to estimate the volatility considering the knowledge of the remaining parameters. According to this model from the price of european options contracts (call or put) the underlying asset price, the expiration of the option and interest rate risk-free estimated volatility for each point in time.

SABR Volatility Model

The SABR Model (by abbreviations of stochastic an the parameters alpha beta, rho) proposes a forward rate (f) (which may be a forward swap rate, a forward exchange rate, forward actions price etc.) and its volatility described by a parameter α , both are described by two stochastic processes.

It is important to remember the following observations about the SABR model: a) forward rate and their volatility are martingale b) all the parameters of the model v, β, ρ are constant c) each forward rate lives in its own measure and does not know anything about the other forward rates. The forward rate and it volatility are described by the following stochastic equations:

$$df = \alpha f^\beta dW_1 \quad (1)$$

$$f(0) = f_0$$

$$d\alpha = v\alpha W_2 \quad (2)$$

where dW_1, dW_2 are brownian motions, f is the forward rate of some underlying, α is the volatility, and v is the volatility of the volatility

$$dW_1 dW_2 = \rho_{12} dt, \quad -1 < \beta < 1$$

the value of european call and put options are given by the formula of Black, in the case that the underlying are futures assets:

$$C = e^{-r(T)} (fN(d_1) - KN(d_2)) \quad (3)$$

$$P = C + e^{-r(T-t)} (K - f) \quad (4)$$

with

$$d_{1,2} = \frac{\log\left(\frac{f}{K}\right) \pm \frac{1}{2}\sigma_B^2 T}{\sigma_B \sqrt{T}} \quad (5)$$

where T is the expiration date, K is the strike price, f is the forward rate, C and P are the call and put options premium. The SABR volatility $\sigma_B(f, K)$ is taken from Labordere (2009), it should be mentioned that the deduction from work is based in Heat Kernel methodology and differential geometry,

$$\sigma_B(f, K) = \alpha (fK)^{(\beta-1)/2} \left\{ 1 + \frac{(1-\beta)^2}{24} \log^2\left(\frac{f}{K}\right) + \frac{(1-\beta)^4}{1920} \log^4\left(\frac{f}{K}\right) + \dots \right\}^{-1} \left(\frac{z}{x(z)}\right) \cdot \left\{ 1 + \left[\frac{(1-\beta)^2}{24} \frac{\alpha^2}{(fK)^{1-\beta}} + \frac{1}{4} \frac{\rho\beta\alpha v}{(fK)^{1-\beta/2}} + \frac{2-3\rho^2}{24} v^2 \right] T + \dots \right\} \quad (6)$$

where

$$z = \frac{v}{\alpha} (fK)^{(1-\beta)/2} \log\left(\frac{f}{K}\right) \quad (7)$$

and $x(z)$ is defined by

$$x(z) = \log \left\{ \frac{\sqrt{1-2\rho z+z^2}+z-\rho}{1-\rho} \right\} \quad (8)$$

For special case when the financial options are in money i.e. If $K = f$ the expression is reduced to

$$\sigma_{ATM} = \sigma_B(f, f) = \alpha / (f)^{(1-\beta)} \left\{ 1 + \left[\frac{(1-\beta)^2}{24} \frac{\alpha^2}{f^{2-2\beta}} + \frac{1}{4} \frac{\rho\beta\alpha v}{f^{1-\beta}} + \frac{2-3\rho^2}{24} v^2 \right] T + \dots \right\} \quad (9)$$

and for the gaussian case ($\beta = 0$) the volatility becomes:

$$\sigma(K) = \alpha \frac{\ln f/K}{f-K} \left(\frac{z}{x(z)}\right) \left\{ 1 + \left[\frac{\alpha^2}{24fK} + \frac{2-3\rho^2}{24} v^2 \right] T \right\} \quad (10)$$

$$z = \frac{v}{\alpha} \sqrt{fK} \ln \frac{f}{K} \quad (11)$$

$$\sigma(K) = \alpha \left(\frac{z}{x(z)}\right) \left\{ 1 + \left[\frac{\rho\alpha v}{4} + \frac{2-3\rho^2}{24} \right] v^2 \{ 1 + [\rho]T \} \right\} \quad (12)$$

$$z = \frac{v}{\alpha} \ln \frac{f}{K} \quad (13)$$

Briefly it is possible to say about parameters and the qualitative behavior of the model, according Labordere (2009):

- i) If the initial volatility increases, σ_0^T moves the smile curve towards the top
- ii) The β exponent has three effects on the smile curve: a) the first one is a progressive lifting of the smile curve as β ranges from 1 to 0 b) the second one is a reduction in the level of the smile as β increases c) the third is the introduction of curvature to the smile as β goes from 1 to 0
- iii) If ρ moves from 0 to - 0.5 the smile is becoming more negative in its slope
- iv) The increase of ν increases the curvature of the smile

International Reserves in México

International reserves are biggest assets of general balance from the Central Bank of México (Banco de México or Banxico)³⁴. The objective of accumulation of reserves is to contribute to the stability of the national currency purchasing power through the compensation of imbalances of the balance of payments. The reserves are used as a kind of insurance to deal with contingencies that could damage trade flows or the balance of payments generated by macroeconomic and financial imbalances. The reserves are financial assets that the central bank invests abroad from Mexico and that can be easily converted into means of payment in other words whose main characteristic is the liquidity. A situation of imbalance in the balance of payments requires that assets are easily convertible in means of payment to pay off the obligations in foreign currency.

International reserves are invested in financial instruments that have with certain attributes in the case of Mexico³⁵ which stipulates that reserves are made up of foreign currency, gold and must be free of any tax, have total availability, it is in addition to assets that represent obligations of entities not residing in Mexico, as deposits in financial institutions from abroad and they must be called in freely convertible currencies.

The same law of Banxico establishes that international reserves in Mexico are only: banknotes and foreign coins, deposits, titles and values payable outside the national territory, considered first-order in the international markets, with a relatively high credit rating agencies and liquidity, credit of central bank not more than six months which this service current and finally special drawing rights of the International Monetary Fund (IMF)

Mexican Oil (Petróleos mexicanos or PEMEX) is the main provider of foreign currency. Pemex sold dollars directly to Banxico proceeds from the sale of oil and it is the main source of foreign currency, which makes up the international reserve. Also occasionally as result of the external debt, the federal Government also sells dollars to the Bank of Mexico and finally another important source of foreign currency comes from the policy of accumulation of international reserves, which in his case, determines the Commission of changes when instructed the central bank to buy foreign exchange in the market.

The appropriate level of international reserves is not a fixed value in time but it depends on the situation and the time for each country and the amount depends is a trade off between cost and benefit.

In the case of high levels of reserves, the benefits are among others: the perception of the strength of the currency of a country, the strength of its economy for its obligations with the rest of the world that improves the perception of the risk country, lowers the cost of external financing and reduces the vulnerability to exogenous shocks.

The costs associated with maintaining international reserves, is the maintain a reserve inverted in extremely liquid financial instruments (such as notes of treasury of United States notes) instead of investing in instruments afforded greater performance as long-term instruments.

It is necessary to mention that an excessive accumulation of reserves is funded with liabilities issued by the Bank of Mexico. If the local rate that the Central Bank must pay for these liabilities is greater than the foreign rate that receives of average performance of the reserve assets, generates a cost for the central bank. Reserves represent a long position in foreign currency leading to major losses or gains of capital.

It is necessary to say that almost all central banks of the world, including of Mexico do not follow any theoretical model for determining reserves, and do not have any particular indicator in particular. If do not primarily based on the analysis cost benefit.

Since the crisis of the nineties (1994-1995) the balance of reserves in the Bank of Mexico has been increased considerably and its evolution is linked to the exchange-rate regime. With a fixed exchange rate, the Central Bank intervened in the market to keep the pegs of the exchange rate and with the flexible exchange rate the international reserve attenuates the economy's vulnerability to external shocks

³⁴ According to article 18 of the law on the same central Institute

³⁵ Reserves must comply with the provisions of article 19 of the law of the Bank of Mexico

The flexible exchange rate currency regime have coexisted in different stages in the policy of accumulation of international reserves, which have detonated several mechanisms of operation of the Mexico Bank in the foreign exchange market.

The experience of Mexico with a floating exchange rate regime has been success and this international reserves accumulation policy has been designed to influence the regime of free float as little as possible. The central bank has implemented various measures to lessen the impact on the Mexican economy, in particular in October 2008 began to sell foreign currency with the purpose of providing liquidity to the market and to cope with the volatility of the exchange rate. The evolution of international reserves of Banxico appear in figure 1) at beginning of 1996 international reserves was less 20, 000 millions of US dollars and sixteen years after the accumulation of reserves are close to 160,000 millions of US dollars. It is a notorious increment in international reserves.

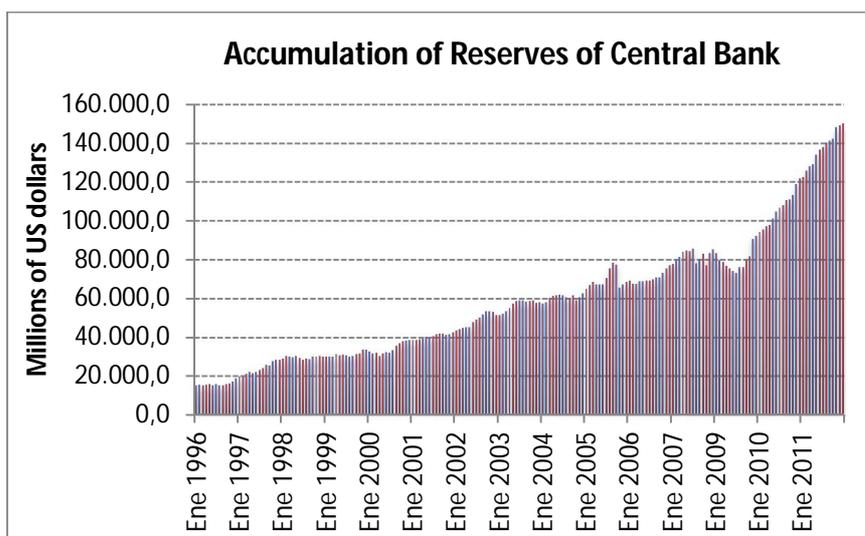


Fig.1

Valuation of O_c options in the strategy of accumulation of reserves of the Bank of México

In 1996 Bank of México proposed the possibility of buying dollars on the market, taking care to not send wrong signals to the market. Although it is advisable to have an enough amount of reserves, the central bank wanted a scheme that encourages the purchase of dollars when the market is offered and inhibits in the opposite case in order to affect the free float regime as little as possible. In August of the same year, the Banxico issued a statement to financial institutions and credit of Mexico where invited through to the payment of a premium (by means of a put option) to sell dollars to the central Institute. it should be noted that these options have characteristics somewhat different from the plain vanilla put options.

The option proposed by the Bank (O_c) can be considered at the same time like a portfolio of some options with a day of maturity, but which may be exercised only once. However there is a risk to accumulate reserves in this way is when the exchange rate shows a trend of depreciation if foreign currency from one day to another, it would be optimal for the holders of the put options exercise at that time then the Bank accumulate reserves through the purchase of currency on the market and at the end would have an effect of devaluation pressure. In order to avoid this behavior the central bank propose that the exercise of the option has made one conditional to the type of this change at the bottom of a certain level, in such a way that the single put option can be exercised if and only the strike price of the exchange is not higher than the arithmetic average of the price of 20 working days before of fix exchange rates

In figure 2 the graph shows the contrast between the spot of foreign US dollar/peso³⁶ and by the other hand the amount of put options exercised, in almost all cases when the exchange rate had an appreciation tendency

³⁶ In all paper pesos refer to mexican pesos

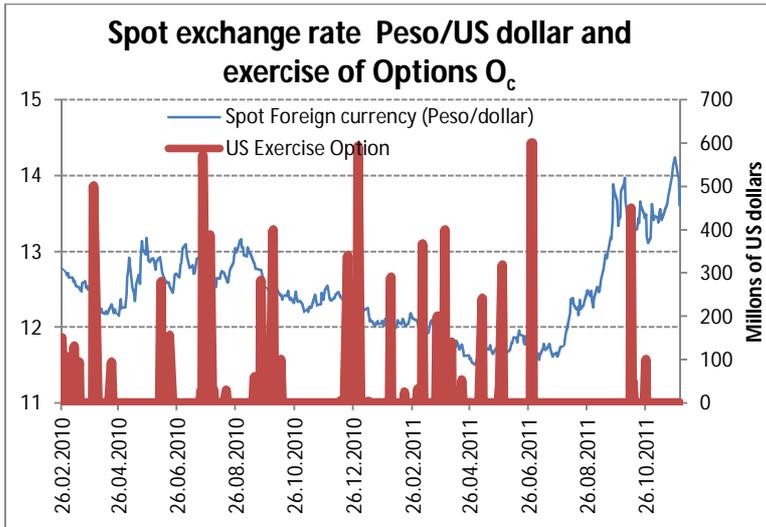


Fig. 2

Galan, Duclaud and García (1996) proposed an approximation to the value of the put option for the sale of dollars to the Bank of Mexico considering the history of the fix peso/dollar exchange rate in order to estimate the volatility. As mentioned previously the choice of Bank Mexico can be seen as a portfolio of European put options "at the money", maturing to a day with exercise price determined by the survey of Bank of Mexico from the previous day, once option is exercised the remaining options are lost. In addition it should be remembered that the option only may be exercised when the strike is equal to or less than the arithmetic average of the survey of the average of the 20 days prior to the date of exercise. In summary, to determine the value of the portfolio of options put in it is necessary shall consider the following factors:

- (a) put Option value "at the money"
- (a) probability to comply with the restriction of the average of the "n = 20" days;
- (b) probability to exercise the put option only on a particular day

$$O_c = \sum_{t=1}^n desc * Put(At\ money)^{BS} * Prob(NoRestricción) * W(ejercicio\ in\ t) \quad (14\ a)$$

or

$$O_c = \sum_{t=1}^n e^{-r(T-1)} * Put(At\ money)^{BS} * N(d_1) * N(C)(1 - N(C))^{t-1} \quad (14\ b)$$

where each one of the options are joined in the portfolio and O_c is a product of 1) a discount factor, 2) the value of the modified Black-Scholes formula "at the money" that mix up the plain vanilla put option with version Garman M. and S. Kohlhagen for currencies and forwards, 3) the term of the probability of exercise in a given day and finally 4) the probability of meet the restriction of the option.

With the formula Galan, Duclaud and García (1996) on the condition that the value of the fix exchange rate is lower than the average of the 20 days prior

$$Prob(S_t \leq Y_t) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{d_1} e^{-\frac{x^2}{2}} dx = N(d_1) \quad (15\ a)$$

with

$$d_1 = \frac{Y_t + \left(\frac{t-1}{n}\right) S_0 - \frac{1}{n} \sum_{i=1}^{t-1} S_{-n+i} + \mu t \left(\frac{t-1}{2n}\right)}{\sigma_{z(t)}} \quad (15\ b)$$

where

- e_t : the exchange rate (fix) determined by the Bank of Mexico day t
- S_t : the natural logarithm of e_t with $S_t = \mu + S_{t-1} + \varepsilon_t$ $\varepsilon \sim N(0, \sigma_\varepsilon^2)$
- Y_t : the moving average of n observations prior to S_t (n=20 days)
- And with Z_t one auxiliary random variable with the following feature

$$Z_t = \sum_{i=1}^t \left(1 - \frac{t-i}{n}\right) \varepsilon_i \quad (16\ a)$$

$$Z_t \approx N(0, \sigma_z^2(t)) \quad (16 \text{ b})$$

and

$$\text{Var}(Z_t) = \sigma_\varepsilon^2 \frac{t}{n^2} \left(\frac{(t+1)(2t+1)}{6} + (n-t)(n+1) \right) = \sigma_z^2(t) \quad (17)$$

On the other hand, also of Galan, Duclaud and García (1996), $W(t)$ is the probability of exercise in one day t , once it has been exercised the option eliminates the possibility of subsequent options. It is noted that there is incentive to exercise the options as quickly as possible, once satisfied the above mentioned restriction and utility exceeds the value of the option premium, this will be exercised.

$$W(t) = \text{prob}(\text{ejercicio} = t) = N(C)(1 - N(c))^{t-1} \quad (18 \text{ a})$$

$$N(C) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^C e^{-\frac{x^2}{2}} dx = N(d_1) \quad (18 \text{ b})$$

$$C = -\frac{(\mu + O_c)}{\sigma_\varepsilon} \quad (18 \text{ c})$$

For equations (14a and 14b) it assumed that the portfolio of the options are of type put "at the money", with maturity of one day with the parameters of the exchange rate.

An adjustment is proposed in the previous model to the premium O_c of the portfolio of the Bank Mexico O_c , instead considering the historical volatility or implied volatility of Black-Scholes model

We used in the model SABR volatility.

Results

In the first part of this section there are the results of the calibration model and which is the best estimation of the parameters, in the second part there is a comparative for the premium option O_c using historical, implied and SABR volatilities, their sensibilities (delta and vega Greeks)³⁷ and finally the differences for the total premium are presented in the cases when strike prices and forward prices are equal and the case when are not the same.

The data for the estimation of SABR volatility are taken from derivatives mexican market (Mercado Mexicano de Derivados or Mexder) and with complementary information of the other financial variables on the mexican market on one day (August 26, 2011). The parameters of volatility, rho, and niu to calibrate the model and the volatility obtained is compared with the implied volatility that is taken of real information (see in the figure 3a 3b and 3), the best parameters of the calibration are shown in table 1 and figure 4:

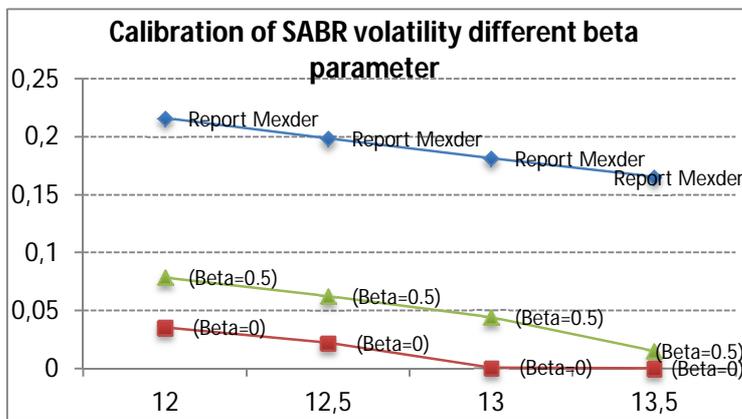


Fig. 3a)

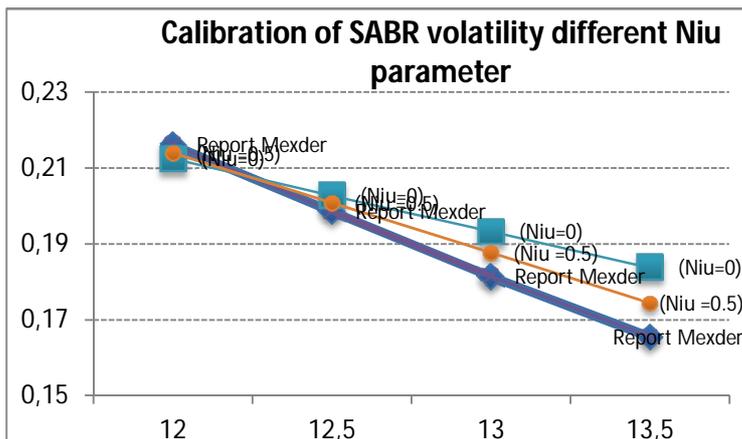


Fig. 3b)

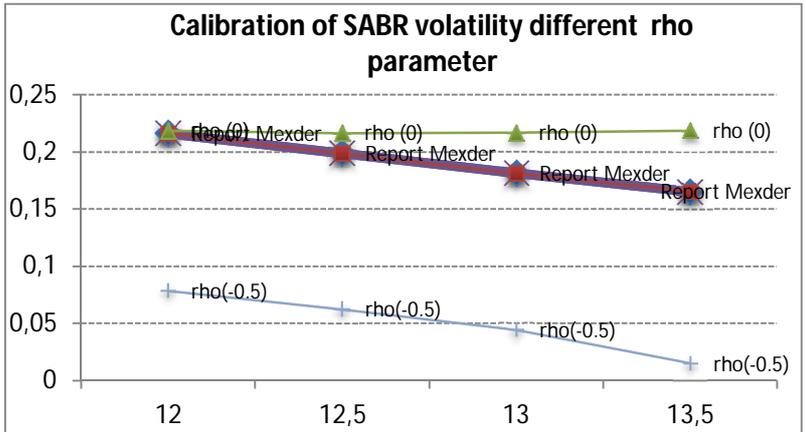


Fig. 3c)

Parameters	12	12.5	13	13.5
K (Strike Price)	12	12.5	13	13.5
F(Forward rate)	12.7	12.7	12.7	12.7
Beta	1	1	1	1
Sigma(I. Vol.)	0.205	0.205	0.205	0.205
Rho	-1	-1	-1	-1
Niu	0.9	0.9	0.9	0.9
T(Maturity)	0.8194	0.8194	0.8194	0.8194

Table 1

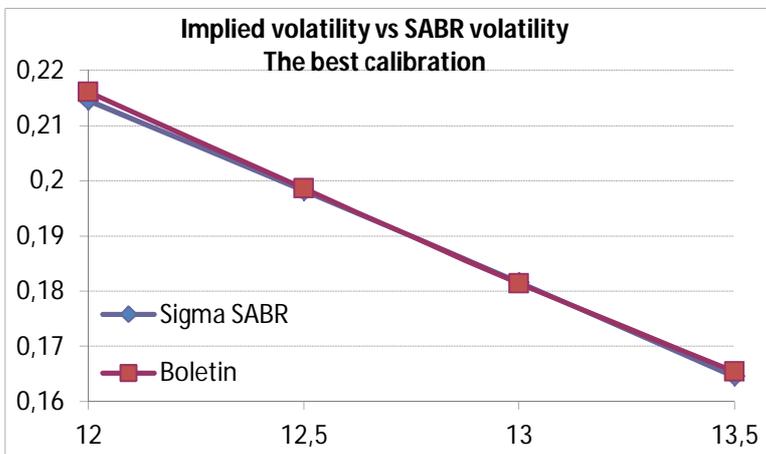


Figure 4

Now applying the SABR model volatility with information of the mexican market of the day (26 August 2011) to estimate O_c that is one portfolio of options put to 20 consecutive days with maturities of one day for each of them. Equations (18 a, b and c) estimate the probability of exercise an particular day and the condition to exercise the exchange rate peso/dollar is lower than the average of 20 days before to perform (15a and b). In order to solve solution equation and find O_c (14b 15a 15b 16a 16b 17 18 a, b y c) it is necessary to use a numerical methods because of the final equation is implied. Now it is propose that the O_c premium, rather than deal with the historical volatility dealt with the estimated SABR model and comparative of the results obtained is shown fig. 5

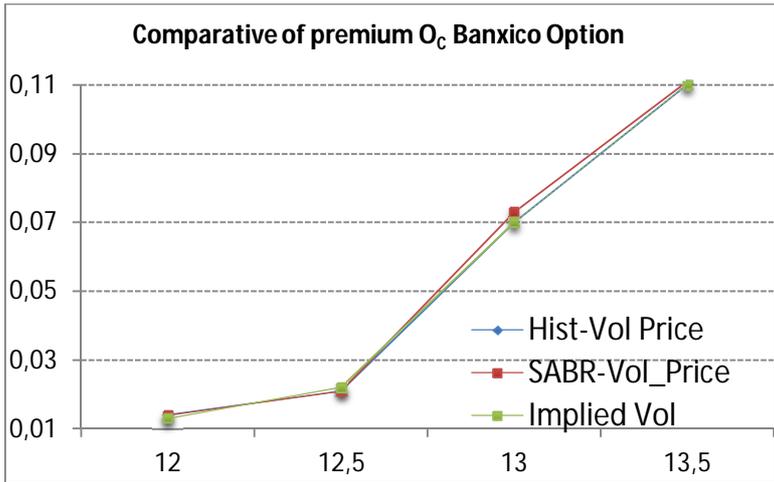


Fig. 5

The sensibility of option O_c respect to change of underlying (foreign currency) and respect to volatility are shown on 6a) and 6b). The maximum sensibility of the value O_c option respect to change of the dollar (Delta greek³⁸) is when $ST=K=12.5$ peso/ US dollar and the sensibility of O_c respect to change volatility (vega greek) is decrease as forward rate increase.

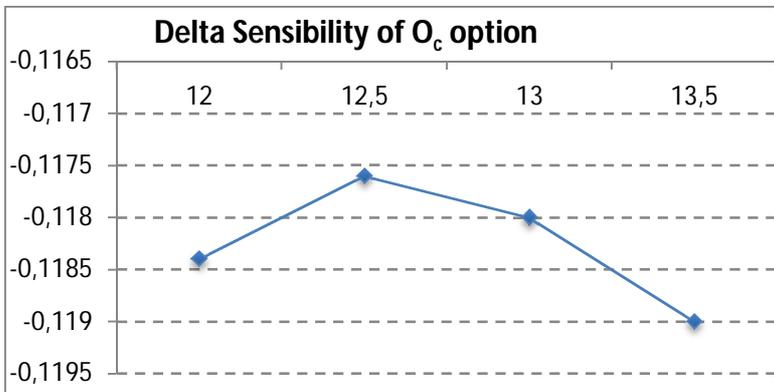


Fig 6a)

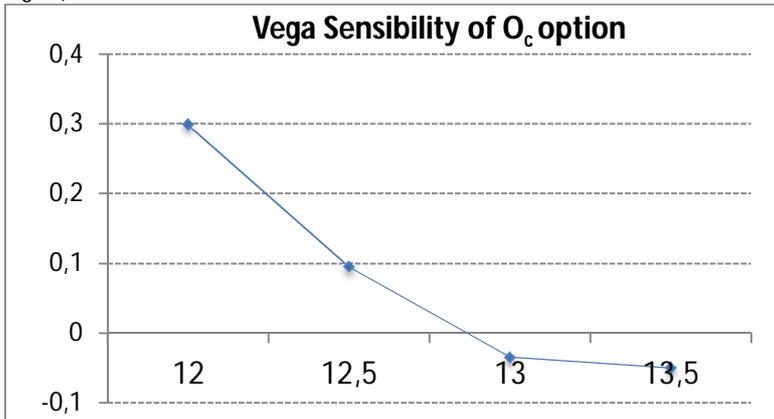


Fig. 6b)

By another way when the forward price of foreign currency coincides with exercise price on 12.5 pesos/ US dollar the difference is minimal 0.001 pesos for the premium O_c option, but another case when the exercise price of 13 pesos/ US dollar, the difference between Black-Scholes and SABR option value is from 0.003. For an offer auction for an amount of \$ 600 million (the nearest day was July 1 of 2011), would represent a difference in income from the premium option by 600,000 or 1,800, 000 pesos respectively.

However if the difference between the strike price and the forward price of the US dollar increase (or decrease) every day one percent until the last one day (day 20) the difference among in the valuation for the O_c premium become more important and particularly for high values of the forward rate. In figure 7 a) and 7 b) the graphs show the difference in the estimation of O_c premium value and in amount for one dollars auction of the option in the case of increase the forward rate and in the figure 8a) and 8 b) the correspond case for decrease the forward rate. In both cases the premium

³⁸ sensibilities in financial option world are known like greeks

O_c almost stay constant while the premium O_c obtained from the estimation historical, implied and SABR(case $F=K$) increase with strike price. Moreover the figure 7b) and 8b) show that the total amount paid for the holder's option and received as premium for the Banxico could become important in the case where strike and forward price are different.

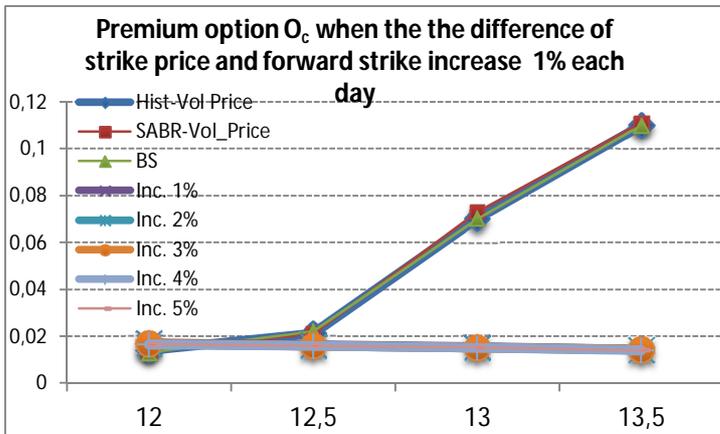


Fig. 7 a) top and 7b) down

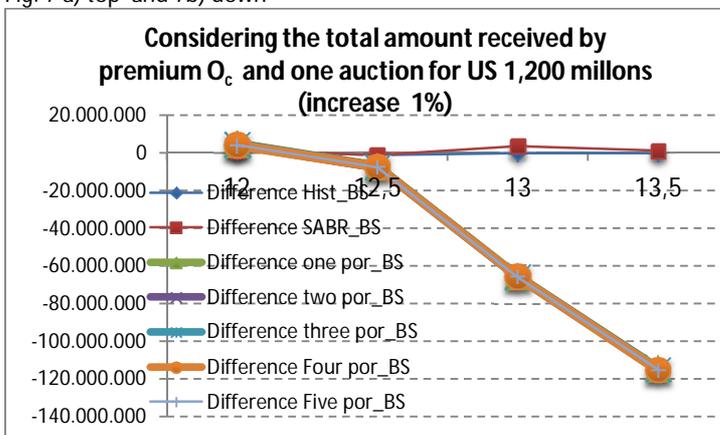
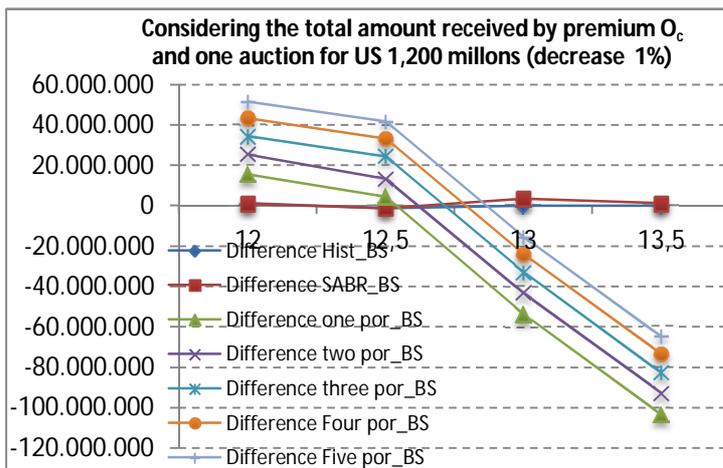
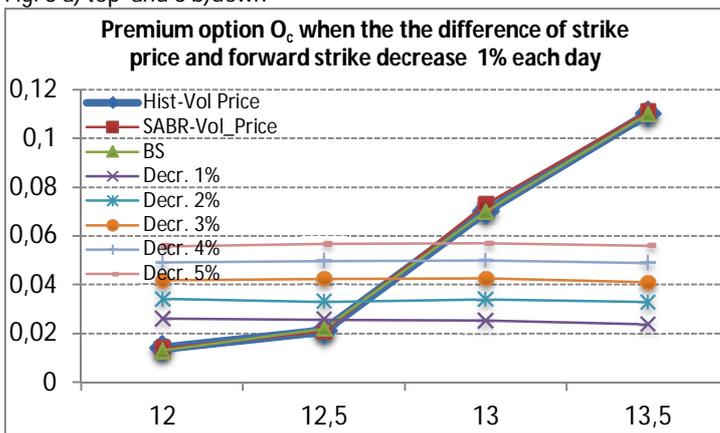


Fig. 8 a) top and 8 b)down



Conclusions

It is important to mention that the volatility function and premium of option of to the SABR model obtained with Differential Geometry is the same that original proposed of Hagan using perturbation theory

In the present work is presented the calibration of the parameters of volatility SABR for the case of foreign currency (US dollar) for the SABR volatility model

There almost is not difference of the premium of Banxico Option O_c "At the money" when the volatility used is Implied, Black-Scholes or SABR

However the difference O_c in is important in all cases different of "at the money" especially for high values of futures of foreign currency dollar

The total premium received for the issue of put options should be much less if the future of the foreign currency is different from the strike price

Bibliography

Black, Fischer and Myron S. Scholes (1973). The pricing of options and corporate liabilities, Journal of Political Economy, 81 (3), 637-654.

Derman, E, and Kani I, (1994). Riding on a smile. Risk 7, 32-39

De Jong L, (2010). Option pricing with perturbation methods, January 2010. Thesis Delft University of Technology Faculty of Electrical Engineering, Mathematics and Computer Science Delft Institute of Applied Mathematics

Dupire B. (1994). Pricing with smile. RISK, 7, 18-20

Hagan P, Kumar D, Lesniewski and Woodward D, (2002). Managing Smile Risk. Wilmott Magazine, September, 84-108

Labordere H. P, (2009). Analysis, Geometry, and Modeling in Finance. Chapman and Hall

Heston S. Loewenstein W, (1993). Options with Stochastic Volatilities with Applications to Bond and Currency Options. Review of financial studies, 6, 327-343

Hull and White, (1987). The pricing of options on assets with stochastic volatilities. The Journal volatilities

Galan M, Duclaud, J., Garcia A, (1996). Una estrategia de acumulación de reservas mediante opciones de venta de dólares: El caso de México. Documento de trabajo del Banco de México

Ley de Banco de México

<http://www.banxico.org.mx/>

Mexder "Boletín diario de Transacciones de mercado del mercado de opciones"

http://www.mexder.com.mx/MEX/Boletin_Diario.html

Session D

"The Inverted-U Hypothesis for the Effect of Market Risk (Premium) on Stock Return: UK Evidence"

Ye Jiang (University of Birmingham, United Kingdom)

The paper offers the first attempt to test the nonlinear relationship, i.e. the inverted-U shape hypothesis among the market risk factor (premium) and the stock return, within the Capital Asset Pricing Model (CAPM) framework, with respect to the UK-listed firms from 2000 to 2010. Moreover, this paper will use the linear and non-linear CAPM to test for the momentum effects and investigate whether the momentum effect in the linear CAPM is attributed to the non-linear factor. In the standard CAPM, the market risk premium is linearly related to the stock return and the effect of the systematic risk on the stock return is always positive, hence, lower risk will induce lower return and higher risk will generate higher return, accordingly. However, the paper is proposed to investigate whether the effect of the market risk on the stock return is approximated by an inverted-U shape relationship, rather than linear: at low levels of market risk premium the effect is positive and at high levels of market risk premium the effect is negative. The inflexion point can be treated as the threshold value among the market risk and the stock return. It represents the critical point at which the extra risk will not enhance stock return, on the contrary, it will affect the stock return adversely. Before the threshold value, the stock return is an increasing function of the market risk premium, and the positive effect exceeds the negative effect at low levels of risk, nevertheless, after the threshold point, it becomes a decreasing function and the negative effect is more important at high levels of risk. Furthermore, the linear and non-linear models will be used to test for momentum effect. The paper will be supposed to find a positive and statistically significant coefficient on the linear term; and a negative and statistically significant coefficient on the quadratic term. In addition, the momentum effects will be tested in the linear and nonlinear models. Finally, we shall propose that the momentum effects this paper found in the linear CAPM is due to the omission of the quadratic term of the market risk (premium), which represents the nonlinear effect the market risk will have on the stock return.

JEL Classification: G1, G12

“Risk Coverage in the top companies in the D/A/CH countries - Development and future challenges in the external risk reporting in the corporate practice”

Christian Theuermann (CAMPUS 02, Austria)

Challenging and difficult current economic conditions and the increasing number of corporate crises show that an effective risk management is essential for successful businesses. Companies are exposed to the risk that negatively by internal or external

factors or influences the achievement of sustainable existence is threatened. The raises in recent years, exacerbating risk situation increased demands on the executive management and its approach to risk. A goal-oriented professional enterprise dealing with risks for companies in all industries and size classes of essential importance. This is partly due to the fact that the interest of strong risk-adjusted information in the context of increasing accounting and recognize a growing demand for a risk-based alignment of management and is controlling. Furthermore, legislators and industry associations to seek a rapid adaptation of laws, regulations and guidelines to ensure that stakeholder interests are protected. To meet these demands, is a holistic and integrated into the business management of corporate risk management imperative. The external risk reporting are of key importance, as there is an urgent need for action in the transparency policy of the enterprises. Against this background, in 2011 conducted a study on the external risk reporting in the D/A/CH countries (i.e. Germany, Austria, and Switzerland). The objective of this study was to demonstrate an insight into the current state of development of business practices and future trends and challenges in the external risk reporting.

To each 100 decision-makers were interviewed using a standardized questionnaire. The high response rate of 22% underlines the importance and relevance, which takes these issues with the companies. Overall, the survey took the top companies in the automotive, construction, chemicals pharmaceuticals, banking/insurance, electronics/engineering, mechanical/industrial, consumer goods and raw materials/energy part. These companies employed between 250 and in 2010 more than

15,000 employees and achieved sales in the range of € 50 million to over € 10 billion.

Key points:

- 95% of the top companies have implemented a continuous risk management and use
- At the organizational integration of risk management can be recognized in principle for improvement
- An integrated view of corporate risk management system enhances the quality of external risk reporting relevant and causes long term to improve the reporting
- The release of the internal risk information to keep the companies surveyed covered
- 81% of respondents believe that the external risk reporting will in future become more important

As a conclusion it can be stated that the external risk reporting should be harmonized and coordinated with the content of internal risk management and reporting. For most of the top companies in the D/A/CH countries risk management is integral part of modern business management. The reasons for the implementation have different causes, ranging from normative standards, gain competitive advantage through to the fulfillment of ownership requirements. A key study finding is that many companies in the D/A/CH countries external risk reporting is not taken seriously enough and let her come not required meaning, acceptance and the necessary resources. At the same time, the tendency towards increased transparency and a continuous development of the external risk reporting are identified.

“Dividend policy's decision making situation and dividend policy forecast model”

Hui-Sung Kao (Feng Chia University, Taiwan)

The purpose of his study discussed earnings change, ownership structure and firm characteristic how to impact on dividend policy. This study used advantage of Cubist regression tree to demonstrate that and used its data mining to get the relevance threshold variable and threshold value. And construct the dividend policy forecast model under its situation rules. This study reached three purposes that are as follow: first, it proved signal theory existing on which situation rules; the second, dividend policy could reduce agency cost on which situation rules; last, building dividend policy predict model. This result could provide users relevant dividend information to make decision and enhance forecasting ability of dividend. This research uses the data of 2000 to 2009 to construct empirical model. And use the data of 2010 as holdout sample to calculate the accuracy of empirical model. It uses MAPE and R2 to measure the model's predicting performance. The empirical findings indicated earnings change and corporate governance are very important factors to dividend policy. The result of this study could provide new idea of dividend policy and corporate governance in academic. This study creates new research design to accounting research area, moreover, it solves insufficient problems and limitation in traditional econometric's method. These empirical findings could provide some contributions of issue and research design in academic. On management implication, this study find the dividend policy predict model on each situation rules. That could provide management to make future dividend policy and help financial statement users to forecast firm's future dividend policy. This empirical result could suggest the users of dividend information to make the optimal policy decision.

Keywords: *Dividend Policy, Signal Theory, Corporate Governance, Firm Characteristic, Cubist regression Tree*

“IPO Underpricing Evidence from Poland”

Adrian Woloszyn, (University of Szczecin, Poland)

Dariusz Zarzecki, (University of Szczecin, Poland)

We examine the initial public offering (IPO) underpricing phenomenon in Poland using the data from the New Connect (an alternative market for small firms) and the Warsaw Stock Exchange (the main market). In the article we survey average IPO underpricing in Europe and outside Europe. We discuss determinants of IPO underpricing. We examine “the market incompleteness hypothesis”, (Mauer D., Senbet L., 1992) which states that the IPO underpricing effect should be greater on an incomplete market. We compare the size, capitalization, and the IPO underpricing effect on the less developed New Connect market versus the more developed Warsaw Stock Exchange. The empirical results support “the market incompleteness hypothesis”: an average IPO underpricing was greater on the New Connect (37.2%) than on the Warsaw Stock Exchange (4.1%).

Key words: IPO, underpricing, stock exchange, incompleteness market hypothesis, WSE, NC

Introduction

In the recent years we have been witnessing more and more companies offering their shares in the stock market as a means of raising capital. In Poland there are two markets between which an issuer can choose: the Warsaw Stock Exchange (WSE) and the New Connect market, and these two markets are complementary rather than competing. On the one hand, the Initial Public Offering (IPO) on the WSE offers an opportunity to raise more capital than going public on the New Connect market. On the other hand, however, IPO in the WSE is more expensive and requires from the issuer more transparency and a greater number of formal documents. As a result, it is only large and stable companies that decide to raise capital in the WSE. New Connect, in turn, is chosen by smaller, more dynamic and innovative companies which are more exposed to risk. Nonetheless, regardless of the capital market selected by the issuer, the shares to be offered need to be priced. The management board assisted by a financial advisor, underwriter or authorised advisor in the case of the New Connect market sets the offering price. This price is usually estimated during bookbuilding. The offering price may vary for individual issues or investors to whom the offer is addressed. After the shares have been sold, the company is listed for the first time on the stock exchange. The closing price on the first day the share is traded is known as the first-day (closing) price.

In theory, if the offering price is lower than the first-day closing price, the company is underpriced. And on the other hand, if the offering price is higher than the first-day closing price, the company is overpriced. In practice, the preceding is usually the case. The IPO underpricing phenomenon was witnessed in the stock exchanges all over the world in various periods: in the United States between 1977 and 1982 (Ritter, 1984), in the UK in the years 1959-1963 (Merrett A., Howe M., Newbould G., 1967), in Australia between 1976 and 1995 (Lee, P., Taylor S., Walter T., 1996), and in less developed markets in China and Bangladesh in the years 1990-1996 and 1994-2001, respectively (Aminul I., Ruhani A., Zamri A., 2010). This effect was also observed in Poland between 1991 and 1998 (Ausseegg W., 1999).

The next part of the paper contains a literature overview, and presents the results of several research studies into IPO underpricing carried out in Europe and other parts of the world in the light of the market incompleteness hypothesis and selected other theories explaining IPO underpricing. Part three explores the characteristics of the Polish capital market, providing a comparison and contrast between two markets where Polish companies may raise capital. Part four presents the data, methodology and results of the research into IPO underpricing in the New Connect market and the WSE. The last part summarises the authors' conclusions.

Literature overview

IPO underpricing is measured with the initial rate of return. The first study to explore this phenomenon was published in 1963 in the United States (Securities and Exchange Commission, 1963). The sample investigated included more than 1,600 companies. In general, the companies which went public between 1959 and 1961 experienced IPO underpricing; more precisely, 79% of them reported higher first-day closing prices than their offering prices. The average underpricing exceeded 20%. The research conducted in the London Stock Exchange reveals an average IPO underpricing of 17.2% (Merrett A., Howe M., Newbould G., 1967). The studies on IPO underpricing were carried out for a number of markets in various periods. The results of such analyses for the European markets are summarised in Table 1.

Table 1: IPO underpricing in Europe

Country	Sample size	Time period	Average initial return
Austria	96	1971-2006	6.50%
Belgium	114	1984-2006	13.50%
Bulgaria	9	2004-2007	36.50%
Denmark	145	1984-2006	8.10%
France	686	1983-2006	10.70%
Germany	700	1978-2008	25.30%
Greece	372	1976-2007	50.90%
Italy	268	1985-2008	16.4%
Poland	224	1991-2006	22.90%
Spain	128	1986-2006	10.9%
UK	4198	1959-2008	16.30%

Source: (Loughran T., Ritter J., Rydqvist K., 1994, update 2010).

The IPO underpricing in Europe can be observed in all the countries subject to analysis. In the UK, where the research covered the largest sample, the average IPO underpricing was estimated at 16.3%. The highest average underpricing was observed for Greece, and the lowest – for Austria. In Poland, the average IPO underpricing in the Warsaw Stock Exchange between 1991 and 2006 was estimated at 22.9%. Similar estimates for other parts of the world are summarised in Table 2.

Table 2: IPO underpricing in other parts of the world

Country	Sample size	Time period	Average initial return
Argentina	20	1991-1994	4.40%
Australia	1103	1976-2006	19.80%
Brazil	180	1979-2006	48.70%
Canada	635	1971-2006	8.40%
China	1394	1990-2005	164.50%
Egypt	53	1990-2000	8.40%
Hong Kong	1008	1980-2006	15.90%
India	2811	1990-2007	92.70%
Iran	279	1991-2004	22.40%
Japan	2628	1970-2008	40.10%
Nigeria	114	1989-2006	12.70%
Russia	40	1999-2006	4.20%
South Africa	285	1980-2007	18.00%
Turkey	315	1990-2008	10.60%
United States	12028	1960-2008	16.90%

Source: (Loughran T., Ritter J., Rydqvist K., 1994, update 2010).

Outside Europe, IPO underpricing is usually higher. It is witnessed particularly in developing countries such as India or China, where the average underpricing between 1990 and 2005 was estimated at 164.5%. Research studies analysing the largest sample of companies – the US market – indicate an average underpricing of 16.9%.

As soon as the IPO underpricing was recognised in economic reality, several theories were developed to explain this effect. One of the first and the most famous theory is known as the winner's curse (Rock K., 1982). This theory distinguishes between two groups of investors: informed and uninformed investors. The preceding group will invest in a company only if its fair value is higher than its selling price. Uninformed investors will make a similar decision in such a case. If, however, a company's fair value is lower than its current market price, only uninformed investors will invest in it. It should be pointed out that they are aware of this fact and, as a result, they will invest only if the expected returns are positive or – in other words – if the issuers, on average, underprice their shares. The winner's curse theory was followed by several others: the institutional lag hypothesis, the speculative bubble hypothesis or the monopsony power hypothesis (Ritter, 1984). Research studies were carried out based on the differences between companies going public in terms of the industry and time period of their IPOs.

In 1992 a new famous hypothesis was formulated – the market incompleteness hypothesis (Mauer D., Senbet L., 1992). According to this theory, a market which reacts flexibly to changes in the environment is a complete one. A complete market is characterised by a large number of buyers and sellers, and offers standard products. In a complete market a single deal does not affect the conditions of other deals. Investors are well-informed, prices are transparent, and there are no entry or exit barriers (Warsaw Center of Economics and Techniques, 2012). The market incompleteness hypothesis assumes that IPO underpricing is a risk premium for investment in the primary market which is less complete than the secondary market. The primary market attracts less investors, and as a result they may demand a premium for investments in companies offering new shares in an incomplete market. The investors also demand a premium for the risk they take while investing in companies representing modern industries which have no peers in the secondary market.

Capital market in Poland

The capitalisation of the Warsaw Stock Exchange, estimated at EUR 140 bn, is approx. 7-15 times lower than that of the largest European stock exchanges such as LSE, BME, NYSE Euronext or Deutsche Börse. In spite of that, in 2010 the WSE was developing rapidly: 112 companies of EUR 3,810 million of worth entered the market. It was the second highest figure after the London Stock Exchange reporting 114 companies worth EUR 10,519 million in total. Also in 2009 the WSE belonged to the top three stock markets in terms of both the number of IPOs and their total value (PWC, 2011).

In Poland the companies which decide to raise capital in the Warsaw Stock Exchange through IPO, may offer their shares either in the main WSE market or in the alternative New Connect market. The main market (WSE) was established in 1991, and it is a regulated market. The New Connect market, in turn, is an unregulated market established in 2007. The New Connect is designed for small, innovative and rapidly growing enterprises with high risk exposure. The two markets are compared and contrasted in Table 3.

Table 3: Comparison and contrast between WSE and New Connect

market	WSE	NC
established	1991	2007
regulated market	Yes	No
general market index	WIG	NCIndex
number of companies quoted	426	333
of which foreign companies	39	7
capitalisation as of 31 December 2012 [PLN millions]	645,692.6	7,668
P/E ratio	12.5	56.3
P/BV ratio	1.06	6.4
total trade value in 2011 [PLN millions]	268,139	1,847
number of transactions per session	55,343	4,441
number of investors	High	Low
formal requirements	High	Low
IPO costs	High	Low
capital opportunities	High	Low
entry barriers	High	Low
issue type	Public	Private

Source: own study based on: (Basic statistics WSE, 2012), (Yearly market statistics, 2012).

The main WSE market is a much more complete and developed market than the New Connect, and has a longer history. The WSE is also a regulated market – which implies more formal requirements, and a more expensive one in terms of IPO costs, yet it offers better capital opportunities in exchange. The New Connect market is designed for smaller companies. Its capitalisation is nearly 85 times lower than the primary market's while the number of listed companies is lower by only 30%. The New Connect market offers also less liquidity; total trade value in this market is 145 lower and the number of transactions per session is 12 times lower than in the primary market. The average annual number of IPOs in the New Connect market is higher than in the WSE. Offerings are usually addressed to less than 100 people (which is called a private offer) whereas the offerings in the WSE are public and anyone may participate. The number of investors in the New Connect market is lower than in the WSE. The companies listed on the New Connect market are more risky and offer higher price/earnings and price/book value ratios. According to the market incompleteness hypothesis (Mauer D., Senbet L., 1992), it may be assumed that investors will expect higher risk premiums for investing in more risky companies on the New Connect market. As a consequence, the average IPO underpricing in this market should be higher than in the WSE.

Data, methodology and results

Between 30 August 2007, when the New Connect market was established, and the end of 2011, 521 companies went public in the Polish capital market. The number of new entrants in individual years is presented in Table 4.

Table 4: Number of IPOs in the Polish capital market

Market	2007	2008	2009	2010	2011
New Connect	24	61	26	86	172
WSE	34	33	13	34	38

Source: own study based on: (Basic statistics WSE, 2012), (Yearly market statistics, 2012).

Between 30 August and 31 December 2007 the main WSE market attracted more new entrants than the New Connect, though the number of companies offering their shares in the secondary market was rising each year. In the years 2008-2010 the number of IPOs in the New Connect market was double the number of IPOs in the WSE, and by 2011 this advantage increased to 4.5 times.

The authors excluded from their research several companies meeting the following criteria:

- their offering prices set for individual investors were different from those for institutional investors,
- they set different offering prices for different issues of shares,
- they transferred from the New Connect market to the primary WSE market,
- they were listed also on other stock markets (dual listing),
- they went public without offering new shares.

Finally, the research into IPO underpricing covered 334 companies which went public on the New Connect market and 112 which offered their shares in the WSE main market, as presented in Table 5.

Table 5: Number of IPOs covered by the research into underpricing

Market	2007	2008	2009	2010	2011
New Connect	19	44	22	80	169
WSE	24	25	12	24	27

Source: own study.

Underpricing was estimated as the rate of return on shares on the first trading day, according to the following formula:

$$I_d = (P_e - P_d) / P_d$$

where:

I_d – initial rate of return,

P_e – offering price,

P_d – first-day closing price.

According to the market incompleteness hypothesis (Mauer D., Senbet L., 1992), IPOs in the New Connect (i.e. less complete) market should offer a higher average initial return than IPOs in the more complete market – the primary WSE market. In order to verify this hypothesis, the Mann–Whitney U test for two samples (Hozer J., 1994) was employed, based on the following formula:

$$U_{obl} = (x_{1sr} - x_{2sr}) / (\sigma_1^2/n_1 + \sigma_2^2/n_2)^{0,5}$$

where:

x_{1sr}, x_{2sr} – arithmetic means for random sample sizes n_1 and n_2 ,

n_1, n_2 – sample sizes,

σ_1, σ_2 – standard deviations in the population or a sample, if the sample is large enough.

Average initial returns in the years 2007-2011 are presented in Table 6.

Table 6: Returns in the Polish capital market in the years 2007-2011

market	underpricing measure	2007	2008	2009	2010	2011	2007-2011
WSE	mean	6.84%	-1.33%	14.51%	4.99%	1.13%	4.07%
	median	2.12%	-0.97%	11.92%	2.56%	2.05%	2.20%
	standard deviation [percentage points]	15.68	19.17	11.53	8.37	10.71	14.62
NC	mean	39.1%	84.69%	85.98%	32.97%	20.29%	37.21%
	median	4.77%	5.38%	41.73%	24.06%	10.87%	13.33%
	standard deviation [percentage points]	68.22	219.32	188.91	46.13	35.28	103.42

Source: own study based on: (Basic statistics WSE, 2012), (Yearly market statistics, 2012).

Between 30 August 2007 and 31 December 2011 both markets, i.e. the WSE and the New Connect, experienced IPO underpricing. 2008 was the only year when the average and median IPOs in the WSE were overpriced. Throughout the entire period of analysis, a clear difference may be observed between the New Connect and the main WSE market. Companies going public in the secondary market offer approximately 9-fold higher average returns and 6-fold higher median returns than IPOs in the WSE.

In order to verify the impact of market efficiency on IPO underpricing, the sample of 446 companies was investigated. 112 of them went public in the WSE main market – considered to be more efficient. IPOs in this market offered average closing returns equal 4.07% with a standard deviation of 0.1462. The remaining 334 companies offering new shares in the New Connect – considered to be less efficient and more risky than the main WSE market – reported an average underpricing of 37.21%. The standard deviation of initial returns among companies going public in the New Connect market amounted to 1.0342. The following two hypotheses were formulated:

H_0 : The first-day closing returns in the more and the less efficient markets are equal.

H_1 : The first-day closing return in the more efficient market is lower than the first-day closing return in the less efficient market.

In the research it was assumed that closing returns in both groups had normal distributions. The hypotheses were verified with the Mann–Whitney U test for two samples, with U_{obs} statistics equal 5.69 and the critical value for the normal distribution so as $P(|U_{\text{obs}}| > U_{\alpha}) = \alpha$ equal 2.585. It follows that $U_{\text{obs}} > U_{\alpha}$, which implies that at the significance level $\alpha=0,01$ the null hypothesis H_0 about equal rates of return in the analysed markets should be rejected in favour of the alternative hypothesis H_1 stating that the first-day closing returns on the WSE main market are lower than the returns in the New Connect market. The results of the research are statistically significant and provide evidence supporting the market incompleteness theory, which assumes that IPOs in a more efficient market are less underpriced than IPOs in a less efficient market.

Conclusions

In the recent years the number of companies raising capital in the stock market has been increasing. As a consequence the Polish stock exchange belongs at the moment to the top three European stock markets in terms of the number of IPOs. In Poland a company may go public offering shares in either of two markets: the New Connect or the main WSE market. The primary market was established in 1991. It is a more complete, developed and a bigger market than the alternative New Connect market, which was established on 30 August 2007. Between its establishment and the end of 2011 the New Connect was entered by 521 companies. Some of them did not offer new shares, others decided to transfer from one market to another, and yet others chose dual listing on the Warsaw Stock Exchange. Such companies were excluded from the research into the underpricing phenomenon, and so were the companies which offered different offering prices. The results of the analysis of 446 companies entering the capital market over the years 2007-2011 reveal the occurrence of IPO underpricing in the Polish capital market in that period. The scale of this effect was greater in the New Connect than in the WSE main market: the average underpricing in the New Connect in the whole period of analysis is estimated at 37.2% as related to 4.07% in the WSE. The differences between the average underpricing can be explained with the market incompleteness theory. Investors who invest in more risky companies which enter a more risky market expect a higher risk premium. As a consequence, the underpricing in a more risky hence less complete market is higher than in a less risky market.

Co-author Adrian Woloszyn is a scholarship-holder in the framework of Submeasure 8.2.2 "Regional Innovation Strategies", Measure 8.2 "Knowledge Transfer", Priority VIII "Regional Human Resources for Economy" Operational Programme Human Capital. The scholarship was co-funded by the EU European Social Fund, the state budget and the budget of the Lubuskie province.



References

Aminul I., Ruhani A., Zamri A. (2010). Underpricing of IPOs: The Case of Bangladesh, *Global Economy and Finance Journal*, Vol.3 No. 1, p. 44-61.

Ausseegg W. (1999). Going Public in Poland: Case-by-Case Privatizations, Mass Privatization and Private Sector Initial Public Offerings, *Vienna University of Technology Working Paper No. 292*.

Hozer J. (1994). *Statystyka część II wnioskowanie statystyczne skrypt dla studentów kierunków ekonomicznych*. Wydawnictwo Naukowe Uniwersytetu Szczecińskiego. Szczecin.

Lee P., Taylor S., Walter T. (1996). Australian IPO Pricing in the Short and Long Run. *Journal of Banking and Finance*, Vol. 20, p. 1189-1210.

Loughran T., Ritter J., Rydqvist K. (1994, update 2010). Initial Public Offerings: International Insights. *Pacific-Basin Finance Journal*, strony Vol. 2, pp. 165-19.

Mauer D., Senbet L. (1992). The Effect of the Secondary Market on the Pricing of Initial Public Offerings: Theory and Evidence. *The Journal of Financial and Quantitative Analysis*, Vol. 27, No. 1, p. 55-79.

Merrett A., Howe M., Newbould G. (1967). *Equity Issues and the London Capital Market*. Longman. London.

Ritter, J. (1984, IV). The "Hot Issue" Market of 1980. *The Journal of Business*, Vol. 57, No. 2, strony 215-240.

Rock K. (1982). Why new issues are underpriced, *Unpublished Ph.D. dissertation*. University of Chicago. Chicago.

2010 US IPO watch Analysis and trends, PWC, http://www.pwc.com/en_US/us/transaction-services/publications/assets/pwc-2010-ipo-watch-annual-report.pdf (accessed on January 31, 2012)

Basic statistics WSE, Warsaw Stock Exchange, http://www.gpw.pl/analizy_i_statystyki_pelna_wersja (accessed on January 31, 2012)

Complete market feature, Warsaw Center of Economics and Techniques, <http://www.eit-centrum.waw.pl/analiza-rynek-doskonaly-cechy-rynku-doskonalego/> (accessed on January 31, 2012)

Securities and Exchange Commission. (1963). *Report of special study on security markets*. Government Printing Office. Washington.

Yearly market statistics, New Connect, http://newconnect.pl/index.php?page=statystyki_rynku_roczne (accessed on January 31, 2012)

Session E

“Network Formation with Productivity as Decay?”

Banchongsan Charoensook (ALHOSN University, United Arab Emirates)

This paper develops a model of noncooperative network formation. Link formation is two-sided. Information flow is two-way. The paper is built upon Bala and Goyal (Econometrica, 2000). A unique assumption is that the value of information decays as it flows through each agent, and the decay is increasing and concave in the number of his links. Thus, an agent may choose to avoid accessing an agent who possess many links since he is aware of the decay incurred through this agent. This avoidance leads to two particular results in the analysis of Nash networks: (1) Nash networks are not always connected; (2) Nash networks do not exist under some parameters. Since disconnectedness is reminiscent of a common feature of real-world network, the model may explain why real-world networks may exhibit this feature even when there is no heterogeneity among agents. Discussion on this insight is provided.

“Keeping a Finger on the Pulse of the Economy: Nowcasting Swiss GDP in Real Time Squared”

Boriss Siliverstovs (ETH Zürich & KOF Swiss Economic Institute, Switzerland)

In this paper we put a large-scale factor model developed in Siliverstovs and Kholodilin (2012) to a forecasting exercise of quarterly GDP growth in Switzerland in real time squared. That is, we strictly use only the information that was available to us at a time of making forecasts and we announce these forecasts at the same time we made those. The model specification preferred in Siliverstovs and Kholodilin (2012) continues to produce superior nowcast accuracy compared to the naive benchmark model, based on a historical mean of observed time series.

The fact that we produce forecasts of quarterly GDP growth at the weekly frequency allows us to continuously monitor the state of the economy and trace the influence of newly released patches of economic data on our forecasts. On basis of this, we were able to capture a phase of economic recovery after the Great Recession, a phase of relatively high growth during the year 2010, and a phase of declining confidence caused by escalating European debt crisis and growing fears of entering a new recession during the evaluation period from 2010Q1 until 2011Q4. According to our results, the latter phase started in May 2011 and continued until November 2011, when pessimistic sentiments dominated economic outlook.

“R&D, Technology Transfer and Growth: An Evolutionary Growth Framework”

Mina Sabaghpour (University of Malaya, Malaysia)

This paper examines the effects of R&D and technology transfer on total factor productivity across 21 high income countries and 6 Southeast Asian countries from 1996 to 2009. The Schumpeterian growth model was used to establish a causal relationship between R&D and technology transfer and productivity growth. The results obtained are two-fold. First, while R&D and technology transfer have positive effects on productivity growth, absorptive capacity was seen to register negative effects. This does not mean that absorptive capacity has no effect at all, but its effects are determined by the intensity of R&D, technology transfer and innovation. Second, the effects of R&D and technology transfer on productivity growth are higher in developed countries than in developing countries. We argue this is due to lack of institutional capabilities to adapt and upgrade imported technologies and innovations by many developing countries. Keywords: Economic growth, R&D, Innovation, Technology

“Discourse Analysis of the Battles regarding Economic Ideas concerning the 2007 Financial Crisis”

Shu Shimizu (University of Essex, United Kingdom)

This paper demonstrates how the battles of the Macroeconomic ideas concerning the recent financial crisis that started from 2007 can be understood and analysed by Ideational Political Economic theory and Discourse Analysis (Linguistic hermeneutic analysis). Put simply, this paper challenges two main questions: 1) how understanding of the recent financial crisis differs among economic scholars and schools: 2) how the solutions proposed regarding the crisis (particularly, on bailout issues) contradict each other depending on one’s theoretical presumptions and problematisation of the crisis.

Introduction

What did the recent financial crisis trigger? A long-term recession, a high unemployment rate, a credit crunch, bank runs, a free-fall of housing and stock prices and fears of sovereign defaults? Indeed, these issues have haunted the global economy over the past five years. They are continuing to force economists to propose solutions to the crisis. Then, over the past five years, numerous articles and papers have been published concerning these issues. However, what is interesting about these solutions is that their arguments are widely divergent and often contradict one another. For example, while many Free Market theorists argue for non-state intervention towards the crisis, many Anti-Free Market scholars argue for active and state-wide intervention towards the crisis. At this point, several economists point out that the crisis also triggered a battle of economics. For example, Joseph Stiglitz (2010) dedicated a chapter to account for the battles among economists. As he points out in one section of the chapter, ‘The Battle of Macroeconomics’, the crisis revitalises the long historical battle between the Classical and Keynesian economic schools (see also, Krugman, 2009; Skidelsky, 2010). On this battle of economics, while economists are most interested in winning the battle itself, we political economists, or more technically ideational political economists, are interested in **why this battle happens, who wins the battle and how this battle proceeds**. These unique analytical interests are rooted in common theoretical beliefs shared by ideational political economists. I would like to start this paper firstly from the introduction of the ideational political economy, secondly to the description of analytical corpus and strategy (i.e. the methodology and data) of my research, then finally to a brief demonstration of findings of the research.

Ideational Political Economy

Firstly, unlike a simple orthodox view of the economy, we ideational political economists believe that the “actual existing economy” is “the chaotic sum of all economic activities” (Jessop, 2004: 162; See also, Blyth, 2002; Foucault, 1978-1979). Namely, we believe that the economy cannot simply be depicted as the sum of aggregate demands and supplies. Drawing on this presumption, we understand an economic idea as one particular way to understand the economy. It means, in other words, we deny the monolithic understanding of the economy and economic events. Rather, we acknowledge the possibility of several understandings of them.³⁹

Nonetheless, while acknowledging the divergence of the understanding of the economy, we also believe that economic ideas struggle for the dominant understanding of the economy and economic events (Foucault, 1978-1979; Polanyi, 1944). This is firstly because each economic idea is based on different presumptions. It means, because their analyses and arguments start from different points, their conclusions and emphases eventually come to different ends, and sometimes apparently contradictory ends. The contradiction of economic ideas may not clearly appear as the battle of economic ideas in ordinary time. However, once certain economic events like a crisis happen, the contradiction of economic ideas starts to clearly appear as a battle, especially in the field of politics. This is because the contradict ends mean contradict political directions. At this point, we ideational political economic analysts highlight the performativity of economic ideas. Namely, economic ideas and the interpretation of *how the crisis is understood* can influence the real economy (Blyth, 2002; Foucault, 1978-1979; Gamble, 2009; Polanyi, 1944; Sum & Jessop, 2010). Economic ideas are referenced to justify particular economic policies, and they indeed encourage political agents to see the legitimacy of the implementation of a particular policy that has a real impact over real economy. For example, as long as the concept of market failure is attributed to the root cause of the crisis in general, political authority can legitimatise the necessity of bailout. On the other hand, opposing parties may attribute the concept of policy failure to the root cause of the crisis, whereby they might stand against the necessity of bailout. This is why the pioneer of UK political economic study, Andrew Gamble, argues: “It matters which explanation of the crisis becomes dominant, because that will shape the political response. Interpretations of the crisis become part of the politics of the crisis” (Gamble, 2009; 141). Therefore, political economists see the importance of the analysis of the battles of economic ideas in order to understand the dynamics of the politics of the crisis.

³⁹ Here, in order to avoid misunderstandings, I would like to emphasise that we do not deny the existence of aggregate demands and supplies. We just mean that understanding economy in terms of aggregate supplies and demands is just one way to understand economy.

Discourse Analysis

The main methodology I shall utilise for the analysis is technically known as discourse analysis. It originally stems from the linguistic analysis of written texts and spoken narratives. In this sense, my analysis is based on linguistic methodology to a degree. However, in political economy, discourse analysis refers to a certain type of ideology analysis.

Although the term 'ideology' is quite often used as a term to criticise one idea as a false belief, we do not use the term 'ideology' in such a negative way. Rather, we use the term to describe a particular view of reality. Then, as pointed out above, because we understand each economic idea as one way to understand the economy, we treat an economic idea as an ideology⁴⁰ (Jessop, 2004; Sum & Jessop, 2010). However, what is unique about discourse analysis as an ideology analysis is that we discourse analysts believe that when examining the narratives of certain events provided by agents, it is possible to know how agents understand the reality and the reason they took particular action. We call the logical structure of understanding and reasoning appearing in their narratives, discourse⁴¹ (Glynth & Howarth, 2007; Howarth, Norval & Stavrakakis, 2000; Laclau, 1997 and 2005; Laclau & Mouffe, 1985). In short, we discourse analysts highlight the causal relationship between agents' understanding of reality and agents' actions, and we believe we can determine their understanding of reality by examining their narratives.^{42 43}

So far, you may still feel discourse analysis is alien. However, it should be noted that discourse analysis is actually not a thoroughly new approach in the field of economics and finance study. For example, we can refer to Reinhart and Roggoff's analysis of 'this-time-is-different syndrome' (2009).

Reinhart and Roggoff's *This time is different* (2009) is a book that provides an excellent economic understanding of the recent crisis, and it has become a kind of bible for its analyses. Though their quantitative analysis is often praised by students of Economics and Finance, their qualitative analysis, that of 'this-time-is-different syndrome', is equally significant.

According to their analysis, when examining the history of financial crises, there is always a social false belief during financial bubbles that occur prior to all financial crises. For example, in every financial bubble, nobody believes the end of the rocketing prices of financial products, and everybody believes that the bubble of this time is different from the previous failed bubbles. Reinhart and Roggoff called this social false belief 'this-time-is-different' syndrome. Based on this analysis of the syndrome, they highlighted the causal relationship between the business cycle and social belief.

Reinhardt and Roggoff's qualitative analysis is a good example of discourse analysis. Although they have not established a concrete methodology for their narrative analysis, they indeed demonstrated how agents' belief or a dominant social belief would trigger some economic events (namely, bubbles). They unravelled such a belief by investigating the agent's narratives. So, like Reinhart and Roggoff, what I shall attempt to do in my whole project (i.e. PhD project) is reveal how economists' understandings of the recent crisis can influence state crisis management such as state regulations and bailouts over banking sectors. However, in this paper, I would like to briefly introduce parts at the very beginning of the project; namely, the analysis of the battle among economists' narratives of the crisis.

⁴⁰ This understanding of ideology and economic ideas corresponds to Greenspan's understanding of ideology which he expressed in the discussion with Waxman at the US congress in October 2008.

Waxman asked Greenspan, "Do you feel that your ideology pushed you to make decisions that you wish you had not made?", to which Greenspan responded, "Remember that an ideology is a conceptual framework for people to deal with reality. Everyone has one. You have to – to exist, you need an ideology".

⁴¹ Note that the definition and understanding of ideology and discourse I provide here is a highly simple explanation of ideology and discourse. The definition and understanding of 'discourse' and 'ideology' vary among discourse analysts and ideational political economists. Indeed, the discussion about the definition and understanding is still a highly debatable point. Also, I have to acknowledge the fact that my explanation of discourse and ideology is mainly based on Essex school's Discourse Analysis and its theory. However, due to the paper's space limits, I believe, this simplistic explanation would be justified.

⁴² More technically speaking, our Essex discourse analysis emphasises the importance of the discursive in social and political life. For the analysis of the discursive, we theoretically rely on many linguistic philosophies such as those of Wittgenstein (1953) and Austin (1975).

⁴³ To be precise, it might be an exaggeration to say that we can determine how agents understand the reality by examining their narratives. Rather, we presume we can know how one certain event is understood by examining how the event is narrated by the agents.

More precisely speaking, this paper explores

- 1) How the understanding of the recent financial crisis differs among economic scholars and schools
- and
- 2) How the solutions, particularly to bailout issues, contradict one another, depending on one's theoretical presumptions and problematisation of the crisis

Data

Once a crisis occurs, what economists try to do is understand the crisis based on their embracing economic doctrine. In other words, the economists provide the narratives of the crisis based on the economic doctrines they have embraced⁴⁴. That is why, in order to understand the academic discourse of the crisis, the analytical procedures I have to follow are firstly to understand (or simply know) the available economic doctrines (or existing economic schools) before and during the crisis; then, I can proceed to the analysis of what kind of narratives the economists provide about the crisis.

For the understanding of the existing macroeconomic doctrines or understanding of bailout issues⁴⁵, I mainly referred to general macroeconomic textbooks, such as David Romer's *Advanced Macroeconomics* (2006), and Wendy Carlin and David Soskice's *Macroeconomics* (2006). Additionally, I also referenced, Todd Knoop's *Recessions and Depressions* (2010), which the author claims is the first macroeconomic textbook that exclusively focuses on how several economic schools account for recessions and depressions.

As for the narratives about the crisis, I widely used several books provided by representative economists, such as Raghuram Rajan's *Fault Lines* (2010), Joseph Stiglitz's *Free Fall* (2010), Paul Krugman's *The Return of Depression Economics and the Crisis of 2008* (2009), and Robert Shiller's *The Subprime Solution* (2008). Likewise, I also referred to some editorial books and journals, such as the Institute of Economic Affairs' *Verdict on the Crash*, edited by Philip Booth (2009), voxEU's *The First Global Financial Crisis of the 21st Century*, edited by Andrew Felton and Carmen Reinhart (2008&2009).⁴⁶

The battle of Macroeconomics regarding the bailout issues

When examining the main economists' writings about the recent crisis, I found the academic discourses concerning the crisis and bailout issues could be categorised into four types: Anti-Interventionism, Reactive Interventionism, Pro-Active Interventionism and Active Interventionism. Though understanding how these four types of economic ideas regarding the bailout policies contradict one another is my primary analytical aim, allow me to demonstrate how Anti-Interventionism and Active-Interventionism contradict one another on the issue of bailout policies in this paper.

- Anti-Interventionist Discourse

Anti-Interventionism is, as its name indicates, the idea of standing against any type of state intervention. The Anti-Interventionist discourse can be found in the narratives of policy failure that are provided by Free Market theorists, especially New Classical scholars.

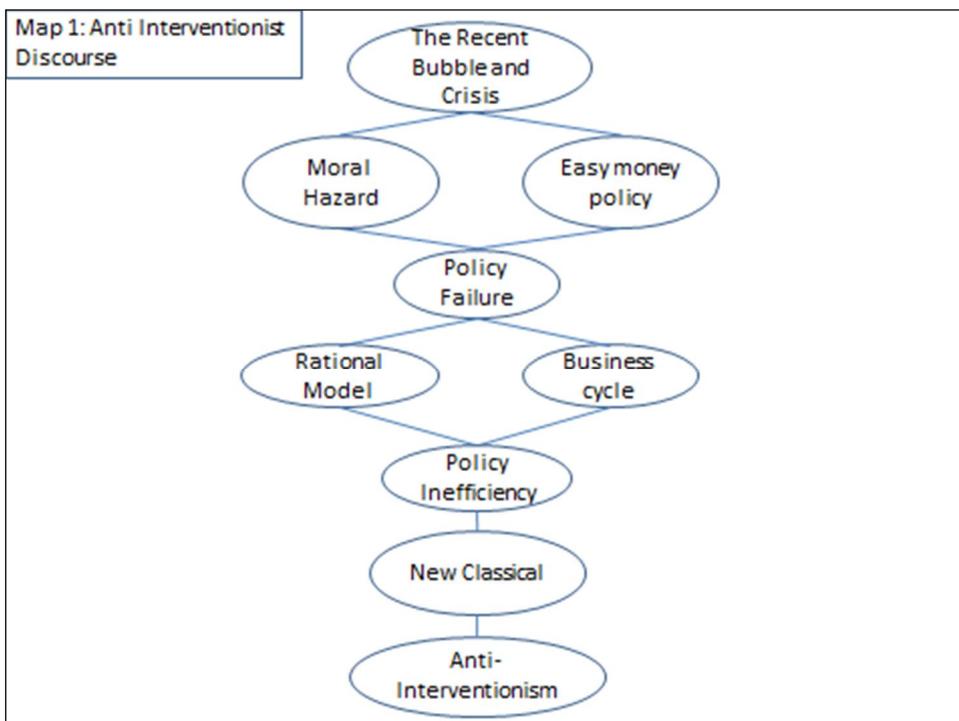
Conventionally, as many of you know, Free Market theorists and New Classical scholars argue against state interventions into the markets during periods of economic turmoil, and highlight the inefficiency of the interventions. This is because they believe an economic cycle is basically caused by the sum of rational behaviours. For this, they claim there is no space for the state to intervene in markets and the economy, even during the period of a crisis. More precisely speaking, they underline the danger of moral hazards caused by state intervention. Indeed, many Free Market theorists apply this economic doctrine to account for the Anti-Interventionist stance in their narrative of the crisis. This application process of economic ideas can be understood systematically.

⁴⁴ Technically speaking, we Essex school discourse analysts called this process of the application of particular ideas to understand certain events a 'process of articulation'.

⁴⁵ As the original abstract indicates, my original PhD projects include the analysis of regulatory issues.

⁴⁶ Again, they are examples of data.

As map 1 (below) shows, the narratives provided by Free Market theorists start by problematising the recent bubble as the policy failure of the recent easy-money policy. In other words, the theorists argue how the recent easy-money policy had sowed a seed about the current financial crisis and caused a moral hazard. Based on this problematisation of the recent policy failure, they emphasise that the bailout policy towards the current financial crisis would follow the same path.



For example, one of the representative Chicago scholars (who are conventionally New Classical school), Raghuram Rajan (2010), and authors of *The Verdict on the Crash* (2009), such as Anna Schwartz and Eamonn Butler, provide a typical narrative of the policy failure in their writings. According to them, although the dotcom burst of 2001 did not require any policy stimulus to recover, the US authorities did take action, cut interest rates continuously, provided easy money, and fostered the recent housing and credit bubble (i.e. the recent financial bubble). Consequentially, the bailouts of that time sowed a seed of the recent crisis. That is why, for them, the bailout policy after the burst of the financial bubble is a repeat of the history of the easy-money policy, and can foster another day of another crisis. At this point, they further develop the narrative of moral hazard based on a New Classical understanding of the business cycle. For example, Rajan argues that “if the current unemployment rate as well as current job growth drive policy actions, then it is possible that policy will remain far too stimulative for far too long. The roads that are budgeted for today will be built a year from now, when recovery is already well under way, potentially causing the economy to overheat and forcing costly policy reversals then” (*Ibid*: 98). Rajan’s claim indicates that there is always a gap between the economic cycle and the timing of the implementation of bailouts, and due to the gap, bailout policy is doomed to fail (i.e. resulting in moral hazard). Therefore, as Rajan’s texts indicate, the Anti-Interventionist discourse provided by Free Market theorists is built on the narratives of the policy failure and a proposal of non-intervention.⁴⁷

- **Active-Interventionist Discourse**

On the other hand, contrary to Anti-Interventionist discourse, the Active-Interventionist discourse can be found in the narratives of market failure that are mainly provided by Anti-Free market theorists, especially New (and Post) Keynesian scholars.⁴⁸ However, while most of Anti-Free Market theorists also provide the narratives of policy failure, they eventually underline the danger of market failure more than policy failure whereby they account for the reason of the necessity of state interventions.

Keynesian schools are conventionally regarded as the iconic economic schools of interventionism. Whereas Keynesian scholars, especially New Keynesian scholars, do not entirely deny the presumption of human rationality, they do highlight

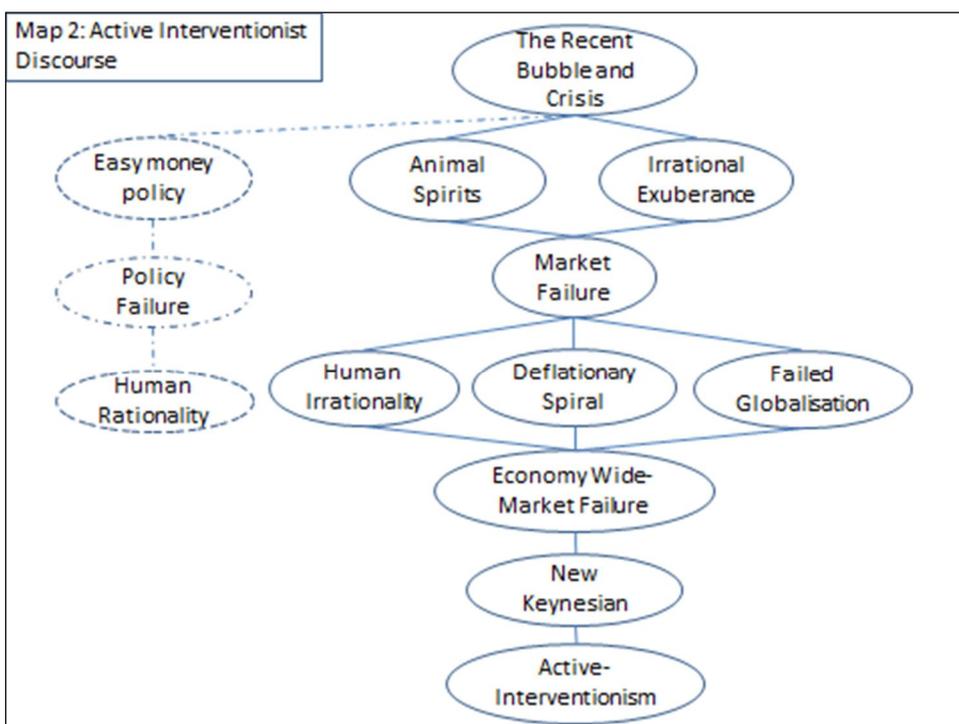
⁴⁷ More technically speaking, what the majority of Free Market theorists argue for is the rule-based state interventions (i.e. monetary policy). In this sense, the battle between Anti-Interventionism and Active interventionism can be described as the battle between discretionary and rule-based state interventions.

⁴⁸ For example, Joseph Stiglitz and Krugman both included one chapter in their books that described how Greenspan’s monetary policy fostered the recent financial bubbles through the continuous rate cuts like Free Market theorists (See, Stiglitz, 2010; Ch1: Krugman, 2009; Ch.7).

the role of human irrationality in an economy, unlike Free Market theorists. Thus, they emphasise that because people can be irrational, there is a possibility of market failure in which the state plays a great role. Indeed, this narrative of market failure can be found in texts provided by New Keynesian and Keynesian scholars in debates over the recent crisis. For example, Robert Shiller and George Akerlof have provided analyses of the relationship between irrational collective behaviours and bubbles in terms of 'animal spirits' (Shiller, 2008; Akerlof and Shiller, 2009). Also, Paul Krugman explained the credit crunch as a typical irrational market behaviour in terms of 'self-fulfilling prophecies' (2009; 184-185). Here the narratives of Market Failure appeared based on the application of New Keynesian theory. In other words, the cause of the crisis was understood in terms of the animal spirits.

Highlighting the role of irrationality in the business cycle, Keynesian scholars call for active and statewide intervention. This is because they focus on the possibility of economy-wide market failure such as deflation and deflationary spiral. For example, Krugman's *The Return of Depression Economics and the Crisis of 2008* (2009) depicts the deflationary spiral and liquidity trap that the Japanese economy has faced. Throughout the book, Krugman calls for active state interventions, such as bailouts over banking sectors and even temporal nationalisation of some failed banks.

In addition, many Keynesian economists believe the deflationary spiral is highly likely to happen. This is due to the domestic industries of developed countries already being weakened by the global markets, namely the massive imports of cheap goods. That is why Keynesian scholars argue for the statewide interventions that rescue not only the banking sector, but also non-banking sectors. For example, Stiglitz argues that the bailout policy should be mainly offered for small and middle-sized enterprises and small and community banks. This is because "if the goal was to encourage job creation – or even job preservation – we would have wanted more credit available to these firms, because they are the source of most job creation" (2010; 133-134). That is why Stiglitz criticises the series of US bailouts implemented up to 2009: "The government giving much of the money to the big banks... banks years ago had shifted much of their focus away from lending to small and medium-sized business." (*Ibid*) Therefore, although there was also the narrative of policy failure, Keynesian scholars mainly problematise the fear of economy-wide market failure as the main issue of the crisis, whereby they provide the discourse of Active-Interventionism. This discourse can be described in map 2 shown below.



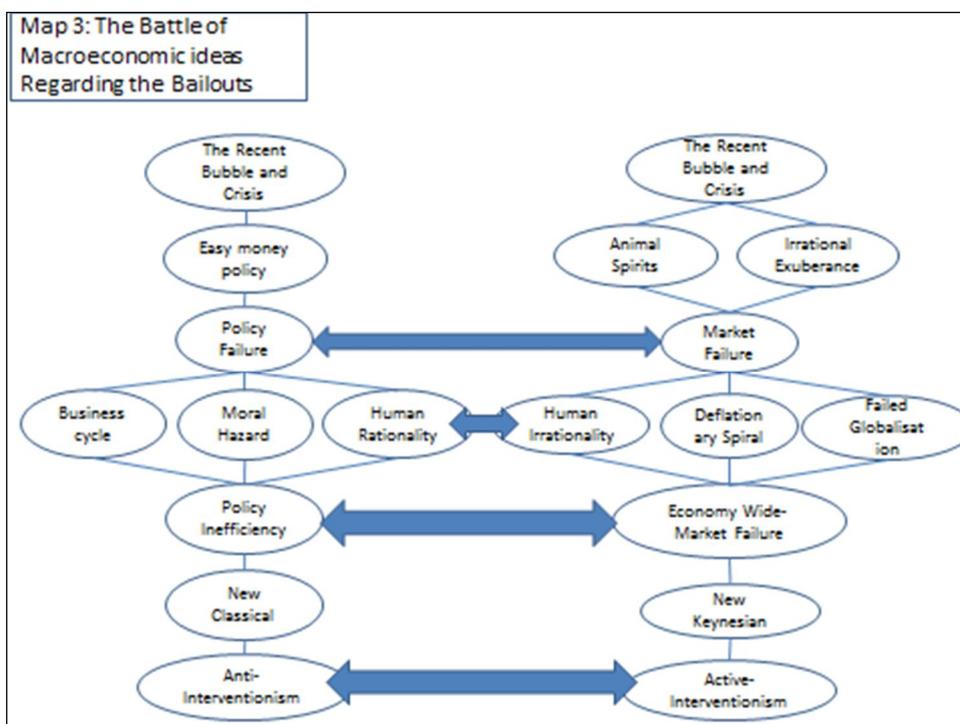
- Summary

In sum, comparing the economic discourses of Anti-Interventionism and Active Interventionism highlights crucial points. Defining or understanding the cause and nature of the crisis is indeed different. While Anti-Interventionists thoroughly diagnose the policy failure of recent monetary policy as the cause and nature of the crisis, Active-Interventionists, though they also point out the policy failure as one cause of the crisis, ultimately see the market failure as the cause and nature of the crisis.

Moreover, regarding the understanding of the crisis, it is an interesting point that, while Anti-Interventionists' problematisation of the crisis is limited to the local level, namely to that of the financial crisis, Active-Interventionists tend to extend the problematisation of the crisis beyond the problem of the financial sector, such as with the case of

globalisation. On this difference in scale of their problematisations, it may not be an exaggeration to say that, although there is a certain sense of optimism in the Anti-Interventionist discourse, there is also a certain sense of pessimism in the Active Interventionist discourse. Indeed, while many Keynesians warn of the worsening situation of the economy as they point out the fear of deflation, many Free Market theorists mention that the crisis would come to an end soon.

Finally, due to these different understandings of economy and crisis, while Anti-Interventionists call for non-intervention, Active-Interventionists call for active and statewide intervention. Therefore, examining economists' narratives concerning the recent crisis, it can be said that there appear to be certain battles of economic ideas, as map 3 below demonstrates.



Conclusion

This paper attempts to reveal the battles of Macroeconomic ideas regarding the recent financial crisis. Due to the limitation of the space, I have only focused on the battle between Anti-Interventionist ideas and Active-Interventionist ideas regarding bailout policy. However, because the battle between them is one of the clearest among economic ideas appearing in academic narratives, this demonstration may be sufficient to introduce ideational political economic theory and discourse analysis. Nonetheless, in order to complete this analysis of the discursive battles, I need to analyse other economic ideas and how they contradict one another in future research. Also, the difference (i.e. the battle) within a similar economic school would be of analytical importance.

Some of you may still wonder how the analysis introduced in this paper is different from a literature review, and you are correct in a sense⁴⁹. However, as I stated elsewhere in the paper, this analysis of the economists' discourse regarding the recent crisis is the mere beginning of my whole project (i.e. the discourse analysis of the politics of the recent crisis). Based on this analysis of the academic discourse, next I shall analyse how these academic discourses are applied in the non-academic political elite discourse of the crisis. This is because such an application of economic ideas in political fields reveals the clearest battle among economic ideas on the debates of crisis management.

So, if economic ideas and economists' understanding of economic events have substantial influence over the economy, economic activities and political economy, the study of economic ideas and their battle would become important, as Keynes argues:

"The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed the world is ruled by little else... It is ideas, not vested interests, which are dangerous for good or evil" (Keynes, 1936; 383-384).

⁴⁹ Indeed, Professor Xiaodong Zhu correctly realized and raised this point in the conference.

Bibliography

- Akerlof, G. & Shiller, R. (2009). *Animal Spirits*. Oxfordshire. Princeton University Press.
- Austin, J. (1975). *How to do things with words*. New York. Harvard University Press.
- Blyth, M. (2002). *Great Transformations*. Cambridge. Cambridge University Press.
- Carlin, W. & Soskice, D. (2006). *Macroeconomics: Imperfections, Institutions, and Policies*. Oxford. Oxford University Press.
- Foucault, M. (1978-1979). *The Birth of Biopolitics*. Basingstoke. Palgrave Macmillan.
- Gamble, A. (2009). *The spectre at the feast: capitalist crisis and the politics of recession*. London. Palgrave Macmillan.
- Glynos, J. & Howarth, D. (2007). *Logics of critical explanation in social and political theory*. Abington. Routledge.
- Howarth, D. Norval, A. & Stavrakakis, Y. (Ed.) (2000). *Discourse theory and Political analysis*. Manchester. Manchester University.
- Booth, P. (Ed.) (2009). *Verdict on the Crash*. London. Profile Books Ltd.
- Jessop, B. (2004). Critical Semiotic Analysis and Cultural Political Economy. *Critical Discourse Studies*, Vol.1, 159-174.
- Keynes, J. (1936). *The general theory of employment, interest and money*. London. Macmillan.
- Knoop, T. (2010). *Recessions and Depressions*. California. ABC-CLIO, LLC.
- Krugman, P. (2009). *The Return of Depression Economics and the Crisis of 2008*. New York. W.W. Norton & Co.
- Laclau, E. (1997). The Death and Resurrection of the Theory of Ideology. *MLN*, 112(3), 297-321.
- Laclau, E. (2005). *On Populist Reason*. London. Verso.
- Laclau, E. & Mouffe, C. (1985). *Hegemony and Socialist Strategy, Toward a Radical Democratic Politics*. London. Verso.
- Polanyi, K. (1944). *Great Transformation*. Boston. Beacon Press.
- Rajan, R. (2010). *Fault Lines*. Oxfordshire. Princeton University Press.
- Reinhart, C. & Rogoff, K. (2009). *This Time is Different*. Oxford. Princeton University Press.
- Romer, D. (2006). *Advanced Macroeconomics (3rd edition)*. New York. McGraw-Hill, Inc.
- Shiller, R. (2008). *The Sublime Solution*. Oxfordshire. Princeton University Press.
- Skidelsky, R. (2009). *Keynes; The Return of the Master*. London. Penguin Books Ltd.
- Stiglitz, J. (2010). *Free Fall*. New York. W.W. Norton & Co.
- Sum, N. & Jessop, B. (2010). Critical Discourse Analysis, Cultural Political Economy, and Economic Crisis. In de Cillia, R., Gruber, H., Kryzanowski, M. and Menz, F. (Ed.) *Discourse-Politics-Identity*(1-9). Tübingen. Stauffenburg.
- Reinhart, R. & Felton, A. (Ed.) (2008&2009). *The First Global Financial Crisis of the 21st Century I&II*. URL: <http://www.voxeu.org/index.php?q=node/1352>
- Wittgenstein, L. (1953). *Philosophical Investigation*, translated by Anscombe. Oxford. Blackwell.

Session F

"The Law of One Price in the Short-Run - Can financial markets provide an answer?"

Igor Sorokin (CUNY Graduate Center, New York, United States)

The Law of One Price (LOOP) and the Purchasing Power Parity (PPP) are important concepts in both economics and finance and have been analyzed rather extensively during the past thirty years. The general consensus in economics literature is that PPP does not hold in the short run, while there might be a convergence in the long run (though with a surprisingly long half-life). Most economists seem to have abandoned the short run testing of LOOP and PPP, concentrating mainly on the convergence to PPP in the long run and the Rogoff puzzle. In this paper, I revisit the short run LOOP and test it using the favorable conditions provided by the U.S. and Canadian financial markets (i.e. same trading times, no trading limitations, ease of access to information, and no necessity of conversion for cross-listed stocks). I use the data collected over 45 randomly chosen trading days, in a period between 2008 and 2010, on the 54 equity stocks that are listed on both Toronto and the New York Stock exchanges. By obtaining estimates for each day individually and then performing a weighted least squares estimation, I find that the hypothesis of the validity of LOOP cannot be rejected in contrast to the general consensus in LOOP/PPP literature.

"Early to Rise: When Opening Stock Returns Are Higher than Daily Returns?"

Andrey Kudryavtsev (The Max Stern Academic College of Emek Yezreel, Israel)

In present study, I explore intraday behavior of stock prices. In particular, I try to shed light on the relationship between the widely-documented U-shaped intraday pattern of stock returns (e.g., Wood et al. (1985), Jain and Joh (1988), Pagano et al. (2008)) and the well-known concept of stock price overreaction resulting in potentially profitable investment strategies based on short-term price reversals (e.g., Zarowin (1989), Cox and Peterson (1994), Park (1995), Nam et al. (2001)). Employing the stocks making up the Dow Jones Industrial Index, I document that for the majority of stocks, open-to-close returns tend to be significantly *lower*, and in most cases negative, if on that respective day their opening returns are *higher* than the average or median opening return on the stocks in the sample. That is, relatively high opening stock returns may serve an indication for subsequent intraday price reversals and for even more pronounced intraday U-shaped return pattern. Based on these findings, I suggest two versions of a daily-adjusted reversal-based investment strategy yielding significantly higher returns and with significantly less risk, than the strategies involving passively holding the index or an equally-weighted portfolio of stocks.

"Stochastic modeling for choice of monitoring indicators of companies' financial condition"

Dmitry Sizykh (Trapeznikov Institute of Control Sciences RAS, Russia)

Annotation: In this paper are proposed the methodology and algorithm of a choice of ratios for monitoring of companies' financial conditions. The proposed approach consists in use of model of stochastic factorial analysis and ensures optimization and objectivity of received results.

Keywords: monitoring of a financial conditions, choice of ratios, stochastic factorial analysis.

Introduction

Indicators of companies' financial conditions are important tool for evaluation of advance in the company's goals achievement, development indicators, and competitive advantages etc. Monitoring of these indicators over a long period is a powerful tool for identification of tendencies of activity and development, company's management optimization and adaptation to the various conditions influencing their activity. More often as indicators are used various ratios. The coefficient (ratio) analysis is diffused and available method of evaluation of company's financial conditions. Financial performances, in particular ratios, are used by external users, for example bankers, investors and business analysts, for evaluation of various characteristics of company's liquidity, financial stability and operating results.

Today the problem of choice of key ratios for monitoring of company's financial conditions is enough actual. Key indicators are necessary for managers in realization of management tasks, for owners and investors for express evaluation of company's financial conditions.

Nowadays the problem of choice of ratios for monitoring of company's financial conditions is characterized by a number of features. Firstly, the increasing competition, necessity of capital formation and various crisis situations conduce to increase of necessity of carrying out monitoring of company's financial conditions. At that, requirements to accuracy and efficiency of these processes are increased.

Secondly, for relative exact and total characteristic of company's financial conditions and tendencies of its change and for company's management, it is enough relative low number of ratios, inasmuch as today is the total number of ratios characterizing of company's financial conditions high, it is increased complexity of choice of necessary quantity of ratios from the large sample. It is inexpedient to aspire to use in analysis and company's management a high number of ratios, because from the one hand, collecting and processing of information can take too much time, from the other hand, it will be received on the basis of a number of ratios similar results, therefore, it is recommended to use limited number of ratios. It is important, so as each of ratios to describe only most essential features of financial conditions. At that, it is important to remember, that any ratio, taken separately, can not describe completely company's conditions.

Thirdly, recommendations available now about a choice of ratios for monitoring of company's financial conditions aren't exact and sensibly indistinct. At that, it is necessary to choose ratios which describe the most essential features of financial condition and exert profound effect on analyzed process, efficiency of evaluation and management. For example, it is recommended to carry out a choice of factors depending on what problem for the company is most critical, conditions of business and reliability of information which should be estimated and so forth.

Thus, nowadays the choice of ratios for monitoring of company's financial condition is subjective and its efficiency in many respects depends on qualification of managers and analysts. Even the number of ratios for monitoring is determined subjectively. Inasmuch as, it is more than it is necessary for managers to choice monitoring ratios carefully, the result of choice will be more effective at highly skilled managers.

All of this indicates, that it is necessary to use more accurate models for determination both required minimum quantity of ratios for monitoring, and just monitoring ratios. Therefore the objective of research, which results are given in this paper, consists in development of methodology and algorithm, using to increase objectivity of choice of ratios for monitoring of company's financial conditions. The goal of research is considered on an example of analysis of characteristics of financial condition, such as liquidity of assets and financial stability.

As is well known, company's financial conditions are characterized by enough difficult integrated factors, which it is impossible to describe functionally. Therefore, decision of determined objective is possible with the help of system approach for analysis of company's activity on application of factor models. Thus, it is determined the task of stochastic analysis and modeling. The proposed models make it possible to take into account cause-effect relation, what enable to reduce essentially quantity of ratios, and substantiate ratios selection for monitoring.

Practical realization of selection process of ratios for monitoring using the model of stochastic factor analysis is carried out on an example of ratios of financial liquidity and financial stability of companies.

Financial ratios: basic data for the factor analysis

As is well known, the main characteristic of company's financial condition is its solvency. This characteristic is very important for such subjects of economic activity as creditors and investors. Solvency describes the cover of company's liabilities by monetary funds and other liquidity assets. Company's solvency is estimated by the method of evaluation of adequacy of financial sources for formation of company's inventories and costs. During the analysis are determined ratios between different assets of company and sources of theirs cover. Depend from that, what sources are used for formation of stocks and costs, it is possible to make conclusions about company's solvency level.

Solvency is described by liquidity ratios in short-term period, and by financial stability ratios in long-term period.

Liquidity - salability, transformation of material or other recourses in monetary funds for cover of current financial liabilities. Analysis of company's liquidity is analysis of company's ability to cover all its financial liabilities. Liquidity level of

asset is determined by duration of time period, during that this transformation can be realized. The shorter is time period, the higher is the level of liquidity of its asset. In general, company is considered as liquidity in case, if company's current assets exceed its current liabilities.

Thus, liquidity is determined company's ability to convert its assets into monetary funds. Liquidity of company is usually stimulated particular interest by short-term creditors, as liquidity describes company's abilities for payments by their loans.

Liquidity ratios are financial indicators, calculated on the basis of data of company's financial statements for estimation of company's ability to cover its current debt at the expense of its current circulating assets. Meaning of these indicators consists in comparison of indicators of current company's debt and company's circulating assets, which have to cover of company's debt.

Usually are calculated three main ratios: Cash ratio, Acid-test, or Quick ratio - QR, Current ratio – CR. The other ratios are additional, characterizing various features of liquidity

- Current ratio evaluates possibility of company to cover its debts, describing, as far as current debts of company are covered by its working capital.
- By calculation of quick ratio (aid-test) is excluded from nominator such indicator as inventories, which include materials, semimanufactures, finished commodity, produce, VAT and accounts receivables for more than 12 months. In other words, this is the ratio of accounts receivable, displayed in assets of balance, and cash equivalents to short-term account payable.
- Cash ratio ist one of the most strict criterion of company's liquidity and describes, which part of short-term borrowed funds in case of need can be cover immediately at the expence of available cash resources, that is ratio of cash resources to short-term accout payable.

Other ratios are additional: they describe structure of assets and liabilities, if accounts receivable is repayable or not and how much amount it, if inventories is liquid or not. All of these exert influence on liquidity in short-term period (in the course of year).

After analysis of great number of liquidity ratios, which are used in practice, it is made the list of ratios for further analysis and selection of company's liquidity characteristics for monitoring.

In this research are used next liquidity ratios:

Liquidity ratios

Common liquidity ratio	L_1
Cash ratio	L_2
Acid-test, or quick ratio – QR	L_3
Current Ratio – CR	L_4
Maneuverability of the functioning capital ratio	L_5
Current assets to to total assets	L_6
Ratio of Own Working Capital	L_7
Total Debt To Total Assets	L_8
Net working capital - NWC	L_9
Net working capital to total assets	L_{10}
Net working capital to Inventory holdings, material assets to current assets	L_{11}
Receivables Ratio	L_{12}
Inventory holdings, material assets to current assets	L_{13}
Receivables to Payables	L_{14}

The company's financial stability describes its durability and stability of solvency. Financial stability ensures free cash flow and constant process of production and sales of products. Thus, financial stability is company's characteristic, which describes its financial independence from foreign loans, its ability to ensure free cash flow, and availability of company's equity capital to ensure main kinds of activity.

If company is financial stable, than it has preference over other companies of some branch in capital formation, taking of credits, choice of providers, staff selection. The higher ist company's financial stability, the more independent is company from unexpected change of market conjuncture, and consequently, lower risk to become out of business.

Financial stability is based on the optimal ratio between separate kind of company's assets (circulating or non-circulating assets, taking into account their internal structure) and their sources of finance (equity or debt capital). The most resumptive characteristic of company's financial stability is surplus or deficit of capital for formation of inventories and costs. This surplus or deficit is result of difference between value of source capital and value of inventories and costs. For calculation of company's financial stability, it is necessary to calculate the value of inventories and costs, and their funding source.

After analysis of relative indicators, characterizing financial stability, which are used in practice, it is made the list of ratios for the future analysis and selection for monitoring.

In this research are used next ratios of financial stability:

Financial stability ratios

Total debt to equity (TD/EQ)	U_1
Own current assets to current assets ((EQ - LTA) / CA)	U_2
Total debt to total assets (TD/TA)	U_3
Equity to debt ratio (EQ/TD)	U_4
Own current assets to equity ((EQ - LTA)/EQ)	U_5
Equity to Total Assets, «equity ratio» ETA	U_6
Equity + Long-term debt to total assets ((EQ + LTD) / TA)	U_7
Long-term debt to fixed assets (LTD/FA)	U_8
Long-term debt to total assets (LTD/TA)	U_9
Own current assets to inventory holdings, material assets ((EQ-LTA)/IH)	U_{10}
long - term assets to equity (LTA / EQ)	U_{11}
Current assets to long - term assets (CA / LTA)	U_{12}
Times interest earned TIE	U_{13}
Current assets - current liabilities to total assets ((CA - CL) / TA)	U_{14}
Long-term debt to fixed assets (LTD/ FA= LTD/ LTA)	U_{15}
Long-term debt to debt ratio (LTD/TD)	U_{16}
Long-term debt to LTD/(EQ+LTD)	U_{17}

The analysis of indicators on the basis of ratios is, usually, carried out in comparison of given results with the norm (norm depends on the number of characteristics: company's form, country, branch etc.), or with the last result of some company (on the basis of dynamic indicators) or with average measures of branch.

The model and algorithm of stochastic factor analysis for selection of monitoring ratios.

By the development of using of methods of today factor analysis is concerned with the possibility of effective solving of next three generalized statistic tasks of economic analysis: study of internal structure of connections in metrics, study of number of dimension for describing of economic process, determination of more informative indicators.

Using today methods of factor analysis, it is possible to realize the shortening of data quantity and classification of original variables, that is after determination of interrelations structure between variables, it is possible to shorten the number of these variables, furthermore, the method makes it possible to take indirect estimations and interpretation of indications, which are not appropriate for direct measuring. As result, there are received variables in more comfortable form for practical use in management.

In general, the factor analysis is the method, with the help of which, quantity of variables, that are described analyzed process, is shortened to smaller number of independent values, called factors (complex factors...). At that is used hypothesis, based on existence of something common in analyzed variables. During the factor analysis, on the basis of really existed interrelations between variables, are determined cryptic (implicit) presumptive characteristics of analyzed process. At that, in each of factors are amalgamated variables, which are strong interrelated with each other. Variables from different factors have weak interrelations. Thus, there are received factors, which are represented as hypothetical, directly immeasurable, latent variable, which is interrelated with original variables. Therefore, the method of factor analysis is directed on determination of such complex factors, which in the best way describe analyzed interrelations between variables, which are available.

This method of analysis makes it possible to determine cause-and-effect relations and take them quantity characteristic, which is provided measuring influence of factors on activity results. The power of influence of factor on some variable is characterized by the value of its dispersion by change of factor values. It makes analysis exact, and conclusions grounded.

The algorithm of stochastic factor analysis used in this research consists of the next three stages:

1. It is chosen maximum number of ratios: we have the list of k various ratios x_1, \dots, x_k .

The ratio matrix looks like:

$$X = \begin{pmatrix} x_{11} & \dots & x_{1k} \\ \vdots & \ddots & \vdots \\ x_{n1} & \dots & x_{nk} \end{pmatrix},$$

where n — number of control points (quarterly calculations of ratios)

2. There are calculated cross correlations, factor loadings by the method of maximum likelihood. It is determined latent variables F_1, F_2, \dots, F_m (factors). Then, there are calculated values of factor dispersions and residual correlations matrixes.

The calculated correlation matrix looks like:

$$R = (r_{ij}) = \begin{pmatrix} 1 & r_{12} & \dots & r_{1k} \\ r_{21} & 1 & \dots & r_{2k} \\ \vdots & \vdots & \ddots & \vdots \\ r_{k1} & r_{k2} & \dots & 1 \end{pmatrix}.$$

The number of factors is determined by implementation of the formula, $(m+k) < (k-m)^2$

where m – number of factors, and k – number of various coefficients

3. Then it is realized rotation of the allocated factors for simplification of theirs interpretation

In the factor analysis by decision of practical tasks is wide used orthogonal rotation. The final purpose of factor analysis is receiving of substantial interpretable factors, which would be able to reproduce of selective correlation matrix between variables.

Inasmuch as, it is necessary to select one from the number of positions of co-ordinates, it is required to have a criterion, which would indicate, that we are closed by the object achievement. Many of such criteria are proposed. It is chosen for use one of more often using method of "varimax" rotation. The method "varimax" calculate V_j quality criterion of structure of each factor.

With the help of "varimax" method can be achieved maximum simplification in describing of matrix columns of factorial mapping. It is possible separate improvement of factor structure. At the best will be maximum value of criterion V_j .

$$V_j = \frac{n * \sum_{i=1}^n a_{ij}^2 - (\sum_{i=1}^n a_{ij}^2)^2}{n^2} \rightarrow \max$$

where, a_{ij} – factor loadings

If after next rotation, V_j is increased - we will continue rotation process. The purpose is not only in shortening the number dimension, we have to take to determined factors economic interpretation. With the help of "varimax" method is achieved maximum simplification in describing of matrix columns of factor mapping.

It is received matrix of rotated components (factors), in which are presented correlation indicators of each of liquidity ratios with related factors F_1, F_2, F_3 .

It is determined substantial interpretation of received factors.

For realization of this algorithm, it can be used such software as SPSS. Using of this software, it is necessary to set correctly related options.

Practical approbation of method

In the research was realized practical approbation on an example of 20 companies: 10 European and 10 Russian. The companies are chosen casually from the list of 200 biggest companies. The only conditions were laid down by selection of companies: accessibility of financial statements for given time period and companies' belonging to different branches (not more than 1-2 companies for each of countries have to belong to same branch). The analysis was carried out on the some medium companies, but there were not included in this paper.

It is presented more detail methodology and received results.

Liquidity. It was selected 14 ratios ($k=14$), calculation was realized on the basis of 18-21 control points ($n=21$). There are given as points quarterly figures.

$$k=14; \quad L=\{L_1, L_2, \dots, L_{14}\} \quad n=21$$

The analysis and ratios selection for monitoring is presented more detail on an example of automobile concern (Germany).

The parent matrix of liquidity ratios looks like:

	L_1	L_2	L_3				L_{14}
1. Dec.31	0,739	0,175	0,781	...	...	...	0,194
2. March 31	0,658	0,128	0,709	...	...	...	0,187
3. June 30	0,698	0,168	0,756	...	...	...	0,174
...
21. March 31	0,681	0,126	0,767	...	...	...	0,119

On the basis of these data was carried out stochastic factor analysis, which made it possible to determine in this case three general latent factors F1, F2, F3.

It was received matrix of rotated components (factors), in which are presented correlation values of each of liquidity ratios with related factors F1, F2, F3.

The matrix of rotated components (factors):

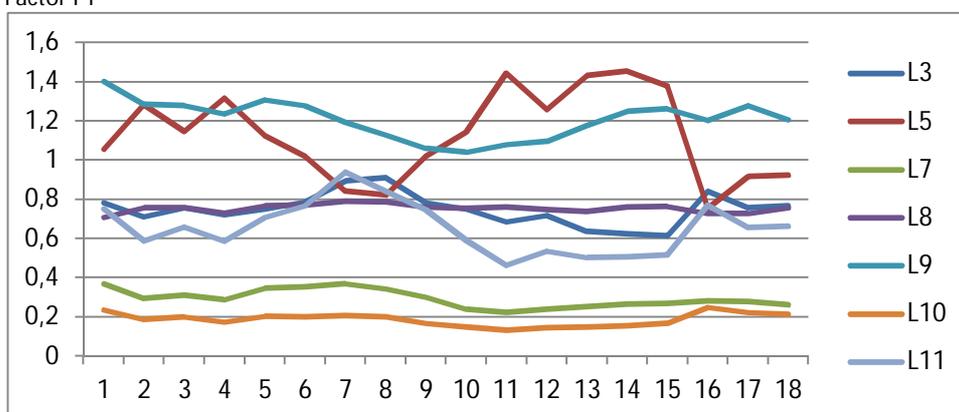
	F1	F2	F3
L_10	,933	,103	-,195
L_3	,908	-,348	
L_11	,888	,295	-,326
L_8	-,876	,129	
L_9	,852		-,494
L_7	,779	,299	
L_5	-,766	-,395	
L_14		-,956	
L_6		,929	-,278
L_4	,357	,833	-,387
L_12		,743	,402
L_13	-,282	-,364	,294
L_2	-,294		,921
L_1		-,528	,803

In this case, correlation of the ratio L_{10} with its factor F1 amount 0,933 (correlation ratio L_{10} and F1 amount 0,933).

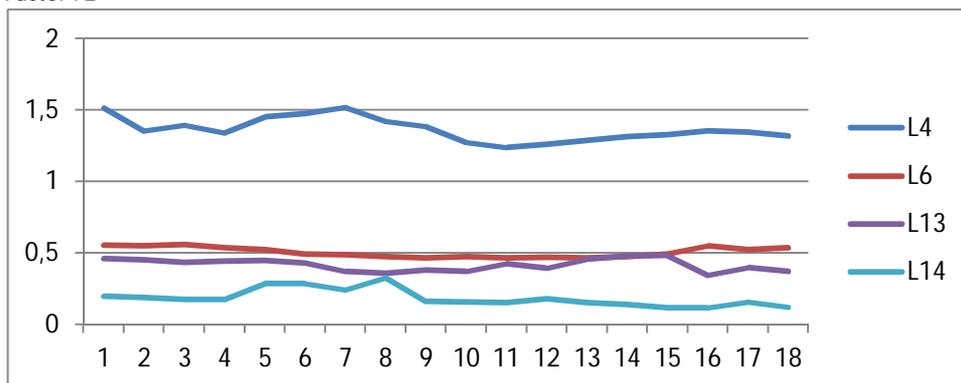
The graphic illustration of factors with related liquidity ratios presents existence of cross-correlation. On the diagrams are illustrated correlations between liquidity ratios, connected to the some factors.

Diagram illustration of factors:

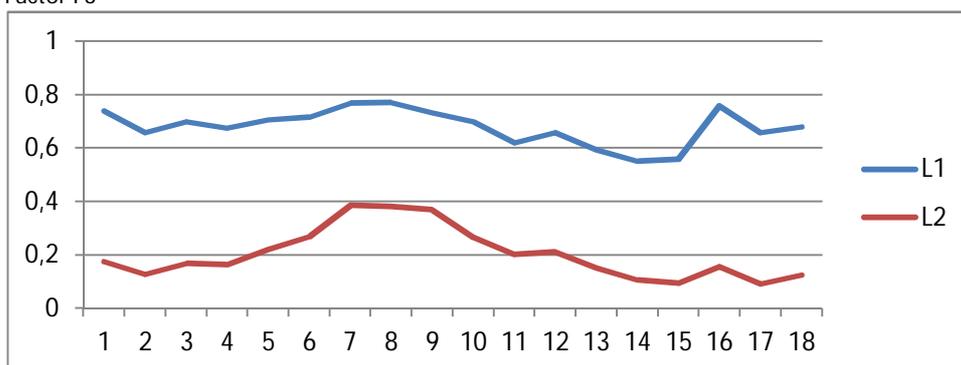
Factor F1



Factor F2



Factor F3



The table of ratios allocation by latent factors F1, F2, F3 for automobile concern looks like:

Company	Factor	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀	L ₁₁	L ₁₂	L ₁₃	L ₁₄	Dispersion, %
Automobile concern (Germany)	F1															39,132
	F2															28,020
	F3															16,934

It was realized financial interpretation of latent factors, for example, factor F1 describes of own working capital on liquidity, factor F2 describes influence of structural features: inventories, accounts receivable and account payable on liquidity, and factor F3 describes influence of most liquid assets on liquidity

F1	Influence of own working capital (L_{10})
F2	Structural features: inventories, accounts receivable and account payable (L_4)
F3	Characteristic of the most liquid assets (L_2)

Thus, for monitoring of liquidity indicators of automobile concern is recommended to select minimum three ratios, which are belonged to different factors. It is possible to carry out selection of ratios for liquidity monitoring from that list, which is belonged to factor and taking into account features of company's activity. For example, in this case is possible to recommend: L_{10} , L_4 , and L_2

1. Share of net working capital in assets – L_{10}
2. Current Ratio – CR - L_4
3. Cash ratio - L_2

Financial stability. It was selected 17 ratios ($k=17$), calculation was realized on the basis of 18-21 control points ($n=21$) There are given as points quarterly figures.

$k=17$; $U=\{U_1, U_2, \dots, U_{17}\}$ $n=21$

The parent matrix of financial stability ratios looks like:

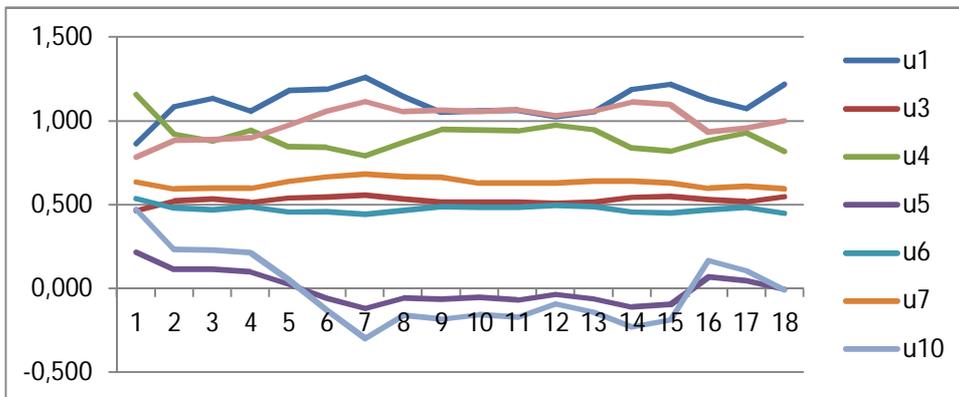
		U_1	U_2	U_3				U_{17}
1.	Dec.31	0,739	0,175	0,781	...	...	...	0,194
2.	March 31	0,658	0,128	0,709	...	...	...	0,187
3.	June 30	0,698	0,168	0,756	...	...	...	0,174
...	
21.	March 31	0,681	0,126	0,767	...		...	0,119

Stochastic factor analysis made it possible to receive in this case three general latent factors F1, F2, F3. The matrix of rotated components (factors):

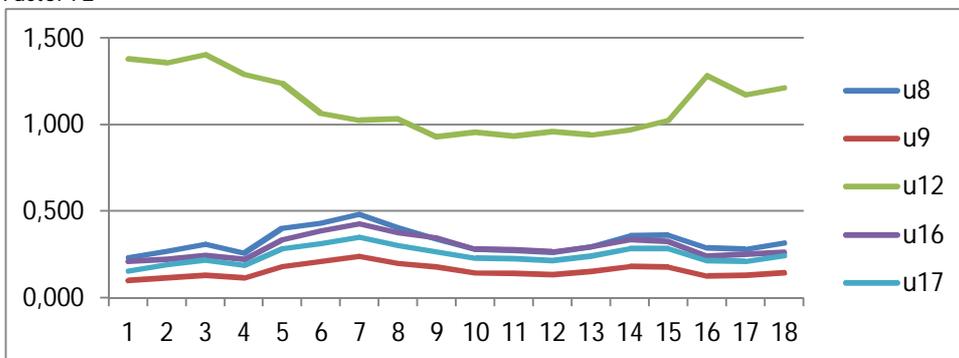
	F1	F2	F3
U_7	,945		-,231
U_4	,934	-,278	-,212
U_11	-,929	-,331	
U_5	,929	,331	
U_6	,900	-,316	-,221
U_1	-,895	,353	,168
U_10	,873	,407	
U_3	-,848	,255	,136
U_9		,972	
U_12		,935	,211
U_8		,930	,295
U_17	-,657	,737	,137
U_16	,578	,698	
U_14	-,256		,942
U_2		,335	,906
U_15	-,604	-,227	,713
U_13	-,186	,522	,577

The graphic illustrations of factors with related ratios are presented on the diagrams.

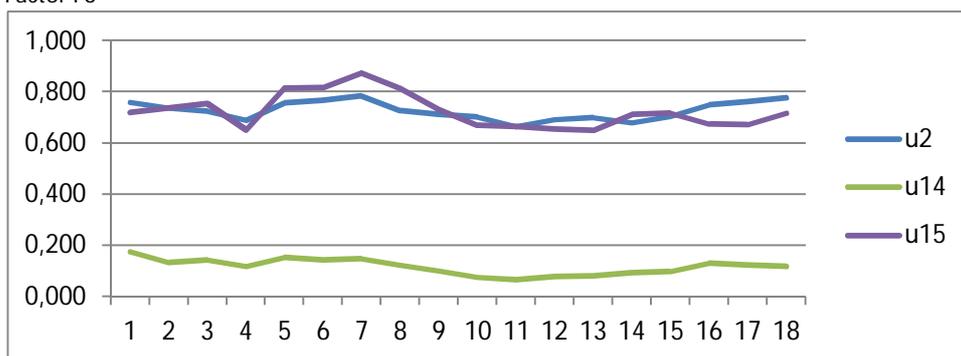
Factor F1



Factor F2



Factor F3



The table of ratios allocation on the basis of latent factors F1, F2, F3 for automobile concern looks like:

Company	Factor	U ₁	U ₂	U ₃	U ₄	U ₅	U ₆	U ₇	U ₈	U ₉	U ₁₀	U ₁₁	U ₁₂	U ₁₃	U ₁₄	U ₁₅	U ₁₆	U ₁₇	U ₁₈	Dispersion, %
		0	1	2	3	4	5	6	7											
Industrial concern (Germany)	F1	Yellow		Yellow	Yellow	Yellow	Yellow	Yellow			Yellow	Yellow								46,049
	F2								Orange	Orange			Orange					Orange	Orange	28,882
	F3		Grey												Grey	Grey	Grey			17,109

It is presented financial interpretation of latent factors, for example, factor F1 describes influence of ratio between equity and debt capital, what is autonomy characteristic, factor F2 describes influence of assets structure, in particular, long-term liabilities and financial stability, and factor F3 describes influence of own funding sources on financial stability.

F1	Influence of ratio of equity and debt capital, autonomy characteristic (U ₄)
F2	Influence of assets structure, in particular long-term liabilities (U ₉)
F3	Influence of own funding sources (U ₁₄)

Thus, for monitoring of financial stability ratios of automobile concern is recommended to select minimum three ratios, which are belonged to different factors. It is possible to realize selection of ratios for financial stability monitoring from that list, which is belonged to factor and taking into account of features of company's activity. For example, it is possible to recommend in this case: U₄, U₉, and U₁₄.

1. EQ/TD Equity-to-debt ratio (EQ/TD) - U₄
2. Long-term debt to total assets (LTD/TA) - U₉
3. Current assets - current liabilities to total assets ((CA - CL) / TA) - U₁₄

The results of allocation of financial stability and liquidity ratios by latent factors on example of some analyzed companies are presented below:

Allocation of liquidity ratios by latent factors

Company	Factor	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀	L ₁₁	L ₁₂	L ₁₃	L ₁₄	Dispersion, %
Automobile concern (Germany)	F1			Yellow		Yellow					Yellow	Yellow				39,132
	F2				Orange		Orange						Orange	Orange	Orange	28,020
	F3		Grey													16,934
Industrial concern (Germany)	F1				Yellow						Yellow	Yellow				43,003
	F2		Orange	Orange	Orange								Orange		Orange	34,967
	F3												Grey			8,773
Trading network (Germany)	F1				Yellow			Yellow			Yellow	Yellow			Yellow	48,417
	F2		Orange	Orange	Orange			Orange		Orange	Orange			Orange	Orange	42,391
Oil-and gas company(Russia)	F1				Yellow						Yellow	Yellow				40,056
	F2		Orange		Orange								Orange	Orange		29,823
	F3			Grey										Grey	Grey	17,923
Telecommunication company (Russia)	F1		Yellow	Yellow	Yellow						Yellow	Yellow				83,552
	F2												Orange	Orange	Orange	12,302

Allocation of financial stability ratios by latent factors

Company	Factor	U_1	U_2	U_3	U_4	U_5	U_6	U_7	U_8	U_9	U_{10}	U_{11}	U_{12}	U_{13}	U_{14}	U_{15}	U_{16}	U_{17}	Dispersion, %
Industrial concern (Germany)	F1	■		■	■	■	■	■			■	■							46,049
	F2								■	■			■					■	28,882
	F3		■											■	■				17,109
Airlines company (Germany)	F1	■		■	■	■	■	■			■	■							46,164
	F2								■								■	■	26,155
	F3		■											■	■				18,257
Trade network (Germany)	F1		■					■	■	■					■	■	■	■	39,297
	F2	■		■	■		■					■	■						33,648
	F3											■	■						26,440
Telecommunication company (Russia)	F1	■		■		■	■	■	■		■	■	■	■					40,056
	F2		■		■											■	■	■	29,823
	F3										■								17,923
Petrochemistry company (Russia)	F1	■		■	■		■	■			■	■							68,371
	F2		■			■				■			■				■	■	18,166
	F3													■	■	■			11,136

On the basis of received results, it is possible to note, that it is determined similarity between factors by functional load, and factor elements are coincided partly.

Conclusion

On the basis of results of realized research, it is possible to make following conclusions:

1. The stochastic factor analysis makes it possible to increase accuracy of ratios selection for monitoring of indicators of financial conditions of company, in particular liquidity and financial stability.
2. Both the number and structure of latent factors depend on features of activity of companies (branch, financial account and so forth)
3. Practical approbation of model of factor analysis has indicated that liquidity and financial stability are the difficult characteristics of company's solvency and can be described by two or three latent factors.

Bibliography

Erich, A. (2002) Techniques of Financial Analysis with Financial Genome Passcode Card.- McGraw-Hill/Irwin, 570 p.

Higgins, R. (2008) Analysis for Financial Management with S&P bind-in card - McGraw-Hill/Irwin Series in Finance, Insurance and Real Estate., 448 p.

Mandel, A., Szykh, D. (2011) Multi-Factor Models in Express Analysis of Company Attraction as Investment / IFAC 18-th World Congress, Milan, Italy.

SPSS Statistics 17.0 SPSS Inc www.spss.com

Esbensen, K. , Guyot, D., Westad, F (2002). Multivariate Data Analysis - in Practice. *Multivariate Data Analysis*, 598 p.

“Analysis of temperature-based Weather Derivatives in Mainland China”

Manuela Ender (Department of Mathematical Sciences, Xi'an Jiaotong-Liverpool University, P. R. China)

Lu Zong (Department of Mathematical Sciences, Xi'an Jiaotong-Liverpool University, P. R. China)

Abstract: In this paper, we present an analysis of weather derivatives in consideration of the climatic regionalization of mainland China. In order to test for patterns of trans-regional temperature data of China, we apply Alaton et al's (2002) temperature model to twelve cities of China. Our main findings are that it is possible to find representative cities in a climatic zone to reduce dimensions when pricing weather derivatives. Given the estimated parameters we provide values of certain weather derivatives for all climatic zones in China.

Keywords: weather derivatives, temperature modeling, climatic regionalization, pricing, simulation

JEL classification: C51, G13, Q54

1 Introduction

Weather derivatives, especially temperature-based derivatives, have become a flourishing financial product worldwide in terms of risk hedging. Even though weather derivatives have not yet been traded in China, we are convinced that these financial products are essential, or at least contributing factors to those industries exposed to weather risks of the country. As a matter of fact, a substitution of weather derivatives, namely the index-based weather insurance, was first put into practice in Anhui Province in China in 2011 (CNKI, 2011). But for the launch of weather derivatives in China, challenges still exist. Apart from the difficulty in pricing with non-tradable underlying (i.e. weather indexes), working out a multi-regional joint model could also be regarded as an important part in opening the road for the use of weather derivatives to China.

In this article, a systematical analysis on temperature using Alaton et al's (2002) method will be applied to twelve main cities of mainland China. The basic idea of our research is to apply multiple mathematical methods to test for patterns of trans-regional temperature data. We are also going to introduce a climatic regionalization method used in architecture to our study of joint modeling.

2 Investigation on climatic regionalization

In this section, we are going to look at the characteristics that may exist in the datasets according to the description of the climatic regionalization. Hypothesized in terms of the parameters, the noise distribution and the cold/warm season division are going to be based on our intuitive inference according to theoretical geography.

2.1 Standard of climatic regionalization

The Standard of climatic regionalization is a division method used in architecture to partition building standards in areas with different climate characteristics (Baidu, 2011). It divides Mainland China into seven climatic zones which is normally represented by Roman numerals. Respectively,

- I stands for the extremely cold area in eastern China;
- II stands for the cold area in eastern China;
- III stands for the area with hot summers and cold winters in eastern China;
- IV stands for the area with hot summers and warm winters in eastern China;
- V stands for warm area in the south-central part of China;
- VI stands for the cold area in the west-central part of China;
- VII stands for the cold area in northwestern China.

Since the motivation for the partition method is based on temperature and precipitation, we propose the possibility that it is also valid for our joint model of temperature derivatives.



Figure 1: Map of climatic regionalization in China

From the map as shown in Figure 1, it is plain to see that the climatic zone I, II, III and IV belong to the eastern part of China which is said to be more economically developed. The other three zones, namely V, VI, and VII cover the less developed regions in China. Hence, in our research, we chose to pay more attention to the first four climatic zones. In these four zones, more than one city is selected for our investigation while for the other three, only one city is involved.

2.1 Overview of datasets

According to the partition method, twelve cities, Haerbing and Changchun (I), Beijing and Tianjin (II), Shanghai, Hangzhou, Nanjing (III), Guangzhou and Hainan (IV), Kunming (V), Lhasa (VI), Urumchi (VII), were selected. Apart from Shanghai, the duration of the temperature dataset is thirty years, covering January 1981 to December 2010. However, the duration of the dataset for Shanghai is twenty years. The truncation of dataset is caused by a change of the meteo-station. Table 1 gives an overview of the daily temperature data samples.

	Climatic zone	Mean	Standard deviation	Max	Min
Haerbing	I	4.95	14.91	30.9	-30.9
Changchun	I	6.20	14.07	30.4	-30.1
Beijing	II	12.96	11.03	34.5	-12.5
Tianjin	II	12.96	11.15	32.9	-14.1
Shanghai	III	16.38	8.75	34.2	-4.8
Hangzhou	III	17.01	8.93	35.0	-4.7
Nanjing	III	15.95	9.38	34.5	-7.8
Guangzhou	IV	22.43	6.17	34.2	3.3
Hainan	IV	25.28	4.35	32.6	9.8
Kunming	V	15.53	4.85	24.6	-3.0
Lhasa	VI	8.54	6.70	22.6	-10.5
Urumchi	VII	7.41	13.71	33.1	-27.2

Table 1: Mean, standard deviation, max and min values of twelve cities' daily temperature (January 1981 -December 2010)

2.2 Temperature joint modeling

Our investigation is divided into three parts, i.e. the noise distribution, the parameters, and the cold/warm season. The tests in this paper all aim to find shortcuts to a joint model, i.e. dimension reduction.

2.2.1 Noise distribution

To get the level of noise, we subtract the daily temperature by the mean part which could be obtained by the sine function. The remaining daily noise forms the noise distribution.

Proposition 2.1. *The noise distribution is the same within the same climatic zones.*

In order to compare the temperature and noise distribution among different cities, we use the Wilcoxon rank-sum test. Compared to the traditional two-sample t-test, the advantage of a rank-sum test is that it has no requirements that the data should be normally distributed, or that the sample size should be larger than a certain number. We apply the rank-sum test within the same climatic zones. So, we have four similar tests: the test of Haerbing and Changchun, Beijing and Tianjin, Hangzhou, Nanjing, and Guangzhou and Hainan. We eliminated Shanghai and Xian, because the samples sizes are

different. Table 2 shows the results of the Wilcoxon rank-sum tests at a significance level of 95%. As a conclusion, the findings support proposition 2.1.

Climatic zone	City	H_0	P-value
I	Haerbing and Changchun	Accepted	0.9306
II	Beijing and Tianjin	Accepted	0.5811
III	Hangzhou and Nanjing	Accepted	0.6130
IV	Guangzhou and Hainan	Accepted	0.8414

Table 2: The Wilcoxon rank-sum test results

2.2.2 Parameter estimation

Recall the formula of the temperature model in Alaton et al's framework:

$$T_t = (T_s - T_s^m)e^{-\alpha(t-s)} + T_s^m + \int_s^t e^{-\alpha(t-\tau)} \sigma_\tau dW_\tau, \quad (1)$$

where

$$T_t^m = A + Bt + C \sin(\omega t + \varphi). \quad (2)$$

To compare the parameters trans-regionally, we start with the parameter estimation. In order to get the monthly standard deviation of temperature, we employ the mean value of two statistic estimators (Alaton et al, 2002). The first one is the quadratic variation of temperature at time t (Basawa et al, 1980). The second one is derived from a discretized equation using the knowledge on regressive process. For a given month p, the quadratic variation is defined as:

$$\sigma_p^2 = \frac{1}{N_p} \sum_{j=0}^{N_p-1} (T_{j+1} - T_j)^2 \quad (3)$$

where σ_p denotes the quadratic standard deviation of month p, N_p denotes the number of days in month p, and T_j denotes the temperature of day j during the month.

While in the case of the discretizing process, the volatility is expressed as:

$$\sigma_p^2 = \frac{1}{N_p - 2} \sum_{j=1}^{N_p} [\tilde{T}_j - \alpha T_{j-1}^m - (1 - \alpha)T_{j-1}]^2, \quad (4)$$

where:

$$\tilde{T}_j = T_j - (T_j^m - T_j^{m-1}). \quad (5)$$

Table 3 gives the mean value of volatility using the quadratic variation and regress method.

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Beijing	2.11	2.26	2.58	2.61	2.44	2.19	1.99	1.64	1.84	2.17	2.52	2.35
Tianjin	1.86	2.07	2.54	2.72	2.51	2.15	1.85	1.58	1.86	2.21	2.33	1.94
Haerbing	3.67	3.41	3.40	3.51	3.11	2.50	1.79	1.80	2.48	3.39	3.97	3.87
Changchun	3.81	3.72	3.61	3.73	3.09	2.38	1.75	1.87	2.64	3.76	4.24	4.16
Shanghai	2.38	2.96	2.82	2.86	2.17	2.23	1.66	1.39	1.79	1.68	2.66	2.71
Hangzhou	2.25	2.57	2.88	2.71	2.36	2.03	1.71	1.48	1.75	1.83	2.29	2.36
Nanjing	2.19	2.41	2.76	2.65	2.29	1.97	1.72	1.55	1.73	1.90	2.34	2.37
Guangzhou	2.29	2.56	2.13	2.67	1.65	1.31	1.30	1.21	1.32	1.58	2.04	2.24
Hainan	1.72	1.81	2.02	1.64	1.24	0.98	0.84	0.91	0.91	1.04	1.46	1.70
Kunming	1.97	2.02	2.19	1.95	2.05	1.50	1.13	1.33	1.48	1.71	1.72	1.87
Lahsa	2.27	2.19	2.02	1.83	1.97	1.90	1.62	1.47	1.32	1.46	1.58	1.94
Urumchi	2.84	2.70	2.97	3.50	3.46	2.76	2.55	2.80	2.87	2.87	3.08	3.16

Table 3: Estimated values of volatility of twelve cities in mainland China

Finally, we can obtain the mean reverting parameter α by substituting the values of σ . According to Alaton et al (2002), α is assumed to be a constant expressed by the following equation:

$$\alpha = -\log \left(\frac{\sum_{i=1}^n \frac{T_{i-1}^m - T_{i-1}}{\sigma_{i-1}^2} (T_i - T_i^m)}{\sum_{i=1}^n \frac{T_{i-1}^m - T_{i-1}}{\sigma_{i-1}^2} (T_{i-1} - T_{i-1}^m)} \right). \quad (6)$$

Table 4 gives the results of A, B, C, ϕ and α of the twelve cities.

	A	B	C	ϕ	α
Haerbing	3.986	1.776×10^{-4}	20.165	-1.851	0.3121
Changchun	5.527	1.25×10^{-4}	18.876	-1.863	0.2800
Beijing	12.406	1.022×10^{-4}	15.017	-1.852	0.2821
Tianjin	12.814	0.278×10^{-4}	15.205	-1.874	0.3091
Shanghai	16.29	2.212×10^{-4}	11.703	-2.071	0.3008
Hangzhou	15.951	1.937×10^{-4}	11.82	-2.015	0.2636
Nanjing	14.999	1.75×10^{-4}	12.561	-1.974	0.2515
Guangzhou	21.819	1.123×10^{-4}	7.649	-2.021	0.2279
Hainan	24.916	0.673×10^{-4}	5.237	-1.86	0.1954
Kunming	14.505	1.872×10^{-4}	5.898	-1.739	0.2911
Lahsa	8.060	1.441×10^{-4}	8.496	-1.84	0.2616
Urumchi	5.942	3.241×10^{-4}	17.81	-1.839	0.1977

Table 4: Estimated values of A, B, C, ϕ and α of twelve cities in mainland China

2.3 Monte Carlo simulation

In order to simulate the daily temperature, it follows:

$$T_t = T_t^m + (T_0 - T_t^m) \exp(-\alpha t) + \int_0^t \exp(-\alpha(t-s)) \sigma dW_s \quad (7)$$

In the performed simulation, a sample size $N = 100,000$ is used. Further, the daily temperature of January and July 2010 is simulated in order to get option values.

Figure 2 gives a comparison between the observed temperature and the simulated values in the year of 2010. We select three cities among the twelve cities in the research, namely Beijing, Shanghai and Hainan, as representatives. From the diagrams of Beijing and Shanghai, the daily temperatures during the winters show a stronger fluctuation than those in the summers. Figure 2 also shows the monthly relative error in the year 2010 of the same cities, where the relative error is defined as (Mraoua, 2005):

$$ER_{relative} = \frac{T_{est} - T_{obs}}{T_{obs}} \quad (8)$$

We can conclude that the error of the estimation is comparatively larger in winters and smaller in summers. For Hainan, the whole year is taken as the hot season which is plausible according to its temperature. Therefore, the estimation error in summer stays within the interval of $[-0.06, 0.06]$.

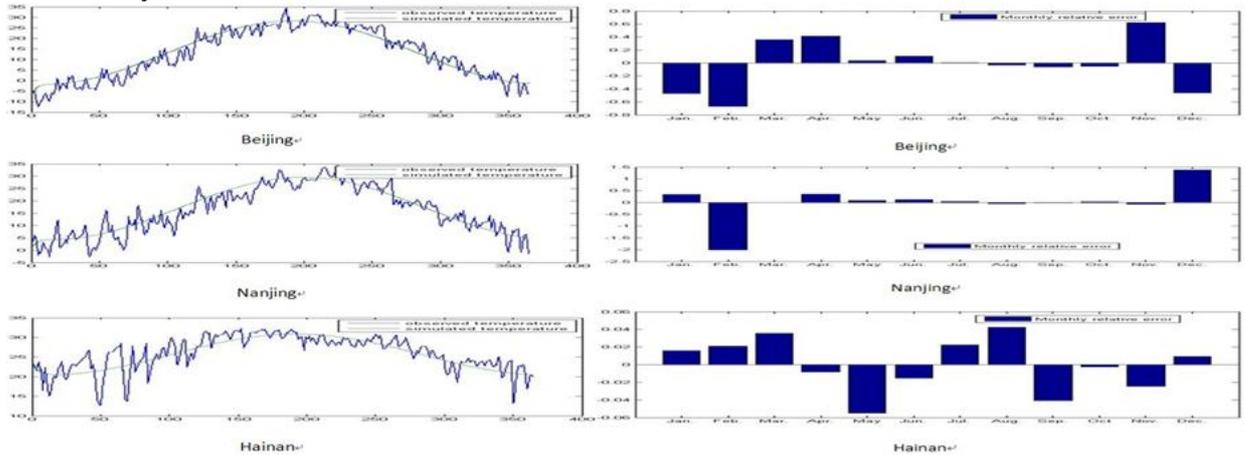


Figure 2: Comparison between observed temperature and simulated temperature (left); monthly relative error (right). (2010)

2.3.1 Propositions for temperature joint modeling based on parameters

Proposition 2.2. The value of A and B varies among different cities within the same climatic zones.

Proposition 2.3. The value of C, ϕ , α , and σ stays constant within the same climatic zones.

To provide evidence for the propositions on A, B, C, and ϕ above, we estimate the temperature, both using the result from the regression following Table 4 and also using the averaged values according to the propositions. The basic idea is to check whether the residuals follow, or at least are close to a normal distribution with mean zero. In this case the climatic zone-based parameter value is accurate enough to fit the real temperature.

Table 5 shows the mean of residuals after we substitute the corresponding parameter with its mean value. As far as we could notice, the residual means are close to zero with either C or ϕ has been replaced. The p-values of a t-test shown in Table 5 support this result. Figure 3 plots the residual distributions for C and ϕ and shows that the residual distributions are close to a normal distribution.

	A	B	C	C: t-test, H_0 : p-value	ϕ	ϕ : t-test, H_0 : p-value
Haerbing	0.7711	-0.1440	4.8435×10^{-4}	0.9906	0.9875×10^{-4}	0.9981
Changchun	-0.7700	0.1441	-3.5225×10^{-4}	0.9934	0.3354×10^{-4}	0.9994
Beijing	0.2035	-0.2043	-5.3702×10^{-4}	0.9848	-4.5555×10^{-4}	0.9871
Tianjin	-0.2041	0.2037	-0.7284×10^{-4}	0.9979	-1.5545×10^{-4}	0.9956
Nanjing	-0.7478	-0.1204	-1.0591×10^{-4}	0.9970	0.4622×10^{-4}	0.9987
Shanghai	0.5426	0.0880	-2.1077×10^{-4}	0.9950	-2.3373×10^{-4}	0.9944
Hangzhou	0.2042	-0.0179	1.3×10^{-3}	0.9891	1.5555×10^{-4}	0.9958
Guangzhou	1.5496	-0.1227	-1.0591×10^{-3}	0.9644	4.5945×10^{-4}	0.9871
Hainan	-1.5483	0.1229	-1.11×10^{-3}	0.9629	-2.5794×10^{-4}	0.9906

Table 5: Residual means obtained from the average valued parameters

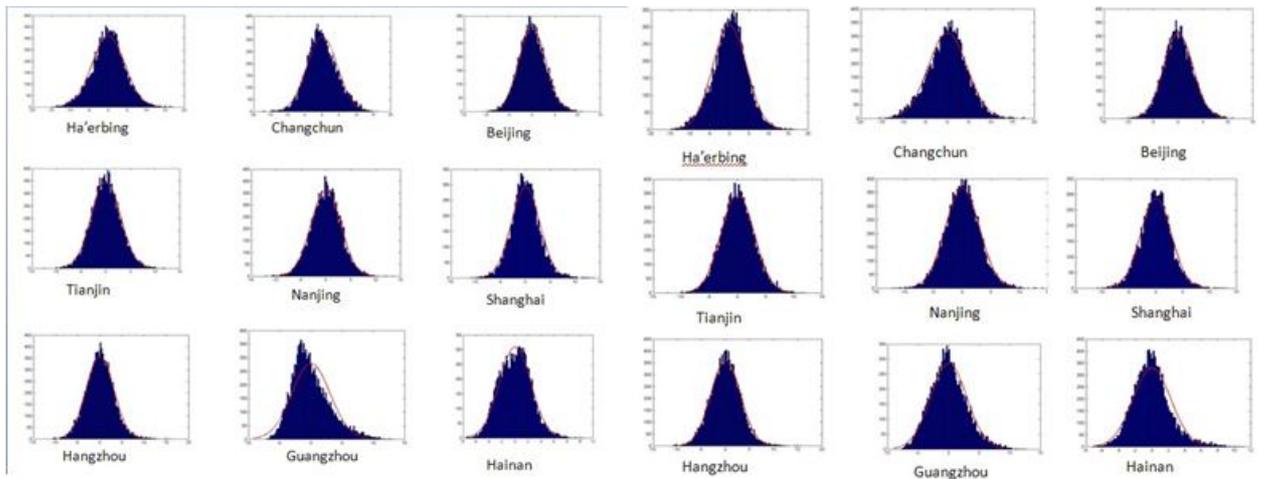


Figure 3: Residuals after C (right) and ϕ (left) has been replaced with average value

For the propositions on the parameters α and σ , we use a Monte Carlo simulation to simulate the daily temperature with the mean values of the cities in the same climatic zone. Then we compare the relative errors (Mraoua, 2005) of the simulation results using the original parameter and the average value. Table 6 represents these relative errors of the eight cities from climatic zone I, II, III and IV.

	original parameter	α replaced	σ replaced
Haerbing	0.0519	0.0520	0.0516
Changchun	0.0799	0.0689	0.0756
Beijing	-0.0145	-0.0099	-0.0202
Tianjin	-0.0445	-0.0461	-0.0421
Nanjing	0.0925	0.1102	0.0876
Shanghai	0.3013	0.2391	0.3029
Hangzhou	0.2548	0.2580	0.2615
Guangzhou	0.0630	0.0612	0.0623
Hainan	-0.0014	-0.0021	-0.0033

Table 6: Relative errors of simulated temperature

2.3.2 Cold/warm seasons

Basically on a weather derivatives exchange, a HDD contract is traded during cold seasons, and a CDD contract is traded during hot seasons. Hence, determining the cold/warm seasons for each city is also an essential step for the trading system.

Proposition 2.4. *The cold/warm season division is the same within the same climatic zones.*

Using 18°C as the basic value, we define the months of the cold season as months with a mean temperature below 18°C , and the months of the warm season as the ones with a mean temperature above 18°C . Table 7 shows the cold/warm seasons of the ten cities from the four climatic zones.

Climatic zone	City	Cold season	Warm season
I	Haerbing and Changchun	Sep. to May (9 months)	Jun. to Aug. (3 months)
II	Beijing, Tianjin and Xian	Oct. to Apr. (7 months)	May to Sep. (5 months)
III	Shanghai, Hangzhou and Nanjing	Nov. to Apr. (6 months)	May to Oct. (6 months)
IV	Guangzhou	Dec. to Feb. (3 months)	Mar. to Nov. (9 months)
IV	Hainan	None	Whole year

Table 7: Cold/warm seasons of 10 cities in mainland China

From these results we conclude that the cold/warm season division of the climatic zones generally follows our proposition. However for Guangzhou and Hainan, there is a special case as Hainan has no cold season at all. In this case, we suggest that the mean temperature is applied as the basic value for further research.

3 Pricing temperature-based options in China

In this section, we perform the pricing process of certain weather derivatives by using both, Alaton et al's (2002) method and Monte Carlo simulation.

3.1 Underlying

Firstly, we need to introduce two basic underlyings for weather derivatives. These are namely CDD (cooling-degree day) and HDD (heating-degree day). A degree day measure is the accumulation of degrees that deviates from a proxy temperature (normally 18°C or 65°F) during a specified period of time. The equation of HDD and CDD can be defined as follows:

$$HDD(t_1, t_2) = \int_{t_1}^{t_2} \max(18 - T_t, 0) dt, \quad CDD(t_1, t_2) = \int_{t_1}^{t_2} \min(T_t - 18, 0) dt \quad (9)$$

where T_t denotes the daily observed temperature.

3.2 Alaton et al's (2002) pricing formula

According to Alaton et al (2002), an approximation of a HDD call option is given by the following equation:

$$C(t_0) = e^{-r(t_n - t_0)} \int_K^{\infty} (x - K) f_{X_n}(x) dx = e^{-r(t_n - t_0)} \left[(\mu_n - K) \phi\left(\frac{K - \mu_n}{\sigma_n}\right) + \frac{\sigma_n}{\sqrt{2\pi}} e^{-\frac{(K - \mu_n)^2}{2\sigma_n^2}} \right] \quad (10)$$

where r stands for the risk free rate, t_0 stands for the first day of the contract, t_n stands for the last day of the contract, K stands for the strike price, $\Phi(\cdot)$ is the c.d.f of the standard normal distribution.

3.3 Numerical results

Table 8 represents numerical results of pricing some specified HDD and CDD call option contracts. Since there is no existing market for weather derivatives in China, we can't derive the real market price of weather risk. In this case, the market price of risk is assumed to be zero. The risk free rate equal to 6.5% is used. The duration of the HDD and CDD contracts is respectively January and July of 2010.

Option type	Climatic zone	City	Strike level	Option price (in RMB) (Monte Carlo simulation)	Option price (in RMB) (Alaton et al's (2002) method)
HDD call options (Contract Period: January 2010)	I	Haerbing Changchun	750	43.01 35.08	42.85 34.75
	II	Beijing Tianjin	500	24.42 27.45	24.42 27.44
	III	Shanghai Hangzhou Nanjing	200	25.25 23.59 32.75	25.15 23.70 32.74
	IV	Guangzhou Hainan	50	7.73 0	7.53 0
	V	Kunming	100	15.75	15.74
	VI	Lahsa	400	21.66	21.52
	VII	Urumchi	600	35.12	35.50
CDD call options (Contract Period: July 2010)	I	Haerbing Changchun	100	11.92 10.40	11.79 10.65
	II	Beijing Tianjin	150	23.07 20.95	23.06 20.81
	III	Shanghai Hangzhou Nanjing	200	18.48 18.60 16.61	18.39 18.54 16.7
	IV	Guangzhou Hainan	250	15.48 17.46	15.37 17.44
	V	Kunming	50	8.12	8.08
	VI	Lahsa	20	0.99	0.770
	VII	Urumchi	100	13.36	13.73

Table 8: HDD and CDD call options pricing using Monte Carlo simulation and Alaton's formula

In Table 8, the difference in price between the approximation formula and the Monte Carlo simulation is relatively small, but should not be neglected. Since there is no existing contract to refer to, a conclusion which method produces more accurate prices on temperature-based weather options is not possible. The price differences among the cities in the same climatic zone generally stay close to each other when the strike level is the same. This can be seen as further evidence supporting the idea to select a representative city for each zone.

4 Conclusion

In this paper, we proposed the idea of a weather derivative trading system using the climatic regionalization in China. After numerous calculations and tests we can conclude that it is possible to select representative cities in each climatic zone in order to reduce dimensions in a joint temperature model. The reasons that support this conclusion are as follows:

- From Table 1, we could see that the temperature samples of the cities in the same climatic zones have similar properties.
- As it is shown in Table 3 and 41, the parameters in the temperature model have some patterns. The values are close to each other to some extent within the same climatic zone. To work out the representative city (or cities), we need to find the city with the largest correlation to other cities in the same climatic zone.
- The noise follows the same distribution within the same climatic zone.
- The same cold/warm seasons give the consistency of HDD/CDD contract trading period within the climatic zone.

For further research, our next step is to work out the multi-dimensional joint model for the temperature from different locations. Finally, we are also going to select the representative cities for each climatic zone. Even though it is the first paper on the temperature modeling and temperature-based option pricing using such a large number of cities in China. We see this paper as a starting point for testing a systematic weather derivatives trading system in China.

Bibliography

- Alaton, P., Djehiche, B. and Stillberger, D. (2002). On Modeling and Pricing Weather Derivatives. *Applied Mathematical Finance*, Vol 9.
- Basawa I. V., Rao P. and B. L.S. (2008). *Statistical Inference for Stochastic Processes*. Academic Press.
- Baidu (2011). Standard of climatic regionalization of architecture in China. <http://wenku.baidu.com/view/0c782d5f3b3567ec102d8a33.html> .
- Benth, F. E., Benth, J. S. and Koekebakker, S. (2008). *Stochastic Modelling of Electricity and Related Markets*. World Scientific Publishing, pp. 277-314.
- CNKI (2011). Operation and Evaluation of index-based Weather Insurance in China, <http://www.cnki.com.cn/Article/CJFDTotat-BXYJ201103001.htm>.
- Davis, M.H.A. (2000). Pricing Weather Derivative by Marginal Value. Technical report, Imperial College London.
- Goncu, A. (2010). Pricing temperature-based Weather Contracts: an Application to China. *Applied Economics Letters*, 00:1-6, 2010.
- Heimfarth, L. and Musshof, O. (2011). Weather index-based Insurances for Farmers in the North China Plain: An Analysis of Risk Reduction Potential and basis Risk. *Agricultural Finance Review*, Vol 71.
- Jewson, S. and Brix, A. (2005). *Weather Derivatives and Weather Derivatives Market*. 2005.
- Jiao, Y. (2009). *Statistical Analysis of Asian Weather Derivatives*. Humboldt-Universitaet zu Berlin.
- Mraoua, M. and Bari, D. (2005). Temperature Stochastic Modeling and Weather Derivatives Pricing: Empirical Study With Moroccan Data. *Afrika Statistika*, Vol 2.

“Forecast of DAX and S&P 500 Stock Index Values Using Differential Neural Networks”

Francisco Ortiz-Arango (Universidad Panamericana, Mexico)

Agustín I. Cabrera-Llanos (Instituto Politécnico Nacional, Mexico)

Francisco López Herrera (Universidad Nacional Autónoma de México)

The use of neural networks as a tool for describing and forecasting the behavior of economic and financial variables has become in recent years an increasingly used and reliable method due to the excellent results obtained. Following this trend, this paper uses a differential neural network (DNN) to analyze the series of daily closing values of stock indexes, German DAX and S&P 500 of the United States between January 3, 2000 and January 13, 2012. The training period of the network was six months: from January 3, 2000 to June 30, 2000. Subsequently, the work period is used to describe the behavior of the value of stock indexes DAX and S&P 500 between July 3, 2000 and January 13, 2012, in both cases the accuracy of the description is excellent.

Later, the DNN performs the forecast of the daily closing values of these indexes for 4 periods of one week (5 days) and the results show an excellent performance, because the relative error of forecasts during the first week of prediction (16 to January 20, 2012) have a range from 0.15% to 1.02% for the DAX, and 0.77% to 2.26% for the S&P 500. For the second week (23 to 27 January 2012), change from 0.95% to 2.37% for the DAX, and 2.91% to 4.36% for the S&P 500. In the third week (30 January to 3 February 2012), change from 1.94% to 5.24% for the DAX, and 5.15% to 6.72% for the S&P 500. And to the fourth week (6 to 10 February 2012), change from 3.83% to 6.82% for the DAX, and 6.97% to 8.34% for the S&P 500.

The obtained results confirm that the neural networks, in particular the differential neural networks can become one of the most powerful and accurate tools to predict future values of financial assets.

Keywords: Forecast, differential neural network, stock indexes, time series analysis.

Session G

“Supplier Development in the Philippines: The Case of EBES-Toyota Cluster Development Program”

Arianne R. Dumayas (Chuo University, Japan)

Working as suppliers for large or multinational firms is seen as one of the mechanisms which enable the small and medium-scale enterprises (SMEs) to improve their competitiveness. Many companies, particularly in industries like electronics and automotive, are actively involved in the development of their suppliers. In the case of the Philippines, the private sector is working together with the government in implementing ECOP Big Enterprise Small Enterprise (EBESE) Program, a supplier development program which engages the Big Enterprise (BE) to assist the SME-suppliers in upgrading their competitiveness. Toyota Motor Philippines is one of the pioneer companies and the most active BE which have been supporting the program since its inception in 2005. The EBES-Toyota Cluster Development Program is mainly based on the 5S housekeeping and quality and productivity improvement. This study presents the preliminary results of the questionnaire survey which is conducted among the participating SME-suppliers and the BE-customers. This study inquired about the impact of EBES Program on the SME-suppliers as well as strengths and weaknesses of the program. Results showed that participating SME-suppliers experience significant improvement in the areas of plant layout, production process, problem-identification, problem-solving, working relations within the firms and with the BE, and orientation towards productivity and quality improvement. Encouragement of partnership at different levels (macro, industry, and firm) and minimal cost are considered as the strengths of the program. Meanwhile, financial limitations and lack of advance or follow-up program are pointed out as the weaknesses. This study is considered significant due to the fact there have been limited researches done on the supplier development program within the context of developing countries. Furthermore, study also focuses on the SMEs which are considered as one of the significant economic agents in both developed and developing countries.

Keywords: supplier development, productivity and quality improvement, 5S Housekeeping, customer-supplier relationship

1. Introduction

The prevailing patterns of production have continuously integrated the developed economies and the developing economies. Studies have shown that participation in the international production network (IPN) and presence of foreign direct investment can bring substantial benefit and spillovers in the economy, in particular with the development of the industrial sector (Lim and Kimura, 2010; Giroud, 2007; Dunning, 1992). Looking at the development experiences of many countries, a strong industrial sector is one of the prerequisites for achieving economic success. For example, Japan which has a strong industrial sector and strong interconnection between the large enterprises and the small enterprises. In the case of the developing countries like the Philippines, small enterprises are linked-up in these production networks but their participation is relatively limited. This could be explained by the relative capabilities of a country. Giroud (2003) argued that capability of the firms is one of the main considerations of the Transnational Corporations (TNC) when establishing linkages. Countries with highly-capable and high-performing firms are entrusted to high-technology and high-value added activities. However, in the case of many developing countries, firms are found to be less capable. Altenburg (2000) observed that linkages are mainly based on factor-cost advantages which rarely bring substantial impact to the economy. SME who offer only factor-cost advantages run the risk of being replaced by other suppliers. Therefore, to attain significant benefit from linkages, small businesses should shape themselves to become globally-competitive. However, many of these small businesses do not have the capacities or resources to develop their own productive capacities. Fortunately, some big enterprises and governments have recognized that the strength of the whole supply chain is reliant on these small-scale suppliers and are implementing supplier development programs but more often than not, it is directed only to their first tier-suppliers.

In the case of the Philippines, there is a supplier development program, ECOP⁵⁰ Big Enterprise and Small Enterprise (EBES) being implemented through the partnership of government agency and the big/ multinational enterprise. EBES is a program which engages the Big Enterprise (BE) customer⁵¹ to assist in bringing about improvement in the competitiveness of their SME supplier⁵². The program was established in 2005 and six years after its implementation it has benefited 272 small enterprises and engaged 25 big enterprises in several industries such as automotive, food, agro-industries, semi-conductor, printing and packaging, fashion accessories, furniture and décor. Toyota Motor Philippines (TMP) is one of the pioneer companies and most active BE supporting the program since its inception in 2005. The EBES-Toyota Cluster Development Program aims to improve competitiveness of the firms through the implementation of the basic housekeeping skills.

⁵⁰ Employers' Confederation of the Philippines. a private non-profit association of the big enterprise corporations and business associations in the Philippines

⁵¹ Thereafter, will be referred to as BE-customer. The use of this terms is not only limited with the assembler firm which is Toyota but also includes big multinational supplier firms/sub-assemblers like Denso or Fujitsu-ten.

⁵² Thereafter, will be referred to as SME-supplier

This study is an inquiry about the impact of supplier development program implemented by BE customers together with the government agencies to the participating SMEs. This study analyzes the following areas: plant layout, production processes, problem-identification, problem-solving, working relations within the firms, working relations with the Big Enterprise (BE) customers, and orientation towards productivity and continuous improvement. This study also attempts to point-out the strengths and weaknesses of the program.

This study intends to fill the gaps in research regarding supplier development within the context of developing economies. While, there are many studies regarding the supplier development, most of them focused on the experience of the developed countries like the US and Japan. Murrays et al. (2005) cited in Humphreys et al. (2011) noted the importance of studies regarding the supplier development of the transitional economies.

The study also focuses on the SME sector which is an important sector in the Philippine economy but is beset by different challenges such as the advent of globalization and economic liberalization. Studies that provide specific actions or recommendation on how can the SME sector survive or thrive in the globalization are valuable.

Data collection was done primarily with questionnaire survey for both the big Enterprise (BE) and small enterprises (SME). Structured questionnaire with five-point likert scale was created (5-highest and 1-lowest). The questionnaire was mailed through the Toyota Motor Philippines. Interview with researchers/consultants are also conducted.

While it may be worthy to undertake the evaluation of the whole EBESE program, due to time and financial restrictions, this study will focus only the EBESE-Toyota Cluster Development Program, which is limited only to automotive sector and Toyota suppliers. Nevertheless, this study could provide useful insights that the other sector could learn. As of 2010, there are 8 BE-customer, and 80 SME-suppliers under the Toyota Cluster. Furthermore, the nature of the data collected is subjective and based on the perception of the SME-supplier and BE-customer.

2. Supplier Development

2.1 Definitions of Supplier Development

Basically, supplier development is any activity undertaken by customers or in this study, including the government to upgrade the performance of the suppliers to meet the customers' needs or a strategic action to maintain competitiveness. Most of the definitions found are line with this definition. Leenders(1966) defines supplier development as efforts by manufacturers to increase the number of viable suppliers and improve suppliers' performance. Krause and Elram(1997) defines supplier development any effort of the firm with a supplier to increase the performance and capabilities of the supplier and to meet the buying firm's supply needs. Reed and Walsh (2002) define supplier development as a corrective mechanism against deficient suppliers. These definitions are reflective of the main purposes of the implementing supplier development. The study by Aberdeen Group Inc. identified the following as driving factors on undertaking and improving supplier development: pressure to generate year-over-year improvements in supplier quality and performance; identify opportunities to remove non-value-added costs from the supply chain; and develop and improve capacity, throughput, and other capabilities of key suppliers(cited by Erasmus, 2006). Meanwhile, Sako(2004) argued that supplier development is considered as capability enhancing activity that fits neither the market nor hierarchy. Supplier development is not based on exclusively on price-oriented transaction and there is no system of authority.

The first-ever documented case of supplier development is implemented by Toyota Motor Corporation(TMC) in 1939(Monczka, Trent, and Callahan, 1993). In the 1939 purchasing rules of Toyota, it explicitly declare that once nominated as Toyota suppliers, they should be treated as part of Toyota(as branch plants) and Toyota should do its best not to switch suppliers and endeavor in Toyota improving their performance. Other automotive companies have followed suit; Nissan implemented supplier development program in 1963, and Honda in 1973. Liker and Choi(2004) argued that through these supplier development and supplier associations, Japan was able to achieve success in industrial sector and resource investment from these supplier relationships is one of the cores of the international competitiveness of the Japanese industry(cited in Krause, Handfield, and Tyler, 2007). Meanwhile, in a study from Harvard-primary identifies that the reason for declining competitiveness in the US is low investment in supplier relations and development(Monczka et al., 1993).

Supplier development program includes various activities depending mainly on the strategy of the MNCs and the needs of the suppliers. Wagner (2006) direct and indirect supplier development provides differentiation between direct supplier development and indirection supplier development. Direct supplier development includes on-site consultation, education and training, temporary transfer of personnel, inviting the suppliers' personnel and the provision of equipment or capital. Meanwhile, indirect supplier development includes supplier assessment, communication of performance goals and evaluation results, and instilling competition by using multiple sources and promising future business. Based from level of involvement of buyer and the degree of implementation complexity, Sanchez-Rodriguez, Hemsworth, and Martinez-

Lorente(2005) categorize supplier development into three levels: basic, moderate, and advanced. Basic supplier development is characterized by limited firm involvement and minimum investment of the company's resources and most likely to be implemented first. It includes supplier performance evaluation and procurement from small numbers of suppliers. Moderate supplier development is characterized by moderate level of buyer involvement and implementation complexity which requires a relatively more company resources. This includes plant visits, supplier recognition, supplier certification(ISO certification). Advanced supplier development refers to supplier development activities which have high level of implementation complexity and buyer involvement which requires higher amount of company's resources. . This includes supplier training and supplier's involvement in new product development. In the case of Japanese firms, the most common activities includes 5S⁵³ Housekeeping, just-in-time(Lean production), kanban⁵⁴, Hoshin exercise(working on the shop floor with operators to find simple and practical suggestions that can be applied immediately in order to improve work organization, plant layout, or production process and solve process problems.

2.2 Impact of Supplier Development

Studies conducted by Krause(1997), Berlow,(1995),Hartley and Choi(1996), Reed and Walsh(2002), and Wagner(2009) have documented that through the supplier development the suppliers were able to increase sales, improve delivery, order completion, reduction of defects, and reduced cycle time. Krause(1997) conducted a survey with 527 purchasing executives in the US and found out that supplier development resulted to timely delivery, completed orders, reduction in defects and scrap and reduced order cycle time. The result is very similar with Berlow(1995) which found that in the supplier development program implemented by Honda of America, have reduced the cost by \$4 million dollars in six months in 12 stamping suppliers in 1995. In the study by Hartley and Choi(1996), it was found out that in the case of General Motors in 1996, supplier development program implemented with over 2000 suppliers have resulted to increased in productivity by 50%, reduced lead time and inventory by around 70%. Specifically, the change in layout resulted to increased suppliers' efficiency.

The study of Reed and Walsh(2002) investigated the potential of supplier development in enhancing the technological capabilities in the UK aerospace and defense sectors and found that supplier development can upgrade technological capabilities and encourage the formation of mutual trust. Doyle (1997) concluded that the major airlines' adoption of supplier development resulted in 30% savings in component support costs(cited in Humphreys et al. 2011).

Using propensity score matching(PSM)⁵⁵ and difference-in-difference(DID)⁵⁶, Arraiz et al.(2011) analyzed the 439 projects implemented by 271 large firms and 8, 820 supplier firms in 2003-2008 under the *Programa de Desarrollo de Proveedores(PDP)*⁵⁷ in Chile. The study found out that the program benefitted both supplier and sponsor large firms. The supplier firms experienced increased sales, employment, as well as increased average salaries paid by these firms. Meanwhile, sponsor large firms improved its sales and its ability to become exporters. The effects of the program are particularly faster to take effect within the supplier firms than the large sponsor firms. This is due to the fact that some changes in production techniques and compliance may take effect within a short-period. Li et al(2007) conducted a survey with 142 electronics manufacturing companies in Hong Kong to analyze the relationships of supplier development on buyer competitive advantage. Using, applied structural equation modeling(SEM)⁵⁸ the study has found out that joint actions and trust have significant impact on the operations of the buyers. Meanwhile, Krause et al.(2007) analyze relationship between U.S. buying firms' supplier development efforts and buying firm performance with 392 survey respondents from the automotive industry. It was found out that buyer commitment and social capital accumulation with key suppliers can improve buying company performance.

⁵³ Seiri(Sort), Seiton(Set), Seiso(Sweep), Seiketsu(Standardize), and Shitsuke(Standardize).

⁵⁴ In Japanese, 看板, which literally means signboard. It is a scheduling system that tells what to produce, when to produce it, and how much to produce.

⁵⁵ PSM is an analytical tool developed by Rosenbaum and Rubin(1993) which aims to provide an unbiased estimation of treatment effects.

⁵⁶ Econometric technique used to measure the change induced by a particular treatment or event. In this case it is used to estimate the impact of the program between the participants and non-participants.

⁵⁷ A supplier development program developed by Chilean Economic Development Agency(CORFO) in 1998. The PDP provides subsidies for programs dedicated to improving the capabilities of SME belonging to the supply chain of BE-customer, which in turns provides financing for the project. The program is implemented in two phase: diagnostic stage and development stage. CORFO pays up to 50% of the cost of the development plan by consultant or consulting firm. The development follows after the creation of development plan and can last up to three years. CORFO covers 50% of the implementation.

⁵⁸ Structural equation modeling (SEM) is a statistical technique for testing and estimating causal relations using a combination of statistical data and qualitative causal assumptions.

2.3 Success and Failure Factors of Supplier Development

Although, the supplier development is widely agreed to have significant improvement to both suppliers and big-enterprise buyer, not all can result into a successful initiatives. Handfield (2002) found out that not all supplier development guarantees success; almost 50% were not successful due to poor implementation and follow-up. This section enumerates the factors that led to the success or failure of a supplier development program.

Among the factors that are instrumental in the success of supplier development are effective communication with suppliers, supplier evaluation, supplier training and supplier award programs(Krause and Ellram, 1997); direct supplier involvement, trust, supplier strategic objectives(Li et.al, 2012); trust(Sako, 1992); a mutual recognition by the buyer and supplier of the need for continuous performance improvement(Monczka et.al 1993).

Krause et. al(2000) using the resource-based theory, internalization theory and structural equation modeling, investigated the effect of various supplier development and found out that direct involvement such training and provision of capital or equipment results into improvement in performance of the suppliers. Li et al. (2012) utilizes a path model approach to analyze how supplier development practices affect buyer-supplier performance from the buying firms' perspective in the case of Hong Kong electronics industry. The study found out that top management, supplier evaluation, and supplier strategic objectives are significant determinants of transaction-specific supplier development⁵⁹ and buyers that have established stronger collaborative relationships have higher probability of improving their competitive advantage. The support of top management as one of keys of the success of supplier development is congruent with the findings of Monczka et al.(1993). Krause &Elram (1997) investigated the success factors in supplier development and why supplier development success varies through a mail survey to 527 respondents who are purchasing executive and members of National Association of Purchasing Management(NAPM). The 527 respondents were divided into two groups: the "exceeded group" or group which results of supplier development have met or exceeded the expectations, and "fallen short" group or groups which results of supplier development program have fallen short of the expectations. It was found out that the Exceeded group are more actively involve than the Fallen Short group in the following activities: formal evaluation, feedback of evaluation results to the supplier, use of supplier certification program, site visits to the supplier, visits to the buying firm by the supplier's representative, supplier recognition, training and education of the supplier's personnel, and investment in supplier's operation. Meanwhile, Mohr and Spekman(1994) established the importance of communication in the success of supplier development efforts. Effective communication is essential to the coordination of the improvement program and understanding the perception or expectation of both the supplier and the buyer. The importance of trust in the strong buyer-supplier relationship was confirmed by studies such as Sako(1992) and Monczka et al(1993). In relation to trust, Monczka et al. (1993) established the significance the mutual recognition by both buyer and supplier of the need for continuous performance improvement in the effectiveness of supplier development program.

Meanwhile, the barriers in the success of supplier development are: poor communication and feedback, unstructured quality improvement program, credibility of buyers, misconceptions regarding purchasing power and supplier satisfaction barrier(Lacselles & Dale, 1989); non-profit situation and racial biases(Krause et al. 1999; Novak, 2008); lack of supplier commitment, insufficient supplier resources, lack of trust, and poor alignment or organizational cultures, unsupportive upper management and insufficient inducement to suppliers(Handfield,Krause, Scannel, and Monczka 2000).

Lacselles &Dale (1989) conducted a survey for the UK based suppliers in automotive industry and found out that poor communication and feedback, unstructured quality improvement program, credibility of buyers, misconceptions regarding purchasing power and supplier satisfaction barriers hinder the effective implementation of supplier development. The incongruence of perception regarding the goals and process of supplier development is also confirmed by the study of Forker, Ruch, and Hershauer(1999). Krause, Ragatz, &Hughley (1999) in their empirical study with 89 minority goods and services providers identified poor communication, non-profit situation and racial bias as main barriers of successful supplier development. The element of racial biases also figures in the study of Novak(2008) which found out that small minority owned suppliers were not as responsive as the large minority owned suppliers to the supplier development. In addition to that, Handfield et al. (2000) study about supplier development strategies in 84 companies enumerated other factors that inhibit the success of supplier development programs and it includes: lack of supplier commitment, insufficient supplier resources, lack of trust, and poor alignment or organizational cultures, unsupportive upper management and insufficient inducement to suppliers.

⁵⁹ This is similar to Wagner(2006) definition of direct supplier development. It includes buyers' direct investment in physical or human assets of a particular supplier, the buyer's expectation of supplier performance improvement and joint action between both parties(Dyer, 1996; Joshi and Stump, 1999 in Li. et al.2012).

3. Philippine Automotive Industry

3.1 Industry Structure

The Philippines automotive industry is comprised of two sectors: assembly firms, and the parts and components manufacturers. There are six major firms in the automotive industry: Toyota Motor Phils. Corp. (TMPC), Mitsubishi Motor Phils. Corp. (MMPC), Honda Cars Phils., Inc. (HCPI), Nissan Motor Phils., Inc. (NMPI), Isuzu Phils., Inc. (IPC), and Ford Philippines⁶⁰. The total production capacity of the passenger cars is 221,450 units per year; 146,022 units/per year; and 2,570,008 units/per year for motorcycle(see Table 3-1).

Table 3-1 Classification and Capacity of the Motor Vehicle Assembly

Classification	Number of Participants	Total Capacity(as of 2009)
Passenger Car	6	221,450 units/year
Commercial Vehicle	19	146,022 units/year
Motorcycle	26	2,570,008 units/year

source: www.boi.gov.ph

In terms of market shares, Toyota dominates with more than 30 percent market share over the last five years. Mitsubishi is running second with 19.7 percent in 2010, followed by Hyundai with 11.1 and Honda with 9.9 percent in 2010(see Table 3-2).

Table 3-2 Market share of Automotive Firms(2004-2010)

Name of Company	2004	2005	2006	2007	2008	2009	2010
Toyota	33.2	36.6	38.4	38.2	39.9	34.9	33.7
Mitsubishi	14.4	13.4	12.6	12.7	14.1	17.6	19.2
Honda	12	10.1	13.9	14.7	11.5	13	9.9
Isuzu	10.5	9.9	8.2	8.3	8.1	7	8.4
Nissan	6.5	5	3.3	2.4	2.4	1.8	5.2
Universal	3.8	3.1	2.7	2.8	9.8	3.8	
Ford/Mazda	8.3	8.6	6.9	6.3	6.2	6.2	5.8
Hyundai	2.8	5.1	5.5	7	8.2	8.4	11.1
Kia	2.6	2.8	2.4	2.4	3.5	2.8	
GM/TCCCI	3.2	2.5	2.1	1.7	1.9	1	1.1
Suzuki	0.7	1	2	1.8	1.8	2	
Hino	0.3	0.3	0.2	0.2	0.3	0.4	
Columbia	0.2	0.3	0.3	0.3	0.3	0.3	3.3
MAN	0	0	0	0	0	0	
BMW	1	0.8	0.8	0.7	0.5	0.5	
Volvo	0.4	0.4	0.4	0.2	0.2	0.2	
PGA		0.1	0.1	0.2	0.2	0.2	
Commercial		0.1	0.1				
Proton, Porsche	0.1						
Dreamco				0.1	0	0	
Daewoo	0	0	0	0	0	0	

Source: CAMPI, in Aldaba(2011)

The part and components manufacturers is composed of 256 companies that produces over 300 parts and components made of metals, plastic, rubber and composite materials for both the original equipment manufacturer (OEM) and replacement market. Almost forty percent (40%) of all parts manufacturers produce OEM parts while the remaining sixty percent (60%) caters the aftermarket. The parts and components manufacturing are divided into the following: metals(63

⁶⁰ Ford Philippines is scheduled to close their manufacturing operations starting December 2012. (<http://www.gmanetwork.com/news/story/263331/economy/companies/ford-philippines-to-close-sta-rosa-factory-in-december>)

or 48%), rubber(20 or 15%), seats and trim(13 or 10%), plastic(12 or 9%), electrical(10 or 8%) and others(13 or 10%). Many of these parts and components manufacturers fall under the SME-category⁶¹.

3.2 Industry Performance

The industry has continued to expand from 2002 to 2008. It achieved 8% growth from 667, 015 units in 2007 to 719, 438 units in 2008. The entry of imported second hand vehicles poses a challenge for the growth of the brand new completely built-up(CBU).

Table 3-3 Industry Sales, 2002-2008

	2002	2003	2004	2005	2006	2007	2008
Passenger Cars and Commercial Vehicle	85,594	92,336	88,077	97,064	99,541	117,903	124,449
Motorcycle	224,501	257,401	409,581	492,883	518,196	549,112	594,989
Total Industry Sales	310,095	349,737	497,658	589,947	617,737	667,015	719,438
Source : BOI, 2009							

Meanwhile in the case of parts and components, it has generated US\$ 1.89B in exports in 2005 from only US\$ 600M in 1995. In 2008, motor vehicle parts exports increased by 36% valued at US\$3.5B compared to 2007 with US\$2.25B. Over 90% of exports are accounted for by MNCs. More than 50% of local parts manufacturers are largely domestic-oriented, relying on local parts purchases from assemblers for their production and sales. The current top five (5) markets of motor vehicle parts include Japan, Germany, United States of America, Thailand and Indonesia.

Total value added contribution of motor vehicle manufacturing has declined significantly to P18 billion in 2008 from about P72 billion in 2006(See Table 3-4). While the share of employment of the motor vehicle manufacturing remained at around 0.6 percent. On the other hands, the parts and components' value-added contribution has grown from P9.5 billion in 2006 to P13.8 billion in 2008. However, its contribution to total employment has slightly declined from 0.17 percent in 2006 to 0.13 in 2008.

Table 3-4 Total Employment and value-added contribution of the automotive industry

Industry Description	Total Employment		Value-Added(in 000)	
	2006	2008	2006	2008
Manufacturing	973,178	862,665	868,301,960	816,462,523
Manufacture of motor vehicles	5,717	4,938	71,745,691	18,625,312
Percentage	0.59	0.57	8.30	2.30
Manufacture of bodies(coachwork) for motor vehicles,Manufacture of trailers and semi-trailers	1,630	1,105	790,410	223,810
Percentage	0.17	0.13	0.10	0.03
Manufacture of parts and accessories for motor vehicles and their engines	18,097	22,487	9,597,339	13,828,202
Total	25,444	28,530	82,133,440	32,677,324
	2.6	3.3	9.5	4.0
<i>Source: National Statistical Office</i>				

Locally-assembled vehicles or completely knocked-down(CKD) units significantly plunge from 96 percent of total sales in 2000 to 44 percent in 2010(see Table 3-5).While the share of CBU imports have increased substantially from 4 percent in 2000 to 56 percent in 2010. The reduction of tariffs to 5 percent under the ASEAN Free Trade Agreement(AFTA) Common Effective Preferential Tariff(CEPT) have prompted the domestic assemblers to shift their operations into CBU imports.

⁶¹ In the Philippines, SMEs are categorized based on asset-size and number of employees. Micro-enterprises, up to P3 million and 1-9 employees; Small, P3 million to P15 million and 10-99 employees; Medium enterprises, P15million to P100 million and 100-199 employees; Big enterprises, above P100 million and more than 200 employees.

Table 3-5 Sales and Imports

Year	Sales	Production/C KD Sales	New CBU Imports	CBU Imports as % of Total Sales	CKD Sales as % of Total Sales
2000	74,000	70,851	3,149	4	96
2001	76,676	65,202	11,468	15	85
2002	85,587	74,734	10,853	13	87
2003	92,336	85,388	6,946	8	92
2004	88,068	58,822	29,246	33	67
2005	97,063	58,566	38,497	40	60
2006	99,541	56,050	43,491	44	56
2007	117,903	61,128	56,775	48	52
2008	124,449	61,513	62,936	51	49
2009	132,444	64,498	67,946	51	49
2010	169,490	74,509	93,981	56	44
<i>source: CAMPI, in Aldaba, 2011</i>					

4. EBES-Program

4.1 Background

EBESE stands for ECOP's Big Enterprise Small Enterprise, a program designed to upgrade the productivity and quality systems of small and medium scale enterprise through the help of the big enterprises and the government agencies. ECOP stands for Employment Confederation of the Philippines, a private non-profit association of the big enterprise corporations which spearheaded the EBES-Program. In 2003, Mr. Feliciano Torres, then Chairman of the ECOP Productivity and Competitiveness Committee and president of Yazaki-Torres conceptualized a program that would infuse productivity across all industries. In 2004, the EBES-Program started with four(4) SME and two(2) big enterprises(BE), Toyota Motor Philippines(TMP) and Yazaki-Torres. The program was formally launched in 2005 under the TEN projects (initials of three partner-agencies implementing the project, TAPI, ECOP, and the NWPC). Technology Assistance and Promotion Institute(TAPI) is one of the agencies of the Department of Science and Technology(DOST) which provides funding for the consultants' services. ECOP- ECOP Institute for Productivity & Competitiveness Foundation(EIPC) is the association that conceptualizes the program and conduct training. National Wages and Productivity Commission (NWPC) is one of the commissions of the Department of Labor and Employment(DOLE) and one of the supporting institutions. In 2006, the Department of Trade and Industry-Center for Industrial Competitiveness(DTI-CIC) started to cooperate and was tasked to select and hire consultants as well as provide training. The big enterprise is responsible for nomination of the suppliers as well for orientation and training.

The program is implemented through a full-cycle approach module beginning from advocacy (accepting change), implementation (applying the change), monitoring (sustaining the change) and all the way to continual improvement (the change becomes an organizational culture). It is based on action training or learning-by doing, where the company's productivity team is mentored by a consultant. The improvement will be applied in the following areas: 5S or Good Housekeeping, Plant Layout, and Production Process. The key result areas are: Increase Product / Service Quality, On Time Delivery of Goods/Services, Reduce Cost of Doing Business, Promote Employer, Employee Relationship through Joint-Problem Solving Approach, and Satisfied Customers. The specific objectives of the program are as follows:

1. To ensure sustained competitiveness of members in the supply chain of companies by engaging both the SME suppliers and their Big Enterprise customers in the national effort to improve productivity. This effort is expected to enhance the global competitiveness of Philippines industries.
2. To contribute to firm-level efforts to upgrade the knowledge and skills of management and workers with respect to quality and productivity improvement in the hope that they will become the catalyst of change in their own companies' pursuit of competitiveness.
3. To institutionalize and sustain the EBES-Program and market it in the business community.

4. To promote the positive synergy of government, private sector and the civil society.
5. To develop network alliance with ECOP's other partner organization.

From 2005-2011, the program has benefited 272 small enterprises and engaged 25 big enterprises in several industries such as automotive, food, agro-industries, semi-conductor, printing and packaging, fashion accessories, furniture and décor. The geographical location of its network can be found in Pampanga, Bulacan, Metro Manila, Rizal, Laguna, Cavite, Batangas, Cebu, and Cagayan de Oro. Toyota Motor Philippines, Jollibee Foods Corporation, Smart Communications Inc., Unilever Philippines, Ford Philippines are among the big enterprises involved in the EBESSE Program.

4.2 EBESSE-Toyota Motor Philippines Automotive Cluster Development Program

In 2004, Toyota joined Yazaki-Torres in the pilot run of the EBESSE program. But the two small enterprise that Toyota had nominated experienced financial difficulties which eventually led to the failure of the initial attempt. In 2005, with formal launch of the EBESSE program, Toyota enrolled 13 SMEs. In 2006, Toyota started to implement the EBESSE-Toyota Automotive Cluster Development Program and was joined by other five BE. In 2007-2008 or the Phase 3, there are 39 SME and 8 BE who participated, by far the biggest number of participants. As of 2011, the program has benefitted 92 SMEs belonging to 1st tier, 2nd tier, and 3rd tier. Aside from the Toyota Motor Philippines, the other BE-customers are Aichi Forging-(Metal Casting/Forging), Fujitsu Ten (Audio/Electronics), Philippine Auto Components/Denso (Electrical/Meters), Techno eight (Metal Parts), Tokai Rika Philippines(Electrical/Mechanical), Toyota Auto Parts Philippines (Transmission), Toyota Boshoku Philippines (Interiors / Seat Assembly).

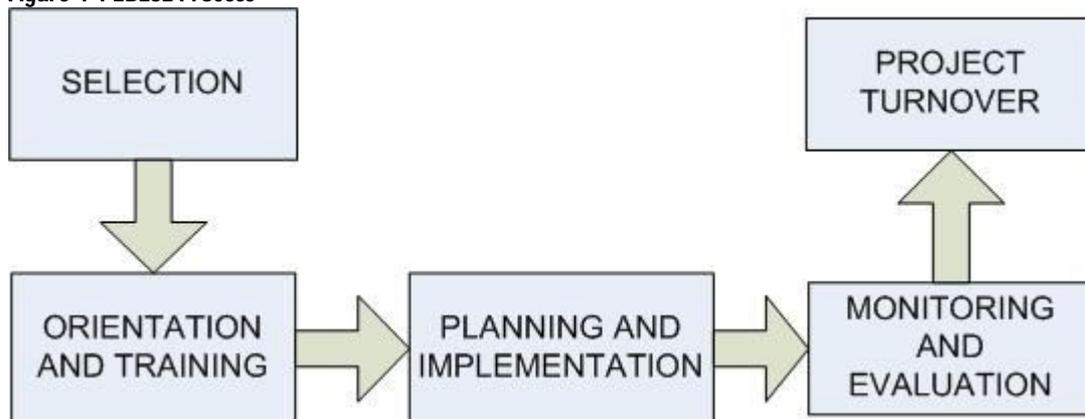
The EBESSE-Toyota Cluster Development is based on supplier development approach which involves a process of mentoring and cascading supplier development from one level to the next level or tier. For example, at the top is the final assembler, followed by sub-assemblers, and then at the bottom were parts and components manufacturer.

The EBESSE-Toyota Cluster Development is based on supplier development approach which is involves a process of mentoring and cascading supplier development from one level to the next level or tier. For example, at the top is the final assembler, followed by sub-assemblers, and then at the bottom were parts and components manufacturer.

4.3 EBESSE Process

The implementation of the EBESSE Program follows five basic steps: Selection, Orientation and Training, Planning and Implementation, Monitoring and Evaluation, and Project Turnover(see Figure 4-1). The process starts with the nomination of the SME by the BE. Most of the SMEs that are selected are relatively underperforming. The BE will then inform the management of the selected SME about their nomination and explained to them the benefits, expectations, and the support that the BE will provide. Participation of the suppliers is voluntary and no supplier is force to join.

Figure 4-1 EBESSE Process



Source: Researcher's own construction based on the EBESSE description

Once the SME agreed to participate, one-day and two-day orientation and training programs for management and employee representative will be conducted by the EIPC and DTI-CIC. The venue for training as well as the equipment, supplies, foods and beverages and other needs is provided by TMP. The basics of 5S(seiri, seiton, seiso, seiketsu, shitsuke) and the need to improve process quality and efficiency through total-system approach using cross-functional teams is taught during the training. The SME-suppliers will be asked to select a pilot area or model, wherein they would like to apply the housekeeping and productivity improvement program. The pilot areas that are selected are commonly important in satisfying the requirement of their customer or areas and areas which are having problems.

DTI-CIC and EIPC will then recruit Consultants who will be assigned to the participating SME-suppliers. There are usually 3 to 6 SME suppliers per consultant. DTI-CIC informs the SME about their assigned consultant and arranges the initial visits. Consultants will have to visit each SME over a six-month period. Consultants and the SMEs suppliers decide on the top priority to two improvement initiatives within the pilot area of each SME: Physical environment through 5S; and Production processes (reduction of quality problems or improvement in productivity) or both. Consultants are required to submit inception report at the start of the implementation.

For the SME-suppliers who choose to adopt 5s housekeeping in the pilot area, they will undergo five phases (decide, prepare, launch, sustain and expand). At the start of the implementation, the consultant will prepare a baseline assessment of the pilot area's physical environment, including taking of photographs. A final approval of the senior management is needed before the implementing the conceptualized interventions. Once, the senior management has agreed, the changes/ interventions will be communicated to all levels of organization. A cross-functional 5s committee which will craft the set of standards or rules for housekeeping and detailed implementation plan within the EBESSE program's time frame will be created as part of the preparation. The consultant will train the committee members about 5s audit. The official launching will start with "Big Clean-up Day" when everyone in the pilot area will do sorting, separating, and systematic arrangement. The activities and improvement done will be captured in documented and photographed. Continual check-up of compliance within 5s standards will be undertaken once the changes/ interventions are completed. Regular 5s audits are done by the committee members. Those with high scores will be given rewards/recognition. Appropriate actions will be given to those with inconsistent scores and failing marks. The last phase includes evaluation of pilot area or modification if necessary and expansion to other organization units such as production areas, administrative offices, and warehouses. This last phase also ends the EBESSE program and the decision to expand the improvement efforts is under the management of the SME.

For those who prioritize production process improvement, the implementation will start with identification of the high-priority problem during the first visit of the consultant. Consultants will come up with systematic data-based methodology for defining, analyzing, and solving the problem. The different dimensions of problem will be analyzed: nature, process steps affected the location of occurrence, the timing and frequency of occurrence, its magnitude and growth trend, and the sequence of activities that led to its creation. The next step is the identification of the cause of the problem and root causes are most probably: man, machines, materials, method, measurement, and environment. Once the problem and its causes has been identified, the consultant the SME personnel will propose solutions, evaluate each solution and select the best one, and prepare implementation plan with action steps in the correct sequence, and for each step assigned responsibility to specific persons, set target dates of completion, and defined appropriate measurable indicators of success.

Once the interventions were implemented, the consultants will conduct a visit once or twice a month over the six-month period to monitor the progress. At the end of the program, the consultant will have to submit a Final Report which documents the evidence(pictures, graphs, charts, and/or quantifiable data) of the improvement that occurred in the pilot area.

5. Results of the Survey

The questionnaire was sent through the cooperation of Toyota Motor Philippines (TMP). This strategy was considered more convenient than contacting directly each participant. Furthermore, a higher response rate was anticipated due to the leverage of TMP. The questionnaires for both BE-customer and SME-supplier were forwarded by TMP to the BE-customers. The questionnaires for the SME-supplier were then sent by the BE-customer to their SME-supplier. The questionnaire were sent out in October but unfortunately this coincided with the massive flooding in the industrial estates of Thailand which disrupted the automotive supply chain. Many firms were forced to cut their operations. This resulted to a relatively lower response rate of the survey particularly among SME: 5 out of 8 BE or 62.5 percent, and 13 out of 80 SME or 16.25 percent .

5.1 SME Respondents' Profile

Seventy-seven percent of the suppliers have been in the business for more 10 years and 15 percent are operating within 6-10 years. There is small percentage of SMEs which can be considered as new-comers with 1-5 years only in operation. Majority of surveyed firms have 10-99 employees (38%) and 100-199 (39%) employees and according to the SME definition of the Philippines this falls under the small and medium enterprises category.

Table 5- 1 SME Company Profile

A. Years in Business		
	Number	Percentage
1-5 years	1	8%
6-10 years	2	15%
>10 years	10	77%
B. Number of Employees		
1-99	1	18%
10-99	5	39%
100-199	5	38%
>200	2	15%
C. Size of Paid-up capital		
<3 million	1	8%
P3-15 million	3	23%
P15-100 million	5	38%
>P 100 million	4	31%
D. Ownership Structure		
100% Filipino-owned	7	54%
100% Foreign-owned	4	31%
Joint-venture	2	15%
E. Exporting Activity		
Exporter	7	58%
Non-exporter	5	42%

Source: Based on questionnaire survey

In regard to the size of paid-up capital, 38 percent reported to have P15-100 million paid-up capital and they can be considered as medium-size firms. While 31 percent reported to have P100 million and above and they can be considered as large enterprise based on the SME definition. While 23 percent of the firms reported to have P3-15 million paid-up capital or under the SME definition, small enterprises.

As for the ownership structure, half of the respondents are 100 percent Filipino-owned or 54 percent. While, the remaining half is divided into 100 percent Foreign-owned (31 percent) and with joint-venture with foreigners (15 percent). The specified foreign-ownership belongs to Japanese. Half of the respondents are involved in exporting but the remaining 42 percent are not involved in any exporting activities.

Table 5-2 History as a Supplier

A. Year as a Supplier		
	Number	Percentage
Less Than a year	0	0
1-3 years	1	77%
4-6 years	2	15%
more than 6 years	9	7%
B. Exclusive Supplier		
Yes	1	7%
No	12	93%
Average Number of Other Firms Servicing	16	
C. Tier Position		
Tier 1	5	38%
Tier 2	7	54%
Tier 3	1	8%
D. Change in Tier		
Yes	0	0
No	13	100%

Source: Based on questionnaire survey

Majority of the firms (75 percent) are working for Toyota/Toyota Group for more than six (6) years. The remaining 17 percent of respondents are serving the Toyota/Toyota Group for more than 4-6 six years. Note that there is no supplier who is servicing Toyota for less than a year. Almost all of the respondents (93 percent) are not servicing the Toyota/Toyota Group exclusively. The average number of firms that respondents have been servicing is 16 customers.

As for the tier position, majority are Tier 1 suppliers(54 percent) and Tier 2 suppliers(38 percent) . No suppliers have reported a change in Tier Position. There is a discrepancy between the tier position reported by the suppliers and the list of participants of Toyota. Some reported that they are Tier 1, but according to Toyota they are Tier 2. Some of the respondents are seemingly not aware of their tier position.

5.2 Common Problems and Motivations in Joining the Program

In general, the respondents have reported that they are not having any of these identified problems as reflected with the means ranging from 2.42 to 3.08. For the lack of access to finance, only 3 have reported that they have problems in securing finances but the rest were neutral about this problem. The three respondent who answered that they have problem regarding to finance are those possess capital of 3-15 million. As for the lack of basic operational management knowledge, majority of the respondents(8 respondents) refute this statement. Similarly, the respondents also reported not have problems related to lack of access to technologies. However, there are four respondents who admitted that they are having problems with lack of access to technologies. These four respondents belong to 100% Filipino-owned.

The respondents also reported that they did not have or having any problems related to lack of information. Seven respondents have disagreed with the statement. While, there are who admitted to have difficulties in lack of access to information. Similar with the profile of the respondents who are having problems regarding technology, most of them are Filipino-owned. There are four respondents who reported that they do not have problems related to lack of access to market channels but at the same time, there are also four who indicated that they had/are having problems with access to market channels/market information. Majority of those agreed that they are having problems regarding access to market channels are Filipino-owned enterprise.

Table 5-3 Common Problems of the SME-suppliers

	Net Rating	Std.Dev
1. Lack of access to finance	2.83	1.19
2. lack of basic operational management knowledge/expertise	2.42	1.16
3. lack of access to technologies	2.83	1.19
4. lack of access to information	2.67	1.15
5.lack of access to market channels/information	3.08	1.16

Source: Based on questionnaire survey

The respondents have unanimously agreed that their motivation in joining the program is to improve their competitiveness in terms of quality, cost, and delivery (QCD). Similar patterns could also be observed with the aim of gaining access to modern productivity improvement. Twelve respondents have agreed that acquiring access to modern productivity improvement is one of their motivations in joining the program. Twelve respondents also admitted that they are interested in participating in the program because they believe that through this program they would acquire access to market information. Nine respondents strongly agree that participation in this program would enable them to improve their current relations with the BE-customers which can sometimes be adversarial.

Table 5-4 Motivations in Joining the EBESSE Program

	Net Rating	Std. Dev
1. to improve competitiveness (quality, cost, delivery)	4.77	0.44
2. to gain access to modern productivity improvement skills	4.62	0.51
3. to gain access to market information	4.54	0.52
4. to improve relations with Big Enterprise (BE) customer	4.77	0.44

Source: Based on questionnaire survey

5.3 Evaluation of the EBESSE Program: SME –suppliers' responses

Responses regarding the impact of their participation in the EBESSE program are very positive. The rating ranges from 3.85- 4.15. Eleven (11) respondents have reported to have achieved improvement in their plant layout with 4.00 net rating. Only one respondent has indicated that they did not experience any improvement in the plant layout. Meanwhile, 12 respondents said that their production processes were improved with 4.15 net rating, one of the areas that got the highest rating. Ten (10) respondents were convinced that their staff's problem identification skills were improved through the EBESSE Program with 3.85 net rating. While, there is one respondent who did not experience improvement in their staff's problem identification skills and another one is neutral about it. Eleven (11) respondents have observed improvement in the problem solving skills of their employee as a result of their participation in EBESSE Program with 3.85 rating. The remaining two respondents either disagree or are neutral about it. Eleven (11) participants have responded positively that their relations within the firm have improved as a result of their participation in the EBESSE program with 3.92 net rating. The other two respondents have disagreed or answered neither. Twelve (12) participants have agreed that their working relations with their BE-customer were improved with 4.06 net rating. Regarding the shared goal or productivity and quality improvement with BE customer, twelve (12) participants responded positively with 4.15 net rating.

Table 5-5 Evaluation of EBESE Program: SME-suppliers

	Net Rating	Std. Dev.
1.1 Our company has gained significant improvement in plant layout	4.00	1.08
1.2 Our company's production processes were improved.	4.15	0.55
2.1 The staff's problem identification skills have improved	3.85	0.80
2.2 The staff's problem-solving skills have improved.	3.85	0.80
3.1 Our company has achieved better working relations within the firm.	3.92	0.76
3.2 Our company has achieved better working relations with the BEs-customer.	4.08	1.04
3.3 Our company shared the same goal of productivity and quality improvement with our BEs customer	4.15	1.07

Source: Based on questionnaire survey

5. 4 Evaluation of the EBESE Program: BE-customers

The BE-customers identified quality, cost, and delivery problems as the most common problems they had with their customers. BE-customers agreed that prior to the implementation of EBESE program, they have experienced quality(3.8), cost(3.6), and delivery(3.6). The BE-customers identified abnormal cost and production delay as the probable repercussion of these problems of the SME-customers. BE-customers reported that they engage in activities to help address these problems. One BE-customer specified that they are sending technical staff to their SME-supplier when such problems occur.

Table 5-6 Problems Encountered with the Suppliers Prior to EBESE

	Net Rating	Std. Dev
Quality	3.8	0.45
Cost	3.6	0.89
Delivery	3.6	0.55

Source: Based on questionnaire survey

The BE-customer agreed that they have observed positive impact of the EBESE program on the SMEs. Problem-solving and problem-identification, working-relations with BE-customer, and shared-goal towards productivity and quality improvement were rated fairly high at 4.4. Meanwhile, plant layout, production processes, and working relations with the firm were also rated relatively high at 4.2.

Table 5-7 Evaluation of the EBESE Program: BE-Customers

	Net Rating	Std. Dev
Plant Layout	4.2	0.84
Production Processes	4.2	0.84
Problem Solving	4.4	0.89
Problem Identification	4.4	0.89
Working Relations within the Firm	4.2	0.84
Working relations with BE	4.4	0.89
Shared goal towards productivity and quality improvement	4.4	0.89

Source: Based on questionnaire survey

One BE-customer pointed out that so far there is no participant who did not achieve improvement except for those decided to cancel their participation. In case of there is underperforming participants, the BE-customer are willing to conduct follow-up with regular plant visit and encourage them to participate actively in the program. In the case of those who withdraw from the program, they are prioritized in the next implementation. Meanwhile, the participants who have exemplary performance are awarded with Model SME in the annual EBESSE recognition rites and are highly advised to implement the program in other areas of production or in the whole company. All the BE-customer is planning to continue the implementation of the EBESSE so as the engage more SME-supplier especially the Tier 2 and Tier 3 It was also pointed out that they are also currently thinking of implementing an advance or follow through programs.

5.4 Strengths and Weaknesses of the EBESSE Toyota Cluster Development Program

The following are identified as the strengths of the program: helps in the development and improvement of SME-suppliers; improves supplier relations; free-of-charge; promotes partnership at the macro-level (industry and the government), industry level (BE-SME/Assemblers-Sub-Assembler-Parts Suppliers), and the firm level(Management-Labor). The BE-customers believe that improvement of SME-supplier would have significant impact not only their but to the whole supply chain as well as in the industry. In the supply chain, the weaknesses of one supplier could affect the whole production system. The program has also created an avenue wherein the buyers and suppliers work hand-in-hand to identify and solve problems and in the process improves the communication and the relations. The EBESSE program is almost free-of-charge for both the SME-supplier and BE-customer. Participation in the program entails minimal cost (venue, food, and transportation, and clerical works). The program is encourages cooperation at the different level and this is deemed valuable not only for the SME-suppliers but also to the vitality of the industry.

Financial limitations are the most commonly identified weakness of the program. The government is shouldering the costs of hiring the consultants but the rest of the cost should be borne by the participants. One respondent commented that because of the limited funding reflective of the low government priority to productivity and competitiveness, participation in the EBESSE program is almost like a volunteer work. No income or incentive was given to those who work for the program. Another weakness is that there is no secondary, advance or EBESSE program. The sustenance of the productivity improvement program depends on the SME participants. Furthermore, the program does not differentiate on what kind of programs to implement according to industry or to the capabilities of the suppliers. One respondent out that these different industries might have different needs so improvement programs should be adjusted according to their needs. Another weakness is that there is a difficulty in matching the schedule of meeting of the BE.

6. Conclusion

EBESSE is a program designed to upgrade the productivity and quality systems of small and medium scale enterprise implemented through the partnership of private(ECOP/BE)-public agencies(DTI-CIC/DOST/DOLE). From 2005-2011, its benefited 272 small enterprises and engaged 25 big enterprises in several industries such as automotive, food, agro-industries, semi-conductor, printing and packaging, fashion accessories, furniture and décor. Toyota Motor Philippines is one of the forerunners of the EBESSE Program which have benefitted 80 SME-suppliers belonging to 1st tier, 2nd tier, and 3rd tier(as of 2010). The implementation of the program takes about six months from inception of the interventions to the actual implementation and monitoring.

Based on the classification by Wagner(2006), EBESSE program can be considered as a form of direct supplier development as it involves actual training and on-site visits from the consultants. Meanwhile, based from the typology of supplier development by Rodriguez et al.(2005) which is based on the involvement of the firm and the level difficulty of the implementation, the EBESSE program could be categorized as somewhere between moderate level to high level. The EBESSE program includes plant visits, supplier recognition, helps in the supplier certification(ISO)62 which is considered as moderate level, and supplier training which is considered as high form of supplier development. However, EBESSE program does not involve the suppliers in the new product development.

Based from the responses of both the BE-customer and SME-supplier, the SME-supplier have experienced significant improvement in the areas of plant layout, production process, problem-identification, problem-solving, working relations within the firm/working relations with the BE, and orientation towards productivity and improvement. These areas are identified by the EBESSE program as key improvement areas.

The involvement of the government is seen as one of the main strengths of the program however, their participation is limited only to provision funds for the consultants' services and training programs. This is very different compared with the case of PDP in Chile wherein the government covers the 50% of the cost of the creation of development plan and the actual implementation. In the EBESSE program, any cost that would arise from any improvement that must be taken must be finance by the SME-supplier participating firms. This situation is particularly difficult for those who reported that they

⁶² Toyota Motor Philippines does not require their suppliers to have ISO certification but some of the participants revealed that through the help of the EBESSE program, they were to able acquire ISO certifications.

are having financial difficulties. Some suppliers expected that they will receive financial assistance from the program. Furthermore, the government is not giving incentive for the BE-customers who are undertaking the EBES program.

7. Bibliography

Agarwalla, Gokul (2005). Study of Linkages in the Philippines Electronics industry". *PowerPoint Presentation*. Manila, Philippines.

Aldaba, R.(2011). Globalization, Competition, and International Production Networks: Policy directions for Philippine automotive industry. *PIDS Policy Notes No.2011-13*. Makati: PIDS

Aldaba, R., & Aldaba, F. (2010). Assessing the Spillover Effects of FDI to the Philippines. *PIDS Discussion Paper Series No. 2010-27*, Makati: PIDS

Aldaba, R. (2008a). SMEs in the Philippine Manufacturing Industry and Globalization: Meeting development challenges, *PIDS Discussion Paper Series No.2008-15*, Makati: PIDS

Aldaba, R. (2008b). Globalization and the Need for Strategic Government-industry Cooperation in the Philippine Automotive Industry". *PIDS Discussion Paper Series No. 2008-21*, Makati: PIDS

Aldaba, R., Medalla, E., Del Prado, F., & Yasay, D. (2010). Integrating SMEs into the East Asian Region: The Philippines. *PIDS Discussion Paper Series No. 2010-31*. Makati: PIDS

Altenburg, Tilman (2000). Linkages and Spillovers between Transnational Corporations and Small and Medium-Sized Enterprises in Developing Countries-Opportunities and Policies. Geneva: UNCTAD

Arraiz, I. & Henriquez, F &Stucchi, R(2011). The Impact of Chilean Supplier Development Program on the Performance of SME and their Large firm customers. IADB.

Battat, J., Frank, I., & Shen, X. (1996). *Suppliers to Multinationals: Linkage Programs to Strengthen Local Companies in Developing Countries*. Washington: The World Bank.

Belderbos, R., Capannelli, G., & Fukao, K. (2001). Backward Vertical linkages of Foreign Manufacturing affiliates: Evidence from Japanese multinationals. *World Development* 29(1) , 189-208.

Berry, A. & Rodriguez, E.(2001). Dynamics of Small and Medium Enterprise in a Slow-growth Economy: The Philippines in the 1990s. Washington, D.C.: IRBD/World Bank. Retrieve from <http://cdi.mecon.gov.ar/biblio/docelec/tb1020.pdf> (accessed September 5, 2009)

Berlow, M. (1995). For Superb Supplier Development. *Purchasing Magazine*, 119(4), 32-40.

Bala Subrahmanya M.H.(2007). Development Strategies for Indian SMEs: Promoting Linkages with Global Transnational Corporations. *Management New Research*,30(1).

Bureau of Small and Medium Enterprise Development(2006). *SME Development Plan 2004-2010*. Makati : DTI.

Crone, M., & Roper, S. (2001). Local Learning from Multinational Plants: Knowledge Transfers in the supply chain. *Regional Studies*, 35(6), 535-548.

Department of Trade and Industry (2004). *SME Development Plan 2004-2010*.

De Leon, M.(2008). *SMEs in RP Asia's 'laggards'*. *The Business Mirror*. Retrieved from www.businessmirror.com.ph (accessed January 28, 2007).

Development Academy of the Philippines(2007). *Report on the program evaluation of ECOP big enterprise-small enterprise productivity improvement program with focus on SME beneficiaries*. Pasig City: Unpublished report.

Dunning, J.H. (1992). *Multinational Enterprises and the Global Economy*, Essex. Addison Wesley.

Dunning, J.H(1996). The Geographical Sources of the Competitiveness of the Firms: Some Results of a New Survey. *Transnational Corporations* December 5(3), 1-30.

Dyer, J. H. (1996). Specialized Supplier Networks as a Source of Competitive Advantage:

Evidence from the Auto Industry. *Strategic Management Journal*, 17, 271-292.

Elvina, J. D. (2005). The Present State of Small-scale Enterprise in the Philippines under the Framework of the National SME agenda: A case study in Zamboanga City. Forum of International Development Studies. Retrieved from www.gsid.nagoyau.ac.jp/bpub/research/public/forum/30/05.pdf (accessed January 28, 2007)

Employment Confederation of the Philippines (unknown). A primer on ECOP Big Enterprise-Small Enterprise Productivity Improvement Program

Erasmus, B. (2006). An Assessment of Supplier Development Practices at the Volkswagen of South Africa. *Unpublished Masters Thesis*. NMMU Business School.

Ernst, D. (1997), Partners for the China circle? The East Asian production networks of Japanese Electronics Firms, in Naughton, B. (ed.), *The China Circle: Economics and Electronics in the PRC, Taiwan and Hong Kong* (210- 253). Washington D.C. Brookings Institution Press

Ernst, D., & L. Kim (2002). Global Production Networks, Knowledge Diffusion, and Local Capability Formation. *Research Policy*, 31, 1417–1429.

Forker, L., Ruch, W., & Hershauer, J. (1999). Examining Supplier Improvements Efforts from Both Sides. *Journal of Supply Chain Management*, 35(3), 35-40.

Giroud, A. (2003). *Transnational corporations, Technology and Economic Development: Backward Linkages and Knowledge Transfer in SouthEast Asia*. Cheltenham. Edward Elgar.

Giroud, A. (2007). MNEs vertical linkages: The Experience of Vietnam after Malaysia. *International Business Review* 16, 159-176.

Halbach, A.J. (1989) Multinational Enterprise and Subcontracting in the Third world: A Study of Inter-industrial Linkages. *Working Paper No. 58*. Geneva: ILO.

Handfield, R.B. (2002). Supplier Development Strategies and Outcomes. Retrieved from <http://scm.ncsu.edu/scm-articles/article/supplier-development-strategies-and-outcomes> (accessed December 15, 2011)

Handfield, R. B., Krause, D. R., Scannel, T. V., & Monczka, R. M. (2000). Avoid the Pitfalls in Supplier Development. *Sloan Management Review*, 41(2), 1-37.

Hansen, M., Pedersen, T., & Petersen, B. (2009). MNC Strategies and Linkage Effects in Developing Countries. *Journal of World Business* 44, 121-130.

Hartley, J., & Choi, T. V. (1996). Supplier development: Customers as a Catalyst of Process Change. *Business Horizons*, 39(4), 37-44

Hobday, M. (1995). *Innovation in East Asia: The challenge to Japan*. Brookfield. Edward Elgar.

Humphreys, P., Cadden, T., Wen-Li, L., & McHugh, M. (2011). An Investigation into Supplier Development Activities and their Influence on Performance in the Chinese Electronics Industry. *Production Planning and Control* 22(2), 137-156

Humphrey, J., Y. Lecler and M. Salerno (eds.) (2000) *Global Strategies and Local Realities: the Auto Industry in Emerging Markets*. London: Macmillan.

Ivarsson, I., & Alvstram, C.G. (2005). Technology Transfer from TNCs to Local Suppliers in Developing Countries: A Study of AB Volvo's Truck and Bus Plants in Brazil, China, India, and Mexico. *World Development*, 33(8), 1325–1344

Jones, R., Kierzkowski H., & Leonard, G. (2002). Fragmentation and Intra-industry Trade in P. Lloyd and H. Lee (eds), *Frontier of research in intra-industry trade*, Palgrave Macmillan.

Kelegama, S., & Foley, F. (1999). Impediments to Promoting Backward Linkages from the Garment Industry in Sri Lanka. *World Development*, 27(8), 1445–1460.

Kim, Y., & Lee, B. (2002). Patterns of Technological Learning among the Strategic Groups in the Korean Electronics Parts Industry. *Research Policy* 31, 543-567.

Kiyota, K., Matsuura, T., & Urata, S. (2008). Reconsidering the Backward Vertical linkages of Foreign Affiliates: Evidence from Japanese Multinationals. *World Development*, 36(8), 1398-1414.

- Krause, D.R., Ellram, L.M.(1997), Success Factors in Supplier Development.*International Journal of Physical Distribution & Logistics Management*,27(1), 39-52.
- Krause, D. R., Handfield, R. B., & Tyler, B. B. (2007). The Relationships between Supplier Development, Commitment, Social and Capital Accumulation and Performance Improvement. *Journal of Operations Management*, 25(2), 528-545.
- Krause, D.R, Ragatz, G.L, &Hughley, S.(1999). Supplier Development from the Minority Suppliers' Perspective. *Journal of Supply Chain Management*, 35(4), 33-39.
- Kumar, R.S. and Bala Subrahmanya, M H. (2010). Subcontracting and Knowledge Transfer from TNC to Indian SMEs in the automobile industry: How Significant is it? *International Journal of Entrepreneurship and Small Business*, 10(4), 460-483.
- Lall, S. (1996). Transnational Corporations and Economic Development. In: UNCTAD, Ed, *Transnational corporations and world development*. London, Boston.International Thomson Business Press.
- Lascelles, D. M., & Dale, B. G. (1989). The Buyer Supplier Relationships in Total Quality Management. *Journal of Purchasing and Material Management*, 7(4), 253-264.
- Lee, P. U. (2005). A Tale of Two (Philippine) Industries. Nagoya: Nagoya University. Retrieved from <http://www.soec.nagoya-u.ac.jp/erc/DP/paper152.pdf> (accessed February 5, 2011).
- Leenders, M. R. (1966). Supplier Development. *Journal of Purchasing*, 2 (4), 47-62.
- Li, W. I., Humphreys, P. K., Yeung, A. C., & Cheng, T. E. (2007). The Impact of Specific Supplier Development Efforts on Buyer Competitive Advantage: An Empirical Model. *Int. J. Production Economics*, 106(1), 230-247.
- Li, W, Humphreys, P., Yeung, A., Cheng, T.(2012). The Impact of Supplier Development on Buyer Competitive Advantage: A Path Analytic Model. *International Journal of Production Economics* 135, 135-366
- Lim, H., & Kimura, F. (2010). The Internationalization of Small and Medium Enterprises in Regional and Global Value Chains. Tokyo: Asian Development Bank Institute. Retrieved from <http://www.adbi.org/working-paper/2010/07/29/3972.intl.enterprises.regional.global.value.chains>(accessed February 5,2011)
- Lim, L. Y. C., & Fong, P. E. (1982). Vertical Linkages and Multinational Enterprises in Developing Countries. *World Development*, 10(7), 585–595
- Lin, P., & Saggi, K. (2005). Multinational Firms and Backward Linkages: A Critical Survey and a Simple Model. In T. H. Moran, E. M. Graham, & M. Blomstrom (Eds.), *Does Foreign Direct Investment Promote Development?*. Dulles: Institute for International Economics.
- Markusen, J. R., & Venables, A. J. (1999). Foreign Direct Investment as a Catalyst for Industrial Development. *European Economic Review*, 43(2), 335–356.
- Mina, E.(2011). Key Success Factors for a Big Enterprise-initiated SME Supplier Development Program for Quality and Improvement. (Unpublished Doctoral Dissertation). De La Salle University.
- Mohr, J. &Spekman, R. (1994). Characteristics of Partnership Success: Partnership Attributes, Communication Behavior, and Conflict Resolution, Techniques. *Strategic Management Journal* 15(2), 135-152.
- Monczka, R.M., Trent, R.J., Callahan, T.J. (1993), Supply Base Strategies to Maximize Supplier Performance.*International Journal of Physical Distribution & Logistics Management* 23, 42-54
- Moran, T. H. (2005). How does FDI Affect Host Country Development? Using Industry Case Studies to Make reliable Generalizations. In T. H. Moran, E. M. Graham, & M. Blomstrom (Eds.), *Does Foreign Direct Investment Promote Development?*. Dulles: Institute for International Economics.
- MSMED Council(2011). Micro, Small, and Medium Enterprise Development(2011-2016). Makati: DTI.
- Novak, C. J. (2008). Correlation Study of Organization Factors that Influence Supplier Development: A Buyer Firm's Perspective . Ann Arbor, MI: ProQuest LLC.
- Porter, M.E. (1990). [*The Competitive Advantage of Nations*](#) .New York. Free Press
- Reed, F.M., & Walsh, K. (2002), "Enhancing Technological Capability through Supplier Development: a Study of the UK Aerospace Industry", *IEEE Transactions on Engineering Management* 49(3), 237-42.

- Rodríguez-Clare, A. (1996). Multinationals, Linkages, and Economic Development. *American Economic Review* 86(4), 852–873. ,
- Sako, M. (1992) *Prices, Quality and Trust: Inter-firm Relations in Britain and Japan*. Cambridge .Cambridge University Press.
- Sako, M. (2004). Supplier Development at Honda, Nissan and Toyota: Comparative Case Studies of Organization Capability Enhancement. *Industrial and Corporate Change*, 13 (2), 281-308.
- Sánchez-Rodríguez, C., Hemsworth,D., & Martínez-Lorente,A.R (2005). The Effect of Supplier Development Initiatives on Purchasing Performance: a Structural Model. *Supply Chain Management: An International Journal*, 10(4), pp.289 – 301
- Shrimali,L.(2010). Analysis of Success Factors of Supplier Development(Unpublished Masters thesis) San Diego State University
- Supapol, A. B. (1995). Transnational Corporations and Backward Linkages in Asian Electronics Industries. *United Nations Conference on trade and development, economic and social commission for Asia and the Pacific. Monograph No. 5*. New York. UNESCAP
- Tamangan, R., Josef, F., & Habito, C. (2004). Small and Medium Enterprise Development Experience and Policy in Japan and the Philippines: Lessons and Policy Implications", *PIDS Discussion Paper Series No. 2004-30*. Makati City: PIDS Retrieved from <http://dirp4.pids.gov.ph/ris/dps/pidsdps0430.pdf> (accessed January 25, 2008)
- Tambunan, T. (2008). SME Development, Economic Growth, and Government Intervention in a Developing Country: The Indonesian Story". *J Int Entrepr* 6, 147-167
- UA &P and SGRA (2008). Present situation of the Philippine Auto Industry and its Position in East Asia. *UA&P SGRA Report No.002*. Tokyo: Sekiguchi Global Research Association. Retrieved from <http://www.aisf.or.jp/sgra-in-english/ManilaReport002.pdf> (accessed December 10,2009)
- UA&P and SGRA (2008). Towards a roadmap for shared growth through the Philippine auto industry. *UA&P SGRA Report No.003*. Tokyo: Sekiguchi Global Research Association Retrieved from <http://www.aisf.or.jp/sgra-in-english/ManilaReport003.pdf> (accessed December 10, 2009)
- Wagner, S.M.(2006). Supplier Development Practices: An Exploratory Study. *European Journal of Marketing* 40 (5/6), 554–571.
- Wagner, S.M., & Krause, D. (2009). Supplier Development: Communication Approaches,Activities and Goals. *International Journal of Production Research*, 47(12), 3161-3177.

“Introduction on the behavioral biases of the efficiency frontier of a lending agent”

Laurence Lion-Oms⁶³(MRM, University Of Montpellier II, France)

Abstract

We present a methodological analysis of the introduction on the behavioral biases: overconfidence and optimism on the borrower's behavior on the household's credit market.

By aggregating the borrower's beliefs, we obtain a portfolio of credits.

This portfolio is efficient in the sense of Markowitz and the frontier has the same form with and without the behavioral bias. To illustrate our comment, we propose one numerical application.

Our analysis of the impact of the introduction of the behavioral biases brings us to two main results. Globally, less risk for the lender because we demonstrate that the efficient frontier of the aggregated behavioral biases is taken into account is more on the left than this without biases. For one operational choice of the lenders: if the establishment wants to increase this market share, it has to accept more risk. For a given number of contracts proposed, we can determine the expected score, the associated risk and the covered borrowers' categories. More market share is considered to be more risk taking. Rationing the offer on the credit is one banking decision taken by lenders and not a market's imperfection.

Classification JEL: G02 (Behavioral Finance); G11 (Portfolio choice)

Keywords: Behavioral Biases; Efficient frontier; Lending agent.

Introduction

The term credit comes from the latin credere, to have confidence.

Neo-classical theory teaches us that the agents are rational and risk adverse. The financial agents (more specifically the lenders and the borrowers) do not depart from this rule. For a lending establishment, the fundamental problems is to constitute a portfolio of credits “of confidence” generating a maximum of profitability, while being coherent with the risk profile of the borrowers. The risk corresponds to the uncertainty on the future flows and more specifically to the capacities of repayment of the agent's borrowers which form the financial institutions' expected income. The lender tries to reduce the unpredictable characteristic of the future flows; one of the techniques available is the diversification of these risks.

Using this report on the market and in association with the foundations of the theory of portfolio and more specifically works of Markowitz (1952), we propose an original analysis of the structure of portfolio of the lenders agents. We introduce the dimension of behavioral finance into our analysis to specify better the borrower's behavior. We suppose that different borrowers' risk profiles lead more or less risky portfolio's structure. If the financial institution is more risk adverse, thus it will detain a portfolio where the part of borrowers' profiles less risky will be more important. The specific risk is independent of phenomena which affects all the financial system. This comes from particular elements of we can call “risk of the life” as the disease, the invalidity, the loss of employment. From a theoretical viewpoint, the specific risk diminishes under a suitable diversification. The diversification allows either to reduce the risk for a given level of profitability or to increase the profitability for a given level of risk. Therefore, the specific risk can be cancelled by a detailed composition of a diversified portfolio.

Identification and selection of the risk profile of the borrower is not easy. Generally, the account managers try to identify the risk of the candidates from information hard or soft collected (Stein 2002) and utilize score's methods to determine a level of risk. We make reference to credit bureaus; one of the leaders on this market (FICO) determines a median score. According to FICO, the median score in 2010 in the USA was 723. The FICO score is statistically calculated using information from consumer's credit files. Credit scores are designed to measure the risk of default by taking into account various factors in a person's financial history. FICO delivers some elements of construction from its score: the payment history, the credit utilization; the length of credit history; the types of credit used and other special factors which can weigh on the FICO score. Determination of the score (S) is an indicator of performance or of repayment by the borrower. In this paper, the borrowers are characterized from a score (from 0 to 1000) with two possible states, which have the same probability of occurrence. For each borrower's category, we can establish an expected score and a variance (in point of score). We suppose that there is a finished number of borrower's categories and we are able to establish a matrix of correlation between them. As a consequence, one may have risk compensations within the portfolio and some profiles, which did not correspond to the selection criteria of credit's attribution, can be accepted. Credit institutions must build an efficient portfolio; one explicit reference of Markowitz's work (1952) on the efficient frontier is used.

We retain as behavioral biases overconfidence and optimism (François-Heude and Fabre 2009). These behavioral biases have an impact on the borrower's score and on the determination of the parameters for the next period. An individual is able to determine different parameters linked to the behavioral biases (the overconfidence, the optimism in good and

⁶³ Montpellier Research Management; CR2M ; University of Montpellier II
Place Eugène Bataillon, 34 095 Montpellier Cedex 5, France.
Tel. (0)4 68 11 13 50/ Fax. (0)4 68 11 13 59
E-mail : laurence.oms@univ-perp.fr

bad state). Overconfidence is associated with the probability of occurrence and the optimism is added (or is reduced) to the value of the score. From March and Simon's study (1958) regarding the process of decision-making, the agent whose cognitive capacities are limited simplifies his access to the information by using heuristics (Kahneman and Tversky, 1974). The Kahneman and Tversky's works (1979) on the perspective theories show that an individual estimates the risk differently according to the situation which he faces.

Shefrin (2007) identifies 3 categories of psychological phenomena: the biases, the heuristics and the frame's effect. He underlines that the bias is a predisposition to an error. Overconfidence is an overestimation of its own knowledge (overestimation of the information's detained). The example of Svenson (1981) on the capacities of the motorists above the average (known under the term "better than average effect") illustrates this further. Optimism is a preference for favorable perspectives. It's an unrealistic overestimation concerning the future events not connected with the personal capacities (Bessi re 2007). The overconfidence is an under estimation of the risk or the variance for future events (Fairchild 2005). Overconfidence is more prevalent in situations where uncertainty is strong (Daniel et al. 2001). Malmendier and Tate (2005) propose the distinction "general optimism" connected to exogenous events and 'overoptimistic beliefs' are resulting from overconfidence of an individual. These two biases are correlated and distinguished in theoretical and empirical analyses.

The lending establishment is aware of the borrower's categories and wishes to grant loans to the various categories of borrowers by accepting a minimal level of risk (for an expected score). Our study aims to highlight why financial establishments accept profiles when they are not in the self-defined "reference frame".

Using portfolio's theory, can we integrate the behavioral biases? What is the impact of these borrower's biases on the formation of the efficient frontier of credit's portfolios? If a frontier exists, can a lending establishment be incited to deviate from this optimal structure? In the case where each establishment has "a reference frame" (definition of a score and a risk associated) and uses it to allow credits, how many contracts can the establishment propose and what category of borrowers does it cover?

Section 1, the framework of the study and the proposed model are clarified. Section 2 is devoted to an application of our model. Section 3 presents aggregate process of borrowers' preferences. Section 4 sets out all the processes to appraise the efficient portfolio value. Section 5, whilst excluding some categories of risk from the portfolio, presents an efficient portfolio value and proposes the operational perspective. Concluding remarks summarizes and highlights the methodological points of view.

1. Framework of the study

We model the effects of the behavioral biases within the framework of a binomial model with two periods.

The behavioral biases, overconfidence and optimism, are going to be integrated into a model of borrower's score. We clarify the combined impact (joint or opposite) of these biases on the expected score and the variance.

1.1 Model without biases

We suppose a model without biases where the variables of score and variance are defined according to two possible states. The relation is symmetric and the probability is the same.

We can represent the process where the probability to experiment bad or favorable state is the same and is equal to 1/2.

Therefore, the score is $S = \left(\frac{S_+ + S_-}{2}\right)$ and the standard deviation: $\sigma^2 = \left(\frac{S_+ - S_-}{2}\right)^2$

The values obtained for S_+ and S_- are the following ones:

$$\begin{array}{l} \nearrow 1/2 \quad \left(\frac{S_+ + S_-}{2}\right) + \left(\frac{S_+ - S_-}{2}\right) = S + \sigma \\ \searrow 1/2 \quad \left(\frac{S_+ + S_-}{2}\right) - \left(\frac{S_+ - S_-}{2}\right) = S - \sigma \end{array}$$

In a dynamic framework, the transition between two dates is:

$$\begin{array}{l} \nearrow 1/2 \quad \text{Period 1} \\ \searrow 1/2 \quad S_1 + \sigma_1 \\ \quad \quad \quad S_1 - \sigma_1 \end{array} \qquad \begin{array}{l} \nearrow 1/2 \quad \text{Period 2} \\ \searrow 1/2 \quad S_2 + \sigma_2 \\ \quad \quad \quad S_2 - \sigma_2 \end{array}$$

We explain the change from period 1 to period 2 by taking into account the borrower's behavioral bias.

1.2 Model with overconfidence bias

Overconfidence's bias is the probability, in a binomial model that a favorable or unfavorable state appears. The individuals may overestimate their capacities and the precision of their knowledge. To introduce this bias, we associate to the probability of emergence of a state one variable noted α with $-1 < \alpha < 1$. At period 2, we obtain (S_2, σ_2) with these relations:

$$S_2 = \left(\frac{1+\alpha}{2}\right)(S_1 + \sigma_1) + \left(\frac{1-\alpha}{2}\right)(S_1 - \sigma_1) = S_1 + \alpha\sigma_1$$

$$\sigma_2^2 = \left(\frac{1+\alpha}{2}\right)(S_1 + \sigma_1)^2 + \left(\frac{1-\alpha}{2}\right)(S_1 - \sigma_1)^2 - S_2^2 = \sigma_1^2(1 - \alpha^2)$$

Two cases are considered: Overconfidence with $\alpha = \frac{\sqrt{(\sigma_1^2 - \sigma_2^2)}}{\sigma_1}$ if $\alpha > 0$ and lack of confidence or under confidence with $\alpha = -\frac{\sqrt{(\sigma_1^2 - \sigma_2^2)}}{\sigma_1}$ if $\alpha < 0$.

Overconfidence increases S from one period for the other one but it decreases the standard deviation ($\sigma_2 < \sigma_1$).

1.3 The model with optimism bias

Optimism (or respectively a lack of optimism) is a preference to the agents for favorable perspectives. It is an overestimation about future events but not linked with particular knowledge or capacities of the individuals.

- In favorable case, this bias $\delta_+ > 0$ increases S.
- In bad case, this bias $\delta_- > 0$ induces a decrease of S

To summarize, we meet these cases:

	Good Case	Bad Case
Optimism bias	$\delta_+ > 0$	$\delta_- < 0$

Pessimism bias $\delta_+ < 0$ $\delta_- > 0$

Score and standard deviation are: $S_2 = \frac{1}{2}(S_1 + \sigma_1 + \delta_+) + \frac{1}{2}(S_1 - \sigma_1 - \delta_-) = S_1 + \frac{\delta_+ - \delta_-}{2} \sigma_2^2 = \frac{1}{2}(S_1 + \sigma_1 + \delta_+)^2 + \frac{1}{2}(S_1 - \sigma_1 - \delta_-)^2 - S_2^2 = \left(\sigma_1 + \frac{\delta_+ + \delta_-}{2}\right)^2$

1.4 Combined effects of these biases in statics

This score is affected by the overconfidence (α); $\alpha > 0$ is a situation of overconfidence and inversely. And $\delta_+ > 0$ is an optimism bias in favorable states and $\delta_- > 0$ is a negative bias in unfavorable states. But, $\delta_+ < 0$ in a favorable state characterizes the pessimism and $\delta_- < 0$ in an unfavorable state characterize an optimistic bias.

The score and the standard deviation are quoted:

$$S_2 = \left(\frac{1+\alpha}{2}\right)(S_1 + \sigma_1 + \delta_+) + \left(\frac{1-\alpha}{2}\right)(S_1 - \sigma_1 - \delta_-) = S_1 + \frac{\delta_+ - \delta_-}{2} + \alpha \left(\sigma_1 + \frac{\delta_+ + \delta_-}{2}\right)$$

$$\sigma_2^2 = (1 - \alpha^2) \left(\sigma_1 + \frac{\delta_+ + \delta_-}{2}\right)^2$$

The biases' expressions can be rewrite from the score and standard deviation:

$$\alpha = \frac{S_2 - S_1 - \frac{\delta_+ - \delta_-}{2}}{\sigma_1 + \frac{\delta_+ + \delta_-}{2}} \quad \delta_+ = \sigma_2 \sqrt{\frac{1-\alpha}{1+\alpha}} + (S_2 - S_1 - \sigma_1)$$

$$\delta_- = \sigma_2 \sqrt{\frac{1+\alpha}{1-\alpha}} - (S_2 - S_1 + \sigma_1)$$

These expressions of the behavioral biases are valid only under some constraints and limits.

$-1 < \alpha < 1$ and $(\delta_+ + \delta_-)/2 < -\sigma_1$ with

$$\lim_{\alpha \rightarrow -1} \delta_+ = S_2 - S_1 - \sigma_1 \quad \lim_{\alpha \rightarrow -1} \delta_+ = +\infty$$

$$\lim_{\alpha \rightarrow -1} \delta_- = +\infty \quad \lim_{\alpha \rightarrow -1} \delta_- = -(S_2 - S_1 + \sigma_1)$$

1.5 Combined effects of these biases in dynamics (period 1 and 2)

With a numerical example, we present the impact of the behavioral biases on the score and the variance (or standard deviation).

There 3 elements which modify the situation: $\alpha, \delta_+, \delta_-$.

The initial period (noted 1) is characterized by $S_1=700$ and $\sigma_1=8$. At the period 2, the score is $S_2=705,9$ and $\sigma_2=12,4$. Let us study the different cases of the borrower's behavior.

The borrower is overconfident and optimistic for the future; he considers with a probability of 70 % that a favorable state comes ($\alpha=0,4$) and the score sets at 714 ($700+8+6$) with $\delta_+ = 6$.

But he's also pessimistic because he considers that an unfavorable state may exist with a probability of 30 % and the score would become 687 ($700-8-5$) with $\delta_- = 5$.

There is a combined effect of overconfidence and optimism; these last ones exceed the pessimism's bias which occurs in 30 % of the cases of unfavorable state.

The borrower is "under confident", he forecasts that a favorable state appears only in 25 % of the cases ($\alpha=0,5$) but he gets 727,32 ($700+8+19,32$) as $\delta_+=19,32$ and in 75 % of the cases he gets 698,75 ($\delta_-=-6,75$).

The borrower is very optimistic but regarding his own capacities he's under confident.

There's an offsetting between the biases.

The borrower is confident and optimistic, he plans a favorable state in 87,5 % of the cases ($\alpha=0,25$) and obtains 715,21 or in 12,5 % of the situations he has 690,39. The agent is confident and optimistic but less than in the previous case in spite of an increased confidence.

Complex relations between these biases exist.

For a favorable state, we obtain 718,6 ($700+8+10,6$) and in an unfavorable 693,2 ($700-8+1,2$) because $\delta_-=-1,2$. The borrower is very optimistic in a favorable state but that he is also optimistic in an unfavorable state. The risk increases.

The borrower is in complex situations where one of both biases has no influence (overconfidence or under confidence doesn't exist ($\alpha=0$) or optimism is zero ($\delta_+=0$)). When $\delta = 0$, we find $\alpha = 0,94$ with a probability of 97 % to have a favorable state with a result of 708. On the contrary, an unfavorable state occurs in 3 % of the cases but with a result of 638. Our borrower is very confident but very pessimistic.

The case when, between period 1 and 2, score and variance remain identical. Initially, we have $S_1 = 700 = S_2$ and $\sigma_1 = 8 = \sigma_2$, and we analyze various situations for three parameters linked to bias: $\alpha, \delta_+, \delta_-$.

We have a pessimist but relatively confident case if three variables are (0,25; -1,805; 2,325) so the probability of a favorable state is 62,5 %.

We can note an accentuation of both effects with the following parameters (0,85; 20,08; - 5,72); the agent remains very confident in his " own future " but he considers future prospects very negative.

An opposite case: our agent is very optimism in an unfavorable state $\delta_+ = 5,845$ and $\delta_- = -3,385$ but he's not very confident, he is 'under confident' ($\alpha = - 0,5$). The effect of optimism counterbalances the effect of negative confidence. Therefore, the impact of the behavioral biases on score and variance (or standard deviation) is complex. There are either combined or opposite effects.

Even if score and variance are unchanged, we find biases' combinations (the impossible case is optimism at the same time in a favorable and unfavorable state : $\alpha < 0$; $\delta_+ > 0$ and $\delta_- < 0$).

Different situations exist and allow expressing borrower's behavior.

2.Numerical application with 15 borrowers

We assume 15 borrowers characteristics; at t , they know the score (S) and the standard deviation (noted σ) of a credit more exactly consumer credit.

2.1 Questionnaire and protocol

With binomial model, we describe the situation with a probability of $\frac{1}{2}$ to be in a favorable state or not. We suppose initially that the score is 723 and the standard deviation (as in % of score) is 72 (10 %).

Initially	Score	Default's risk	Number of borrowers
Credit	723	10% soit 72	15

15 borrowers' characteristics: A man, in couple, retired without credit; A woman, in couple, retired with credit; A woman, widowed, salaried, 1 child, without credit ; A woman, single, salaried, with some mortgage loans (it's investment in rental property but it's debt ratio is more important than the average); A woman, in couple, salaried with children and a mortgage loan; A woman, single, manager with credit; A woman, single, salaried without credit; A woman, in couple, to be unemployed, 2 children, without credit ; A man, in couple, a child, a fixed term contract with a credit; A man, in couple, salaried, 2 children, without credit; A man, separated, manager of society, 2 children with a mortgage credit; A man, single, to be unemployed, with credit ; A man, single, salaried in retraining, without credit ; A man, in couple, 3 children with credit ; A student (second cycle).

We interview 15 persons with different characteristics to know the behavioral biases: overconfidence and optimism.

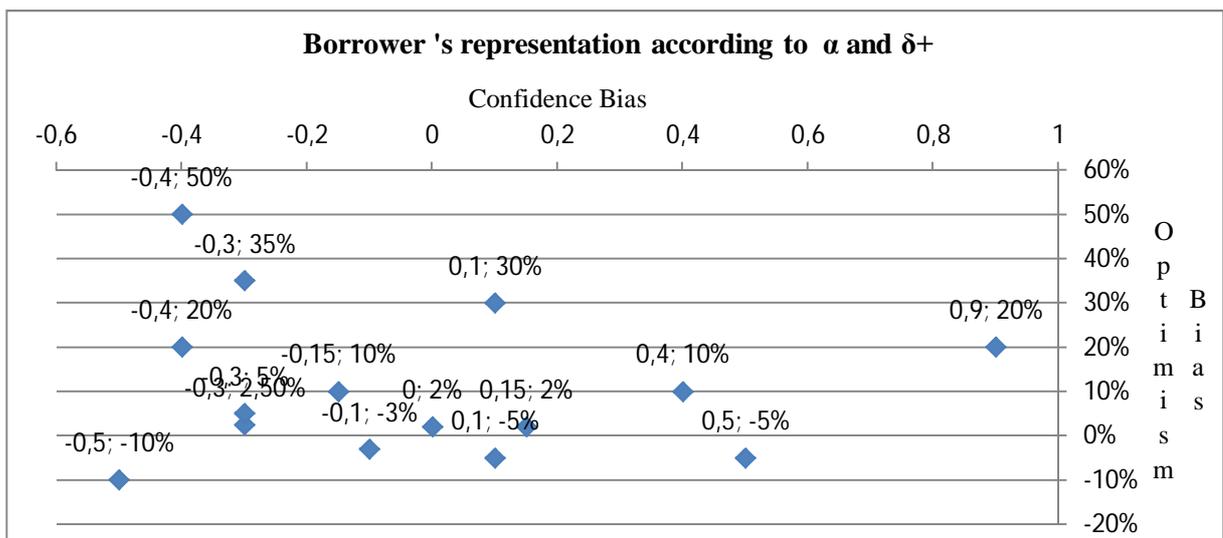
We can inform the participants that the aim of this experiment consists in estimating behavioral biases and taking into account to obtain a credit (a score and an average risk of default on a loan are presented). The questions are :

- According to you, which is the probability that there is an increase or a decrease of the borrower's score (or of your score)?
- If the score increases, how much do you judge the impact on the average score?
- If the score decreases, how much do you judge the impact on the average score?

2.2 Results

We analyze the borrower's characteristics: overconfidence or not, optimism or no as well as the combined effects. We obtain for each borrower with biases the following results.

Initial Parameters			Behavioral Biases Parameters-Score and Deviation					
Borrowers	Score	Standard Deviation	A	δ^+	δ^-	Weight	Score	Standard Deviation
1	725	106	0,10	-5%	0%	6,67%	736	105
2	650	120	-0,30	2,50%	20%	6,67%	614	115
3	672	90	-0,50	-10%	5%	6,67%	627	78
4	710	70	0,00	2%	5%	6,67%	710	70
5	590	60	-0,15	10%	-2%	6,67%	581	59
6	535	90	-0,4	50%	0%	6,67%	499	83
7	780	110	-0,4	20%	10%	6,67%	736	101
8	850	80	-0,50	-5%	3%	6,67%	890	69
9	790	170	0,40	10%	10%	6,67%	858	156
10	732	230	0,10	30%	10%	6,67%	755	229
11	485	180	-0,3	35%	1%	6,67%	431	172
12	890	140	-0,3	5%	1%	6,67%	848	134
13	560	190	0,9	20%	0%	6,67%	731	83
14	700	100	-0,1	-3%	4%	6,67%	690	100
15	650	100	0,15	2%	2%	6,67%	665	99



Our borrowers answered are generally overconfident and not very optimistic.

3. Aggregated process

In their methodological note, Fabre and François-Heude (2009) show it's possible to calculate the score and variance in a dynamic frame. A same approach is using to determine the score at period 2 as well as an associated risk.

3.1 Aggregated score and variance

The expected score is equal to the arithmetic average of the expected average of every borrower: $S_2 = \frac{1}{n} \sum_{i=1}^n S_1^i + \frac{1}{n} \sum_{i=1}^n (\bar{\gamma}^i) + \frac{1}{n} \sum_{i=1}^n \alpha_i (\sigma_1 + \bar{\delta}^i)$

With $\bar{\gamma}^i = \frac{\delta_1^i - \delta^i}{2}$ and $\bar{\delta}^i = \frac{\delta_1^i + \delta^i}{2}$

Adding n parameters, we obtain: $S_2 = S_1 + \bar{\gamma} + \alpha (\sigma_1 + \bar{\delta})$

The standard deviation is $\sigma_2^2 = (1 - \alpha^2) (\sigma_1 + \bar{\delta})^2$

We hold $\bar{\delta} = \frac{1}{n} \sum_{i=1}^n \bar{\delta}^i$ and $\bar{\gamma} = \frac{1}{n} \sum_{i=1}^n \bar{\gamma}^i$

3.2 Aggregated behavioral biases

From the mean and deviation aggregated, we deduct:

$$(S_2 - S_1 - \bar{\gamma})^2 = \alpha^2(\sigma_1 + \bar{\delta})^2 = (\sigma_1 + \bar{\delta})^2 - \sigma_2^2$$

By substitution, we obtain the expression of the aggregated overconfidence, aggregated optimism in a favorable state and aggregated optimism in unfavorable state.

$$\alpha = \frac{S_2 - S_1 - \bar{\gamma}}{\sqrt{(S_2 - S_1 - \bar{\gamma})^2 + \sigma_2^2}} \quad \delta_+ = \sqrt{(S_2 - S_1 - \bar{\gamma})^2 + \sigma_2^2} - \sigma_1 + \bar{\gamma}$$

$$\delta_- = \sqrt{(S_2 - S_1 - \bar{\gamma})^2 + \sigma_2^2} - \sigma_1 - \bar{\gamma}$$

3.3 Numerical application

Borrowers are questioned to obtain their estimations of the biases, the answers were synthesized and every profile has the same representativeness.

From the representative equations of the aggregated mean and variance (or standard deviation), we determine the expected score and the volatility corresponding.

From the representative equations of the aggregated biases, we determine the parameters of overconfidence and optimism.

The expected average score is: 672, 92 and the volatility is 183, 24 (near 30 %).

α = overconfidence bias	δ_+ = optimism bias Favorable state	δ_- = optimism bias Unfavorable state
-0,2735	84,54	84,47

Generally, the borrowers are under confident ($\alpha < 0$) and they perceive a greater risk because the standard deviation increases to reach 183, 24. The aggregated average score is weaker than the initial proposition (723), its 672,92. Here, the optimism bias is near the same whatever the state. For more than half pooled persons, the overconfidence bias is negative.

We can think that the recent events on financial markets and international economic activity bring to more pessimistic forecasts of the borrowers interviewed.

4 Efficient credit's portfolio structure

From your previous work, we know the preference of a borrower by taking into account behavioral biases. With the aggregation process, we can generalize this method to a credit's portfolio detained by a banking or financial institution. We take into account relations between the borrowers' scores for the same credit (process of aggregation) but also relations between different credits in a portfolio (P). A matrix of correlation between characteristic's borrowers is proposed.

After presenting, the methods of aggregation within portfolio's framework (score, variance, behavioral biases), we try to study the efficient frontier which is established by taking into account, at first time, not behavioral biases and, in a second time, the biases' influences.

We compare these two situations and shall conclude on the possible impact of the biases on the efficient frontier of a credit's portfolio.

4.1 Aggregated score and variance

We consider a portfolio composed of n consumer credits ($i = 1, 2, m$), each is held in x_i proportion with a correlation between credits i and j noted ρ_{ij} .

The portfolio is considered as a particular credit where $i=P$; it's the sum of the various credits which train a portfolio. These various credits are detained by borrowers with different risk's characteristic and therefore different scores.

For a portfolio, the score and standard deviation are $S_1^P = \sum_{i=1}^m x_i S_1^i$ $\sigma_1^{P2} = \sum_{i=1}^m \sum_{j=1}^m x_i x_j \sigma_1^i \sigma_1^j \rho_{ij}$

With the biases, the score is: $S_2^P = \sum_{i=1}^m x_i S_1^i + \sum_{i=1}^m x_i \bar{\gamma}^i + \sum_{i=1}^m x_i \alpha_i (\sigma_1^i + \bar{\delta}^i)$ or $S_2^P = S_1^P + \bar{\gamma}^P + \alpha^P (\sigma_1^P + \bar{\delta}^P)$

The standard deviation is $\sigma_2^{P2} = \sum_{i=1}^m \sum_{j=1}^m x_i x_j \sigma_2^i \sigma_2^j \rho_{ij}$ or $\sigma_2^{P2} = (1 - \alpha^{2P}) (\sigma_1^P + \bar{\gamma}^P)^2$

We find similarity between these expressions and those presented to the individual level. We are in a process of aggregation of the values in a portfolio.

4.2 Aggregated behavioral biases

Our objective is to express the behavioral biases overconfidence and optimism for the portfolio P.

From the aggregated biases presented before, we find $\alpha_p = \frac{S_2^p - S_1^p - \bar{\gamma}^p}{\sqrt{[S_2^p - S_1^p - \bar{\gamma}^p]^2 + \sigma_2^{p2}}}$

The optimism's parameters are $\delta_+^p = \sqrt{[S_2^p - S_1^p - \bar{\gamma}^p]^2 + \sigma_2^{p2} - \sigma_1^p + \bar{\gamma}^p}$

$$\text{and } \delta_-^p = \sqrt{[S_2^p - S_1^p - \bar{\gamma}^p]^2 + \sigma_2^{p2} - \sigma_1^p - \bar{\gamma}^p}$$

4.3 Construction of an efficient portfolio

Credit institution know the borrower's categories (we brought to light 15 borrowers' characteristics) and wish to grant loans to the various borrower's categories by accepting for an expected score the lowest risk.

The financial markets foundations are brought by Markowitz (1952) with the portfolio's theory, Sharpe (1963, 1964), Lintner (1965) with the CAPM and Fama (1970) with the hypothesis of markets efficiency.

Using the methodological framework of Markowitz works (1952) on the efficient frontier, we minimize the variance / the standard deviation (the risk) for a mean given or the highest mean for a variance / standard deviation given. We draw the efficient border what is the combinations of borrower's categories and we retain the top of the envelope.

Lending institution knows the borrower's categories and wishes to grant loans to the different categories by accepting a minimal level of score and to minimize the risk associated with this expected score.

We present the portfolio which minimizes the variance (for an expected score) and we can calculate the proportions of borrowers in each category. We characterize our portfolio by weights attributed to the different scores or borrowers' characteristics.

The lagrangien's method allows maximization or a minimization under constraint. In this case, we make a minimization of the risk (variance or standard deviation) under constraint of an expected score.

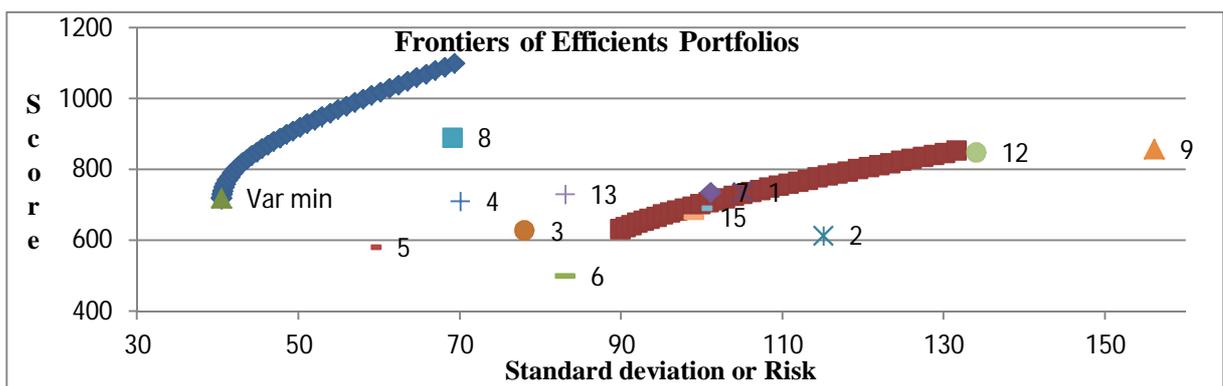
The program which allows finding the lowest variance's portfolio for an expected score is classical. We suppose the non-existence of borrower's category without risk⁶⁴.

4.4 Efficient portfolio with the biases

The score and the risk of the efficient portfolio are built with the score and the risk of every borrower. We can represent the efficient portfolio by specifying portfolio with lowest variance.

Portfolio with lowest variance	Score	Standard deviation
	719,87	40,42

We build the efficient frontier of two portfolios: the first one with no behavior bias and a second portfolio which integrates these two biases. In the following graph, we present borrowers' categories biased with regard to the frontiers.



The line which begins in the lowest variance represents the border of efficiency in period 2 (behavioral biases are included) while the line most to the right corresponds to the efficient frontier of the portfolio in period 1 (biases are neutralized).

⁶⁴ Traditionally, the free asset is an asset whose standard deviation is 0 and which has a no correlation with the risky assets. On the household's credit market, we cannot suppose that one borrower to be sheltered from any risk of not repay his debt.

The structure of the portfolio with minimal variance for each borrower's category is:

1	2	3	4	5	6	7	8
0,0915	-0,2501	0,4863	-0,7520	0,3220	0,0294	-0,1286	0,4133
9	10	11	12	13	14	15	
0,0286	-0,0867	0,1160	0,1279	0,5731	0,1681	-0,1391	

4.5 Comments about the efficient frontier

In our methodology, we accept negative classes of borrowers in the efficient portfolio. Traditionally, these negative parts are short selling in the Markowitz's model.

Here, it means that the financial institutions have in their portfolio borrower's category with negative proportions. To justify this choice, we make reference of securitization or derived of credit⁶⁵.

The presence on behavioral biases does not prevent the agents from building efficient frontier.

Therefore, the shape of the border is not exactly the same in both cases; even if we find the positive relation between the expected score and the risk on the efficient portfolio.

Without the biases, the relation between the expected score and the risk is linear. This relation seems less linear with biases; indeed the risk increases less quickly as the score rises.

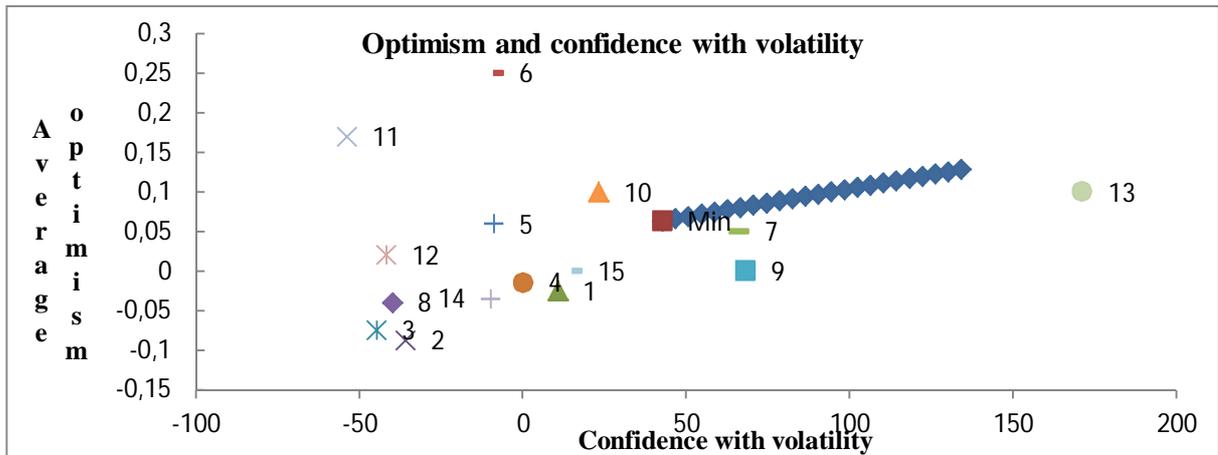
Taking into account behavioral biases allows reducing the global risk on the portfolio for the lending establishment.

For illustration, for an expected score expected of 730 in the first case the associated risk is 104,96 while in the second case for the same expected score the risk is 40,44.

We notice that the questioned agents are relatively under confident and they reduce the risk for an expected score.

For the optimism (in a favorable or unfavorable state), the interpretation is more difficult because these biases are relatively equivalent and we can think that they counterbalance.

We enrich the market's model because we incorporate the confidence and the bias of optimism and pessimism. For highlight clearly the behavioral biases, we present a graph the confidence increased by the volatility $\alpha(\sigma+\delta)$ and an average optimism's bias $\gamma = \frac{\delta_+ - \delta_-}{2}$.



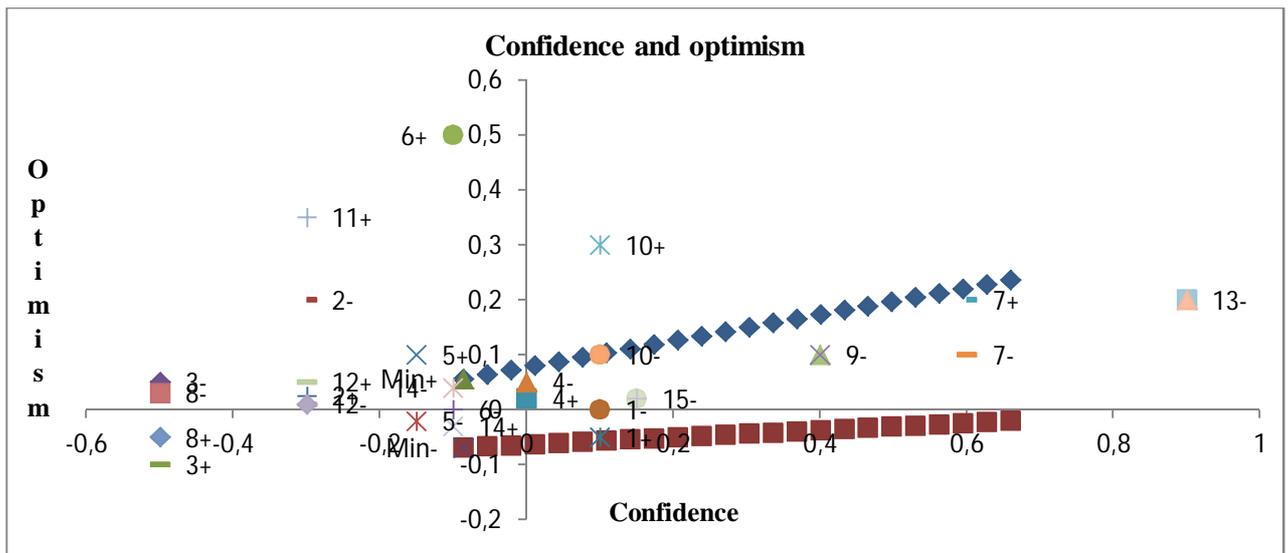
Optimism and confidence (with volatility) biases are positively correlated when the expected score and the associated risk rise. More the score and the risk increase more the borrowers are confident (or less under – confident) and optimists. From the collected data and the operated treatments, we see that the portfolio with lowest variance is the one for which the confidence (with volatility) (42,49) and the average optimism's bias are the lowest (0,06316).

If overconfidence bias rises, then an increase of the average score and the risk associated along the border of efficiency leads to an raising of the optimism's bias in a favorable state and consequently of the volatility $(\sigma_1 + \frac{\delta_+ + \delta_-}{2})$. This effect is partially compensated with an increase of the optimism's bias in an unfavorable state.

In the graph, the respective effects of the optimism's bias in a favorable or unfavorable state given the overconfidence's bias on efficient frontiers are exposed.

Borrowers' categories are also presented by distinguishing the optimism's bias in a favorable and unfavorable state.

⁶⁵ We can make reference Asset backed securities (ABS).



Points do not appear as 9 +; 11-, 13 + or 15 + because they are merged with other points.

We present the efficient frontiers according to the behavioral biases; the superior curve represents the efficient frontier through the confidence bias and the optimism's bias in favorable state (δ_+) and the lower curve the efficient frontier with the confidence bias and the optimism's bias in unfavorable state (δ_-). Both curves are increasing and linear, they increase simultaneously. Optimism's biases have different amplitude. Optimism in a favorable state, given the confidence, rises more quickly. The confidence rises with optimism in favorable state but it rises less quickly with the optimism in unfavorable state (the optimism remains negative).

Portfolio with lowest variance corresponds to lowest degree of overconfidence and to the highest degree of 'under confidence' but also at the lowest degree of optimism. In this paper, we present 15 borrowers' categories strongly overconfident. For others parameters, the results would have been modified.

Beyond a level of score and risk which we can qualify as "reference frame" for the financial institution, they should not lend to all the borrower's categories. For instance, if the establishment decides as "reference frame" to grant a credit: score 800 and risk associated 100, it excludes some borrowers' categories (1, 2, 7, 8, 9, 10, 11, 12 and 13). With the "reference frame", we can wonder about the opportunities of a lending establishment to be agreed to take the other borrowers' profiles which are beyond the risk and the score.

The answer holds the correlations between the borrowers: some categories have the capacity to compensate for the others. If a borrower's category is negatively correlated to the portfolio: when the "performances" of the credit's portfolio are bad, this of the borrower's "I" has a strong probability to be good. Conversely, if the category is strongly correlated to the portfolio, the fluctuation in its score has a cumulative effect. This category increases the global risk of the credit's portfolio.

An establishment doesn't have interest to meet the expectations of all borrowers' categories but given the correlations between them, it is effectively the case. The lending establishment covers all the borrowers' categories. Your presentation on the efficient frontier is a proof.

5. Efficient portfolio with behavioral biases and neutralization of risk categories

We improve our analysis by excluding borrowers risk categories (quoted A,...O). Technically this is achieved by the clever use of a solver.

5.1 Results

With new constraints, the portfolio with the lowest variance is:

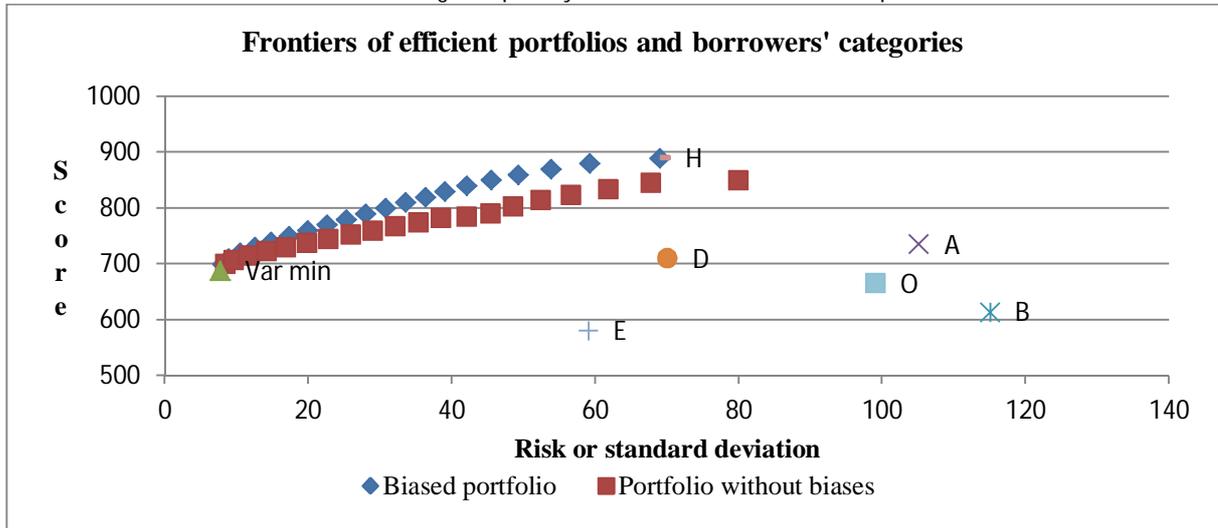
A	B	C	D	E
0,1129	0,2252	0	0,3682	0,0451
F	G	H	I	J
0	0	0,0537	0,0007	0,0138
K	L	M	N	O
0	0	0	0	0,1800

Score	687,97
Risk or standard deviation	7,68

Borrowers' categories are excluded: C, F, G, K, L, M, and N. This exclusion is calculated by a decrease of the expected score anticipated by the portfolio with the lowest variance. This was 719, 87 for all borrowers (with negative parts in the portfolio), which becomes 687, 97.

The exclusion of the risk categories reduces the expected score. You find the same result for the risk: the standard deviation of the portfolio, with lowest variance with all categories, was 40, 42 while here it's 7, 68.

We reassess the construction of the efficient frontier with two portfolios: one including the behavioral biases and the other excluding. Both these portfolios have a positive relation between the risk and expected score, their frontiers have an identical shape. However, for the same expected score, for instance 800, the graph shows that the risk on the biased portfolio is lower than that without biases. The risk is respectively 30, 73 and 48. In the following graph, we show that an efficient combination of the borrowers' categories portrays a decrease in the risk of an expected score.



Borrowers' categories: C, F, G, K, L, M and N are excluded.

For F and K, with the following characteristics: F (score 499; risk 83) and K (score 431; risk 172) reinforces that the weakness of their scores is a justification of their exclusion.

A strong risk is not a reason of exclusion because J with a risk of 229 is acceptable.

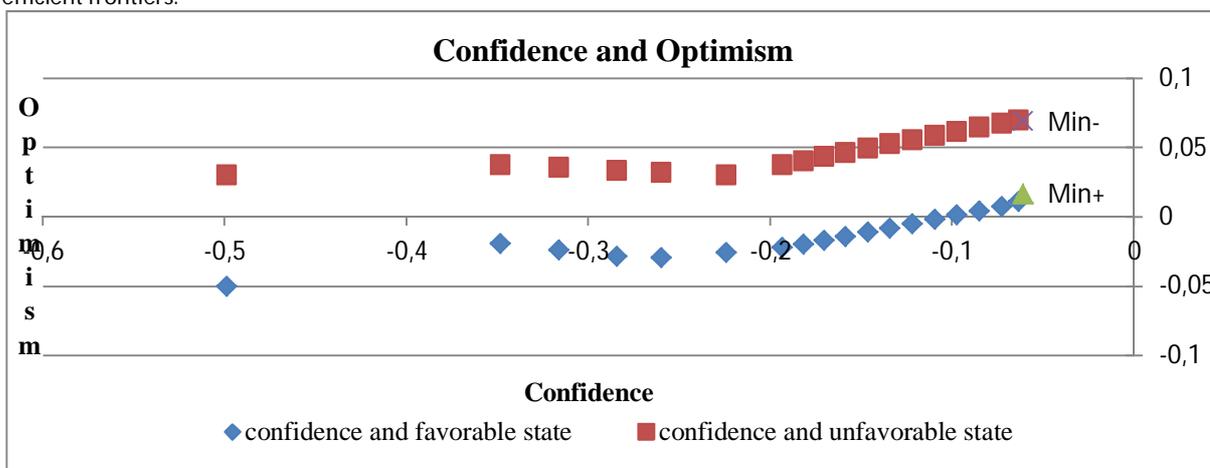
On contrary, there is not a great difference between N (690,100) and O (665, 99), although O is accepted and N excluded. All the interests inherited in the correlations between borrowers' categories in a theory of efficient portfolio can be noted.

In particular, the borrower H, the last point of the frontier, has the highest score (890), which corresponds to a portfolio's structure where it is uniquely represented.

The financial institution proposes contracts only to this borrower's category. Evidently, for this score, the maximum risk is 70.

5.2 Impact of the behavioral biases on the efficient frontiers

We present the respective effects of optimism bias in a favorable and unfavorable state given the confidence bias of the efficient frontiers.



The portfolio with lowest variance has the bias parameters near to 0 (it's the most confident or the smallest under-confident and most optimist).

The confidence's bias increases negatively with the expected score of the efficient portfolio. This bias is -0,06 for a score of 700 and -0,49 for a score of 890.

The borrowers become less confident and less optimistic in a favorable and unfavorable state (δ - defined by 0,06 to 0,03). These results are closely connected to the solutions outlined by the borrowers, with the majority being under-confident.

This trend seems to be reversed when we reach an expected score level.

With this method, we can increase the expected score and gradually eliminate profiles.

5.3 Operational perspectives

If every borrower's category obtains an equal share of funds (same probability of representation for each category), then the score and the risk involve:

Score	691,39
Risk or standard deviation	37,68
Offered Contracts	150 000

If the financial institution is inclined to propose 150 000 contracts of credit, then each borrower's category obtains 10 000 contracts.

The financial institution has the ability to decide whether to lower the number of contracts proposed⁶⁶. This is a means to control the risk as it excludes some borrowers' categories. If the establishment restricts its offer to 90 400 contracts, then the score and the risk are:

A	B	C	D	E
3938	7764	6765	7557	9581
F	G	H	I	J
7264	6259	7484	5698	0
K	L	M	N	O
1752	5551	5760	5022	10000

Score	690,38
Risk or standard deviation	30
Offered Contracts	90 400

⁶⁶ The rule of calculation of its parts is the following: N = number of contracts proposed and n = number of borrower's category. The total number of credits allowed for a level of score and risk given is: $N' = \frac{N}{n(x \% \max)}$ with $1/n < x \% \max < 1$

Therefore, the establishment decides to exclude or minimise its offer for borrowers' categories whilst maintaining an objective of profitability.

Portfolios with the lowest variance have the following characteristics:

A	B	C	D	E
3068	6616	0	10000	1225
F	G	H	I	J
0	0	1460	20	375
K	L	M	N	O
0	0	0	0	4889

Score	687,08
Risk or standard deviation	7,68
Offered Contracts	27 155

The optimal structure of the portfolio eliminates half the borrowers' categories and considerably reduces its offer amongst four categories. In terms of marketing, this establishment targets three or four borrowers' categories. This results in loss of market share. If the establishment has a commercial policy, aiming to cover the whole market, then it is necessary to accept a higher score and risk

Without following this extreme position, the establishment is able to agree for a controlled risk-taking system in order to maintain its market share. This strategy derives from the optimal structure (portfolio with lowest variance). We can make the following proposition for 38 795 contracts:

A	B	C	D	E
5859	6027	0	10000	0
F	G	H	I	J
0	0	9120	1445	222
K	L	M	N	O
0	0	0	0	6122

Score	740
Risk or standard deviation	14,79
Offered Contracts	38 795

The establishment modifies its offer by gaining market shares; however, this involves more risk. If the establishment increases its risk for the same expected score, then we obtain the following results:

A	B	C	D	E
4750	5365	0	8226	3001
F	G	H	I	J
0	0	10000	2388	1325
K	L	M	N	O
0	1097	0	0	6682

Score	740
Risk or standard deviation	20
Offered Contracts	42 835

Borrowers' categories E and L successfully obtained a credit and for category J the offer is considerably increased. With the same expected score (740), the increase of the risk allows for further coverage of new profiles. The number of contracts offered is 42 835.

An extreme case would be if the lending establishment only covers a borrower's category. This would result in the following situation:

Score	890
Risk or standard deviation	68,93
Offered Contracts	10 000

The establishment proposes only 10 000 contracts in the class H. This risky case shows us that a financial institution has no interest in following the strategy of "the mono-category of a borrower".

The simulation presented above demonstrates that a lending establishment makes decisions according to the risk incurred on its credit portfolio. Furthermore, commercial arguments assist in preserving market shares. By accepting more risk (for a given score), the market share increases and more borrowers' profiles are covered.

Conclusion

We recognize efficiency and validity of the portfolio choice theory which take into account behavioral biases. There is a positive relationship between the expected score and the associated risk on the efficient portfolio.

The introduction of these biases allows the lending establishments to take less risk (the borrowers possess a concise evaluation of their capacity for repayment). According to the models used to determine the optimal portfolio (with or without negative proportions), the results concerning the effects of the biases are not identical.

The consideration of the phenomena of securitization by financial institutions conveys a greater risk. We are able to determine an optimal structure for the credits' portfolio, however if the establishment decides on a fixed number of contracts established (a marketing logic), we can determine the expected score and its associated risk. Furthermore, greater market share is considered to be more risk taking. Rationing the offer on the household's credit is one banking decision taken by lenders and not a market's imperfection.

We can consider the origin of the biases: not only the borrowers are biased; however the lenders can be biased too.

Concerning the borrowers, we can decipher their capacity to answer correctly. We can evoke the model of classic critics such as Markowitz's, in particular in his work on the "criterion expected-variance".

For future research, we can consider that some lending establishments "specialize" in borrowers categories (credit institutions case of consumption) or that the borrowers' categories have different weightings: what are the consequences on the efficient frontier?

Bibliography

- Bessière, V. (2007). Excès de confiance des dirigeants et décisions financiers : une synthèse. *Finance, Contrôle, Stratégie*, Vol.10-1.
- Daniel, K. Hirshleifer, D. and Subrahmanyam, A. (2001). Investor Psychology and Security Market Under and Overreactions. *Journal of Finance*, 56, 1839-1885.
- Fabre, B. François-Heude, A. (2009). Optimism and overconfidence investors' biases: a methodological note. *Revue de l'association française de finance*, vol.30, 79-96.
- Fama, E.F. (1970). Efficient Capital Markets: A review of theory and empirical work. *Journal of Finance*, 25 (2), 383-417.
- Kahneman, D. Tversky, A. (1974). Judgment under uncertainty: Heuristics and Biases. *Sciences*, 185, 1124-1131.
- Kahneman, D. Tversky, A. (1979). Prospect Theory: An analysis of decision under risk. *Econometrica*, 47, 263-292.
- Lintner, J. (1965). The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *Review of Economics and Statistics*, 47, 13-37.
- Malmendier, U. Tate, G. (2005). CEO Overconfidence and Corporate Investment. *The Journal of Finance*, 60, .2661-2700.
- Markowitz, H. (1952). Portfolio selection. *The Journal of Finance*, 7, .77-91.
- Markowitz, H. (1958). *Portfolio Selection: Efficient diversification of investment*. New Haven, Conn: Yale University Press.
- March, J. & Simon, H. (1958). *Organizations*. New York, Wiley.
- Sharpe, W. (1963). A simplified Model for Portfolio Analysis. *Management Science*, 9, 277-293.
- Sharpe, W. (1964). Capital asset prices: a theory of market equilibrium under conditions of risk. *The Journal of Finance*, 19, 425-442.
- Shefrin, H. (2007). *Behavioral Corporate Finance: Decisions that Create Value*, McGraw-Hill International Edition.
- Stein, J. (2002). Information production and capital allocation: Decentralized vs. hierarchical firms. *The Journal of Finance*, 57, 1891-1921.
- Svenson, O. (1981). Are we less Risky and more Skillful than our Fellow Drivers? *Acta Psychologica*, 47, 143-148.

“Towards a social discount rate in Russia: methodology and regional differences”⁶⁷

Tatiana Kossova (National Research University Higher School of Economics, Russia)

Mariia Sheluntcova, (National Research University Higher School of Economics, Russia)

Abstract

Nowadays performance estimation in the public sector of economics is a problem of high importance for Russia since the public sector is rapidly developing. In order to take the proper investment decision the correct economic evaluation of public sector projects is required. According to the world best practice performance estimation is conducted with the help of the cost-benefit analysis (CBA). Despite a great popularity of CBA this instrument is rarely used in Russia. In Russian statutory acts methodologies of performance estimation are allocated but there are no recommendations concerning a (social) discount rate for comparison of costs and social benefits of public sector projects. Nevertheless the use of a social discount rate in decision-making process can help to calculate the net present value of public sector projects properly and to avoid taking nonviable investment initiatives.

For the lack of social discount rate appraisal economic evaluation of public sector projects is needed to take a turn for better in Russia. In spite of the fact that there are several approaches of social discount rate estimation (the most popular are the social rate of time preferences and the social opportunity cost of capital) they cannot be applied for Russia without necessary adjustments. The main point we must note is the difference of economic development of Russian regions. It demonstrates differences in society's time preferences and should be included in estimation of a social discount rate. This is correct not only for Russia but also for post-Soviet countries and developing countries. However regional differences are not taken into account in the framework of existing approaches to social discount rate evaluation.

Thus the paper proposes methodology of social discount rate evaluation taking into account a regional aspect. We modify existing approaches and determine the limits of solutions offered. As a result appropriate values of a social discount rate in Russia for public sector projects on a national scale and for regional projects are given. All calculations are based on the data of Federal State Statistics Service of Russia.

Key words: cost – benefit analysis, social discount rate, social rate of time preferences, regional differences.

Introduction

Nowadays performance evaluation in the public sector of economics is a problem of high importance for the Russian Federation since the public sector in Russia is rapidly developing. There are many public sector programs and projects aimed at increasing society's welfare and at improving of the functioning of many public sector spheres such as water utility, waste disposal, forest industry, agricultural industry, medical care, education and others. In order to take the proper investment decision the correct economic evaluation of investment initiatives is required. Investment projects in the public sector of economics, as opposed to investments in the corporate sector, are carried out in areas where market failures exist. Such projects bring benefits not only to the firm, but to the society as a whole. That is why performance evaluation of such projects should be made from a broader perspective than for private projects.

According to the world best practice the most widespread instrument of performance estimation of public sector projects is the cost-benefit analysis (CBA). It is based on the comparison of costs and benefits (in monetary units) which arise as a result of a project implementation in different points of time. Despite a great popularity of the CBA there are an extremely small number of cases of its application in Russia. Different methodologies and statutory acts are used for performance evaluation in the public sector of economics but it is still a very common situation when effectiveness is not regarded as a benefit – cost ratio. There are indicators of performance in passports of public sector projects while costs and social benefits are compared without taking into account the point of time of costs and benefits appearance.

As it is recognized by economists, the instrument to compare social benefits and costs is a “social discount rate”. The use of a social discount rate enables to calculate the net present value of projects with social benefits accurately since the time of costs and benefits appearance is considered. There are several approaches to social discount rate evaluation. The most popular ones are the social rate of time preferences (SRTP), and the social opportunity cost of capital (SOC).

However an application of unadjusted approaches leads to the wrong assessment of a social discount rate for Russia. The most important problem that should be noticed is the difference of Russian regions in economic development. This is reflected in the value of statistical indicators which are included in calculations of the social discount rate. It leads to differences in society's time preferences. However this point does not considered in the framework of existing approaches to social discount rate evaluation.

Moreover there is a lack of time series of important statistical indicators (statistics about consumption, income and so on). In most research papers conducted for developed countries like USA and Great Britain, long time series data is used for forecasting of necessary parameters of a social discount rate according to the SRTP approach and the SOC approach. If we make calculations for Russia we don't have an opportunity to analyze trends of indicators qualitatively since data before 2000 is unavailable.

⁶⁷ This article is an output of a research project implemented as part of the Basic Research Program at the National Research University Higher School of Economics (HSE) in 2012.

Thus the paper aims at estimation of the social discount rate for public sector projects in Russia taking into account the regional aspect. In order to do this we should modify existing approaches and determine the limits of proposed solutions. As a result appropriate values of a social discount rate for public sector projects in Russia on a national scale and for regional projects will be given.

Literature review

The literature on the problem of social discount rate evaluation for Russia doesn't give examples of careful consideration of this issue. To determine the correct approach for social discount rate estimation in Russia we should consider existing approaches taking into account their advantages and disadvantages. The necessity of making the choice among approaches is explained by the fact that in the case of capital market imperfections SRTP and SOC are not the same values.

The definition of the social rate of time preferences (also known as the "consumption rate of interest" (Pearce, Ulph 1995)) is given in many research papers. For example, the SRTP can be interpreted as the marginal rate of substitution between consumption in one period and the next period (OXERA 2002, p.4). The SRTP approach is the most popular and carefully examined one among others. It is widely discussed by economists such as F. Ramsey, D. Pearce, A. Boardman, R. Zerbe, L. Young, X. Zhu, etc. The popularity of this approach is explained by the existence of the SRTP formula with definition of all necessary parameters. However there is a need to match the names of required statistical indicators with Russian ones. In other words it is necessary to find proxies for parameters included in SRTP.

«The social opportunity cost is the rate that reduces the net present value of the best alternative private use of the funds to zero. The government should take into account what "similar" projects would provide in returns if undertaken in the private sector» (OXERA 2002, p.3). Among economists there is no consensus on how to estimate a social opportunity cost of capital, and there is no unified formula for calculation. Application of the SOC approach for developing countries involves difficulties because as a rule there is no sufficient informational base on similar projects and their rates of return. In order to smooth an inequality of SRTP and SOC it is suggested by K. Arrow, M. Feldstein, D. Bradford, R. Lind, M. Moore, A. Boardman to use the shadow price of capital (SPC). The shadow price is a price which replaces the observed market price of a good or a service. This approach «involves converting all costs and benefits into their corresponding changes in consumption. Then the social rate of time preference is used as the discount rate» (OXERA 2002, p.7). The shadow price of capital calculation is rarely used in the process of social discount rate estimation for developing countries due to the lack of required informational base and the lack of clarity on statistical indicators that should be included in calculations.

Generally, the main advantage of the shadow price of capital approach is that a decision-maker takes into account both SRTP and SOC in economic evaluation. For the same purpose weighted social discount rate can be used. It was examined by R. Haveman, A. Sandmo, J. Dreze, and others. According to the weighted-average calculations, the social discount rate is defined as a weighted average of the social rate of time preferences and the social opportunity cost of capital. Weights are the proportion of funds directed to current consumption and the proportion of funds directed to private investment. With all of these the social rate of time preferences approach has the greatest practical importance for determination of a social discount rate for Russia since there is greater clarity about the methodology of evaluation. The wide popularity of SRTP approach from practical point of view is confirmed by numerous recent papers such as "Estimation of a Social Rate of Interest for India" (Kula 2004), "Social discount rates for six major countries" (Evans, Sezer 2004), "A social discount rate for Italy" (Percoco 2008), "The Social Discount Rate: Estimates for nine Latin American countries" (Lopez 2008), "A Social Discount Rate for the US" (Azar 2009), "Towards a social discount rate for the economic evaluation of health technologies in Germany: an exploratory analysis" (Mareike, Jurgen 2012), and many others. As we can notice SRTP is used not only for developed countries but also for those ones where attempts of correct evaluation in the public sector has been started recently. One more point that should be mentioned is that SRTP formula makes it possible to take into account regional differences of public sector projects through the relevant choice of available statistical indicators. Thus our further analysis will focus on the evaluation of a social discount rate for Russia on a basis of SRTP approach. First of all we should pay attention to the methodology and after that to necessary calculations.

Methodology

To define the formula we should solve the problem of maximization of utility function for the society (obtained by consumption). While deriving SRTP formula we take the utilitarian approach. According to the common practice the utility function is the following (Stern 1977), (Pearce, Ulph 1995), (Boadway 2000):

$$U(C_t) = \frac{1}{1-\mu} * C_t^{1-\mu} \quad (1)$$

where $U(C_t)$ – the society's utility from consumption;

C_t – consumption in moment t ;

μ - the parameter of the utility function.

Maximizing the utility function with the restriction connected with consumption we can derive the social rate of time preferences formula.

$$\begin{cases} U(C_1) + \frac{U(C_2)}{1 + \rho} \rightarrow \max (C_1, C_2) \\ C_1 + \frac{C_2}{1 + SRTP} = 1 \end{cases}$$

where C_1, C_2 – consumption in different points of time;

$U(C_i)$ – society's utility function (utility is obtained from consumption);

ρ – rate of time preferences.

After solving this system with the use of the Lagrange function we derive the social rate of time preferences.

$$SRTP = (1 + g)^\mu * (1 + \rho) - 1 \quad (2)$$

where g is rate of growth of per capita consumption;

ρ is the rate of time preferences which consists of the rate of life chances (L) and the pure rate of time preferences (δ);

μ is the parameter of the utility function.

Let us notice that this formula is a linear approximation of the well-known Ramsey's formula (Evans, Kula 2011):

$$1 + SRTP = (1 + g)^\mu (1 + \rho)$$

$$\ln(SRTP + 1) = \mu \ln(1 + g) + \ln(1 + \rho)$$

$$SRTP = \mu * g + \rho \quad (3)$$

According to the Ramsey's formula (3) the social rate of time preferences is constructed additively. It consists of two components which are the time preferences of the society (ρ) and the increase of society's utility from consumption ($\mu * g$). With all of these we will use the formula (2) in calculations in order to make it more accurate.

Evaluation of SRTP for Russia

Let's consider how to calculate all parameters of the SRTP for Russia. Important assumptions are that we use available Russian statistics (Federal State Statistics Service of Russia) starting from 2000 to 2009, and all parameters are calculated in real terms.

The rate of time preferences ($\rho=L+\delta$). Taking utilitarian approach we assume that pure rate of time preferences (δ) is zero (we don't give any preferences to any generation). Therefore the rate of time preferences should be estimated as the rate

of life chances ($\rho = L$). In the given research we estimate life chances (L) as a risk of nonreceipt of future benefits from public sector project. We calculate it as a death rate (number of deaths in a given year to the average population in that year). Estimated value of this parameter (L) for Russia is 0,014.

For calculation of **the rate of growth of per capita consumption (g)** we use a statistical indicator which is called "final consumption of households per capita in percentage to the previous year" and the consumer price index. An average rate of growth for the period from 2000 to 2009 is 9,5% in real terms. However this value (9,5%) is considerably higher than values of this parameter for different countries. Generally the value $g=2\%$ is considered by economists as a base case, 3% as an optimistic value and 1% as a pessimistic value (Baum 2009). This difference in values of the parameter (g) for Russia and for other countries is explained by short time-series statistical data that is used in calculations for Russia. The shortage of statistics constrains a planning horizon of a social discount rate. Without additional constraints on the value of this parameter we can use a final value of a social discount rate only for short-term and medium-term period.

The parameter (μ) of the utility function. The survey of literature revealed several methods of estimation of this parameter. According to the chosen type of the utility function (1) it is the elasticity of marginal utility of consumption with the negative sign.

Marginal utility of consumption equals:

$$\frac{\partial U}{\partial C} = \frac{1}{1 - \mu} * (1 - \mu) * C^{1-\mu-1} = C^{-\mu}$$

Then the elasticity of marginal utility of consumption is:

$$elasticity = -\mu * C^{-\mu-1} * \frac{C}{C^{-\mu}} = -\mu$$

Most popular methods for estimation of the elasticity of marginal utility of consumption are Stern's method which is based on an analysis of individuals' savings behavior; the method which proofs that elasticity equals the average propensity to spend money on non-food multiplied by the income elasticity of food and divided by the relative price elasticity of food, and the method which states that elasticity can be calculated on the basis of the effective marginal tax rate and the average tax rate.

Considering the possibility of practical application of these techniques in Russia we are forced to reject the last two methods since there is the lack of necessary statistics for their implementation. The formula for elasticity according to the Stern's method given below (Pearce, Ulph 1995):

$$e = \frac{r - \delta}{\frac{S}{Y}(r - y) + y} \quad (4)$$

where r is the alternative cost of capital;

δ is the pure rate of time preferences;

S/Y is an average savings rate;

y is the expected growth rate of income.

The result of elasticity's estimation for Russia is presented in the table below.

Table 1

Estimation of elasticity of marginal utility of consumption (e) for Russia

Estimation of elasticity (e)	Value for Russia
alternative cost of capital, r	-0,017
pure rate of time preferences, δ	0
average savings rate, S/Y	0,162
expected growth rate of real income, y	0,1038
Elasticity of marginal utility of consumption, (e)	-0,2

$$e (Russia) = \frac{-0,017 - 0}{0,162 * (-0,017 - 0,1038) + 0,1038} = -0,2$$

Thus we can derive:

$$\mu (Russia) = -e = -(-0,2) = 0,2$$

Despite the fact that the parameter (μ) for Russia is substantially lower than for many other countries (Evans, Sezer 2004), in aggregate with the rate of growth of per capita consumption it is approximately the same value of the growth of future generation's welfare (it is a multiplication of the rate of growth of per capita consumption (g) by the parameter (μ)).

As far as we have got all values of parameters which are included in the social rate of time preferences we can calculate the final value of this rate for Russia with the help of the formula (2).

Table 2

Evaluation of the social rate of time preferences (SRTP) for Russia

Parameter	Value for Russia
The rate of life chances, L	0,014
The parameter of the utility function, μ	0,2
The rate of growth of per capita consumption, g	9,5%
Social rate of time preferences (SRTP)	3,3%*

$$* SRTP_{Russia} = (1 + 0,095)^{0,2} * (1 + 0,014) - 1 = 3,3\%$$

As we can see from the table the most reasonable SRTP value for Russia is 3,3% in real terms. This value is very close to the values of a social discount rate obtained for most of the European countries (3-4%) (Mareike, Jurgen 2012) and the U.S (3,7%) (Azar 2009).

The value of SRTP for Russia (3,3%) can be used for evaluation of public sector programs and projects with the short-term and medium-term planning horizon. For this time interval the value of a social discount rate is constant. For the long-term period stricter assumptions for evaluation of a social discount rate for Russia should be made. Despite the lack of statistics we should notice that it does not substantially reduce the practical significance of the results since most of the public sector projects in Russia are short term and medium term projects.

Evaluation of SRTP for Russian regions

Since there is the great diversity of regions in Russia from the point of their economic development we should determine SRTP for a particular region in order to provide values for estimation of public sector projects on a regional level. The regional diversity becomes apparent when we analyze such indicators included in the social rate of time preferences evaluation as a rate of growth of real income, an average death rate, and others. Let's consider, for example, an average death rate in different regions of Russia. Regions were selected for the sake of displaying the greatest differences in values of the indicator. The period for calculation is from 2000 to 2009 (the data is from the Federal State Statistics Service of Russia).

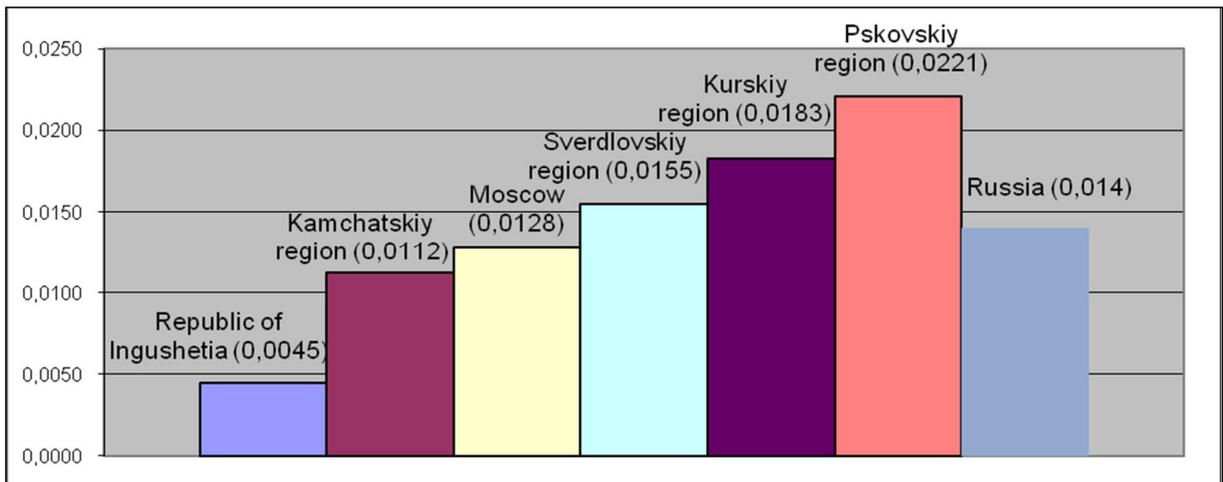


Diagram 1. The average death rate from 2000 to 2009 in Russian regions

The same situation can be observed when analyzing other statistical indicators included in SRTP estimation such as the expected growth rate of real income, the average savings rate, the rate of growth of per capita consumption. Thus we can conclude that people in different regions have different time preferences for consumption. Moreover, the benefits of regional projects belong to the population of the particular region rather to the population of a country as a whole. Only if a government project has a broad scope and spreads to different regions of a country the social discount rate for the whole country should be used in estimation.

According to the analysis the range of SRTP values for Russian regions is from 2,5% (for Moscow) to 5,8% (for Magadan region). All values are presented as a diagram.

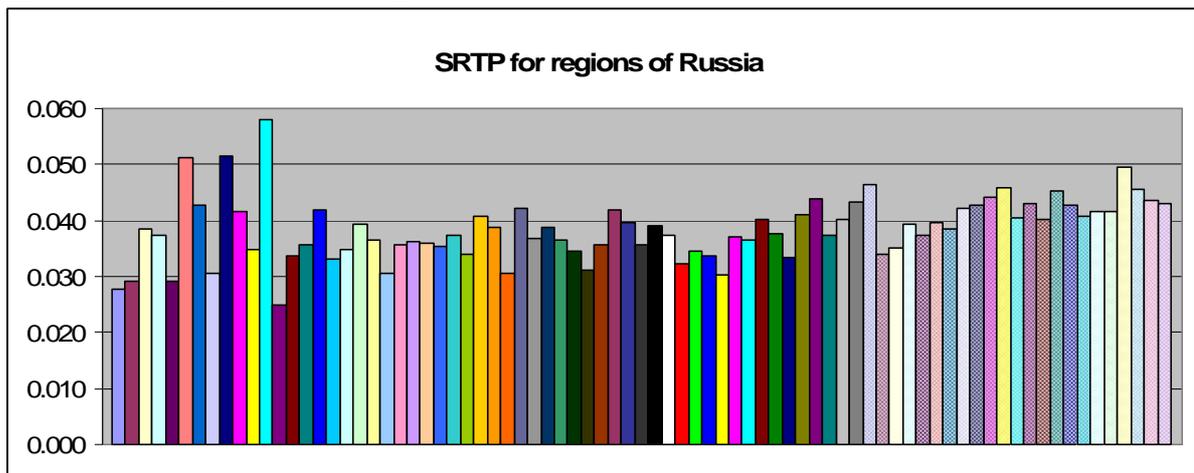


Diagram 2. The social rate of time preferences for all Russian regions

The rates shown in the diagram are for the short-term and medium-term projects as well as the previous result of SRTP calculation for Russia as a whole. As we can see, SRTP values fall into the interval of 3% to 4% for most of the regions. The low values of SRTP for Moscow are explained by the low average rate of growth of per capita consumption (it is approximately 4,7% per year while for Russia as a whole it is 9,5% per year). In addition low SRTP has been derived for North Caucasian Republics. The reason is that average death rate for these regions (0,005–0,01) is substantially lower than for the country as a whole ($L=0,014$).

The high SRTP for regions like Magadan region (5,8%), Chukchi Autonomous District (5,1%), the Republic of Kalmykia (5,1%) is explained by the fact that the elasticity of marginal utility of consumption (e) is higher for these regions than for others. It is about 0,35-0,6 while the mean value of elasticity for Russian regions is 0,24. High elasticity has been obtained because the expected growth rate of real income (y) is low for these regions (e.g. $y=0,055$ for Magadan region) in comparison with the value of this indicator for the whole country ($y=0,104$). Furthermore there are regions where relatively high SRTP is explained by the high death rate (L). It is Tula region, Tver region, and others. Thus, the population of regions with high SRTP requires greater compensation for the failure of current consumption for the sake of project implementation.

Conclusion

As the result of the analysis the numerical value of the social rate of time preferences for Russia has been derived. It is 3,3% in real terms for short-term and medium-term projects. The necessity of SRTP estimation for Russian regions has been substantiated and appropriate methodology has been given. The range of SRTP values for Russian regions is from 2,5% to 5,8%. These results of the social rate of time preferences appraisal for the whole country and for particular regions can be a good instrument for public sector projects evaluation in Russia. In addition to government agencies it may be helpful for private firms which implement projects bearing social effects.

Thus the paper provides an empirical assistance in the search for a measure of a social discount rate for Russia. Applying the new insight on project evaluation will lead to better investment decisions and budget sources savings. The most significant limitation of the analysis is the time horizon for the derived values of the social discount rate. We propose further study of the issue in another research with the same methodology applied in the paper including the opportunity to estimate the social discount rate for long-term projects in Russia.

Bibliography

1. Arrow K.J. (1966). Discounting and public investment criteria. In: Kneese, A.V., Smith, S.C. (eds.) *Water Research*, John Hopkins, Baltimore, London, 13–32.
2. Azar S.A. (2009). A Social Discount Rate for the US. *International Research Journal of Finance and Economics*, ISSN 1450-2887 Issue 25.
3. Baum S.D. (2009). Description, prescription and the choice of discount rates. *Ecological Economics* 69, 197–205.
4. Boadway R. (2000). The economic evaluation of projects. Queen's University, Kingston, Canada, http://www.econ.queensu.ca/pub/faculty/flatters/courses/rwb_ben-cost_rev.pdf.
5. Bradford D.F. (1975). Constraints on government investment opportunities and the choice of discount rate, *American Economic Review* 65(5), 887–899.
6. Evans D. J., Sezer H. (2004). Social discount rates for six major countries. *Applied Economics Letters*, 11, 557–560.
7. Evans D., Kula E. (2011). Social Discount Rates and Welfare Weights for Public Investment Decisions under Budgetary Restrictions: The Case of Cyprus. *Fiscal Studies*, vol. 32 (1), 73 – 107.
8. Feldstein M.S. (1972). The inadequacy of weighted discount rates. In: Layard, R. (ed.) *Cost-Benefit Analysis*, Penguin, London, 140–155.
9. Haveman, R.H. (1969). The opportunity cost of displaced private spending and the social discount rate. *Water Resources Research* 5(5), 947–957.
10. Kula E. (2004). Estimation of a Social Rate of Interest for India. *Journal of Agricultural Economics* Volume 55, No. 1, 91-99.
11. Lind R.C. (1982). A primer on the major issues relating to the discount rate for evaluating national energy options. In: Lind, R.C. (ed.) *Discounting for Time and Risk in Energy Policy*, Resources for the Future, Washington, DC, 21–94.
12. Lopez H. (2008). The Social Discount Rate: Estimates for nine Latin American countries. The World Bank, Policy Research Working Paper 4639.
13. Lyon R.M. (1990). A federal discount policy, the shadow price of capital and challenges for reforms. *Journal of environmental economics and management*. Vol. 18 (2).
14. Mareike S., Jurgen J. (2012). Towards a social discount rate for the economic evaluation of health technologies in Germany: an exploratory analysis. *European Journal of Health Economics* DOI 10.1007/s10198-010-0292-9.
15. OXERA (2002). A Social Time Preference Rate for Use in Long-Term Discounting // a report for ODPM, DfT and Defra., http://www.odpm.gov.uk/stellent/documents/pdf/social_discounting_pdf_600106.pdf >
16. Pearce, D.W., Ulph. D. (1995). A Social Discount Rate for the United Kingdom // CSERGE Working Paper 95-01. Centre for Social and Economic Research on the Global Environment, University of East Anglia, UK.
17. Percoco M. (2008). A social discount rate for Italy. *Applied Economics Letters* 15, 73–77.
18. Sandmo, A., Dreze, J.H. (1971). Discount rates for public investment in closed and open economies. *Economica* 38(152), 395–412.
19. Stern N. (1977). The Marginal Valuation of Income, in M. Artis and A. Nobay (eds), *Studies in Modern Economic Analysis*, Blackwell. Oxford.
20. Young L. (2002). Determining the discount rate for government projects. New Zealand Treasury Working Paper 02/21.
21. Web site of Federal State Statistics Service of Russia, www.gks.ru

"The usage of credit cards in Turkey and expectations for the future of credit cards"

Volkan DAYAN (Mugla Sitki Kocman University, Milas Sitki Kocman Vocational School, Department of Management and Organization, Mugla, Turkey)

The usage of credit cards as a mean for payment and consumer credits is consistently increasing worldwide and Turkey. It brings the consumers into the banking system and provides the possibility of shopping and cash withdrawal anywhere in the world. Development process of credit cards is similar process to Europe. Credit cards had been used before beginning of consumer credit service in Turkey. The number of credit cards owned in Turkey was 51.360.809 in 2011. Turkey's credit card average per person is closely reaching that of Europe.

In this study it is aimed to calculate trends values of number of credit cards, number of atm pos terminals, number and volume of credit card transactions, domestic transaction volume of Visa, MasterCard and other credit cards, number of domestic and international transactions by the holders of Visa, MasterCard and other credit cards, domestic and international transaction volume by Visa, MasterCard and other credit cards, card payment system foreign exchange inflow and outflow have been annually examined so as to display the credit card usage.

Keywords: credit cards, banking, trend analysis, Turkey

Introduction

The usage of credit cards in Turkey increases gradually thanks to the variety of possibilities provided by them. According to 5464 numbered article of Credit Cards and Bank Card law, a credit card defines the number that neither has a physical existence nor a printed version and that provides purchase of goods and services or withdrawal of cash opportunities without any use of cash. Credit cards provides users a variety of positive features such as; instant available credit in addition to one's income, elimination of the risks of carrying cash, the allowance of installment for the cost of shopping etc. (Basaran et al. 2012). In this paper, first a literature review is provided, and then the usage of credit cards in Turkey is discussed. While examining the credit card usage between the years of 2003 and 2011, the number of Point of Sale (POS) machines, customs of domestic purchases and cash transaction, the turnover of use in domestic shopping and cash transaction and the inflow and outflow of foreign currency of card payment system have been considered. Finally, the trend analysis of Visa, MasterCard and the other credit cards has been analyzed.

Literature Review

There are several studies made in literature about credit cards market in Turkey. In 2011, some of the studies were compiled as a book named 'The Credit Card Market in Turkey' by credit cards study group of Central Bank of the Republic of Turkey.

One of these studies, Aysan (2011) has discussed the problems and questions of the credit card market in Turkey. The problems and questions were classified as supply side and demand side, and it is emphasized that two sided structural reforms should be performed.

Karahan & Cakmak (2011) in their studies; discussed the development of the credit card transactions within means of payment, and the cost of conversion loans of the credit card transactions. Then, the comparison between consumer credit loans interests, investment instrument interests and credit card interests was made. The concentration in credit card sector and income provided from credit card transactions were examined.

Gungor & Yildirim (2011) in their studies about the determination of the factors of the credit cards interest rates, it is found that the credit card interest rates have been higher than the financing cost of the banks in Turkey. Rigidity in credit card interest rates has also determined despite of the decreases in market interest rates.

Karahan (2011), in this study; the articles of Bank Cards and Credit Cards Law which may have effects on credit cards interest rates were discussed. The advantages and the cost of these articles for banks and cardholders were examined. By the law, it is determined that an increase has recorded in the outcome of the credit card transactions, but there hasn't been any slight decrease in the income of the credit cards.

Gungor (2011) examined the reference interest rates considered by banks for determination of the discount rates, and also made a search on the movements of the discount rates in reward point applications which are used as promotional tools. Gungor observed that banks increase their profits by commissions apart from interest rates; however, there are differences in commission rates on a sectoral basis depending on the competition.

Erol (2011) in this study about the effective interest rate of credit cards and the cost; discussed that giving detailed information to the cardholders about the product they use is much more important instead of credit card interest rate

discussions or regulations. Hence, cardholders are going to make better decisions in terms of their knowledge about the product and their expenses and usage of loans.

Gur ve Kucukbicakci (2011) examined international applications associated with declaration of the credit card information to the public, promotion applications of the corporations producing credit cards, international dimension of the credit card pricing and commission, maximum interest rates applications determined by the countries for the credit card interest rates in order to cope with the problems and protect the consumer.

Aysan et al. (2011) in their study, analyzed the structure of the credit card sector in Turkey, the nature of the competition in the sector and the reason of the high credit card interest rates. It is concluded that the credit card market in Turkey is lack of price competition.

Aydin (2011) in this study; analyzed the relation between consumer loans and credit cards by considering the interest rates for two types of loans implemented by the banks. According to the results, it is realized that credit card interests have similar tendency to other countries in the way of long-term relation; however the interests are very different in near-term.

Uzgoren et al. (2007) aims to analyze the factors that affect the credit card spending in Turkey and applies multiple regression analysis in his study. It has been observed that the financial crises in November 2000 and February 2001 have a major effect on the decrease of the turnover of the credit card spending. On the other hand, Uzgoren concludes that gross national product per person, the number of POS and credit cards and the inflation rate affects the credit card spending turnover in a positive manner.

Material and Methodology

Material: The main material of the research is the statistical demonstration of credit cards. The data is gathered from the Interbank Card Center and the related written sources prepared previously.

Methodology: The statistical data of credit cards have been analyzed and interpreted. In this research, the secondary data have been used and interpreted, trend values have been calculated and the outcomes have been discussed. The Least Squares Method is employed in order to calculate the trend values.

Outcomes and Discussion

In this part of the study, the operating system of credit cards is going to be discussed. In the following section; the amount of domestic use of credit cards, the turnover of domestic use of credit cards and the inflow and outflow of foreign exchange of the card payment system by the number of POS machines, Visa, MasterCard and the other credit cards have been annually examined. The trend values have been computed with the number of variables of Visa, MasterCard and other credit cards and the results of trend values have been demonstrated with the help of the tables and graphics.

Credit Card System

Generally, there are five parties in the credit card markets. As shown in Figure 1, the most significant parties are issuers, cardholders and customers and merchants who accept credit card. In addition to that, the acquirer and network operators are the other parties of the credit card markets. While issuers, acquirers and network operators all around the world are operating as separated and independent entities, Turkish banks are able to operate as both issuers and acquirers at the same time (Aysan 2011).

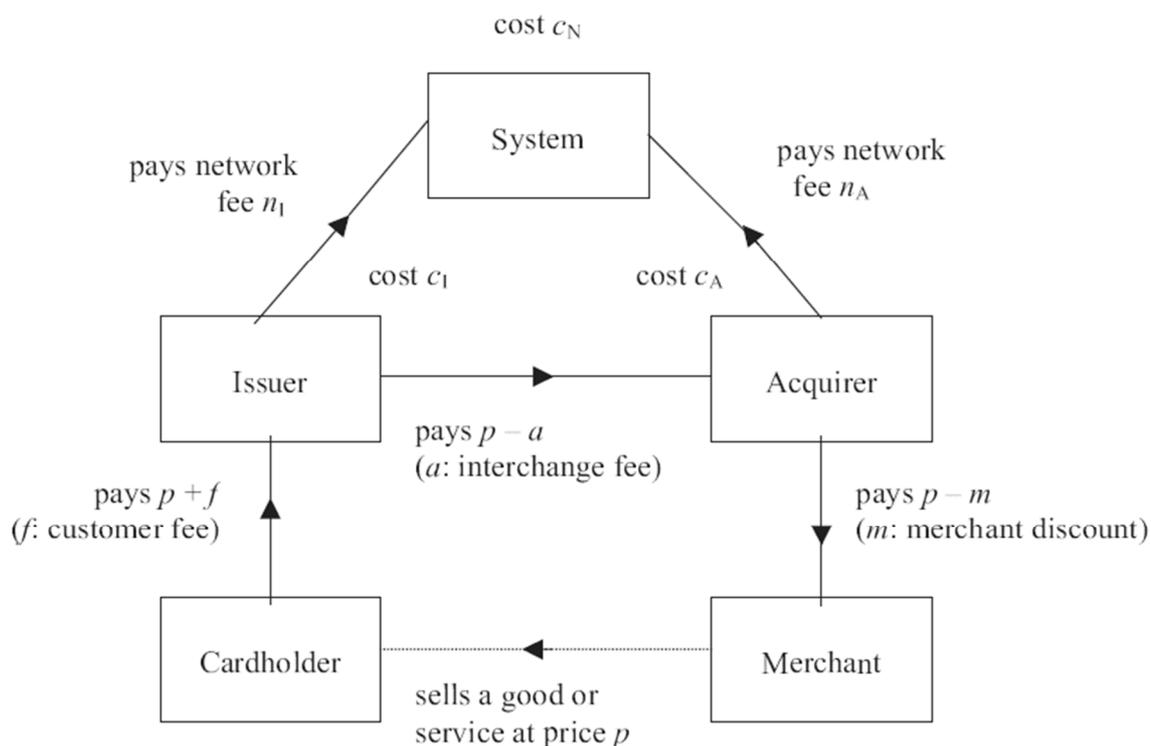


Figure 1. Credit Cards Operation System
Resource: Rochet & Tirole 2003.

In contrast to the other countries, in Turkey, only The Interbank Card Center (BKM) operates as the credit card system corporation. In Turkey, the credit card system corporations such as MasterCard, Visa, etc. undertake the payment function of credit card spending in foreign countries.

The only institutions that provide credit cards and make agreement with the merchant are the banks in Turkey. While the financial institutions other than banks are authorized to operate in other countries, in Turkey only the banks have this authorization. However, all the credit cards spending in Turkey have done not only through The Interbank Card Center (BKM). If the issuer and the acquirer is the same bank, transaction might be done without The Interbank Card Center (BKM) (on-us transactions).

If the issuer and acquirer are the different banks, The Interbank Card Center applies pre-defined exchange rate (Aysan 2011). In 2012, the highest average deferred interest rate has been specified as 2,84% for deposit banks in credit card usage in Turkey (Central Bank of Republic of Turkey 2012).

The Usage of Credit Cards in Turkey

POS is an electronic device which controls the validity of the credit card or bank card, checks if the account is available or not, transmits the data about issuer, acquirer and merchant to the center, and completes the payment process by charging the amount after confirmation (<http://www.tuketicifinansman.net> 2012).

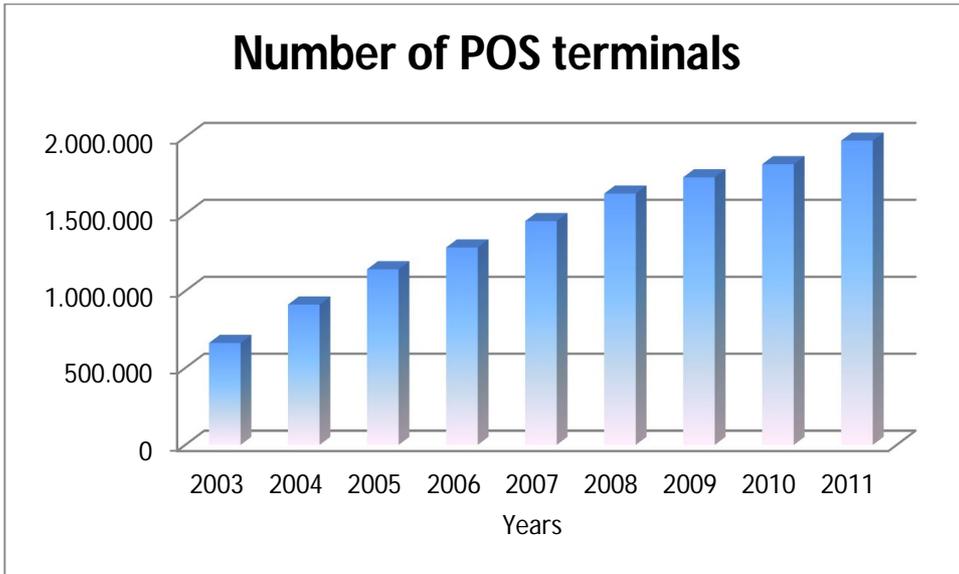


Figure 2. Number of POS terminals
Resource: The Interbank Card Center (BKM), 2012.

As it is seen in Figure 2, while the number of the POS machines was 662.429 in 2003, the number reached up to 1.976.843 in 2011.

The reason of the increase of POS machine number depends on the increase of the credit cards or bank cards amounts and usage. The number of domestic purchases transactions by Visa, MasterCard and other cards is shown in million units in Figure 3.

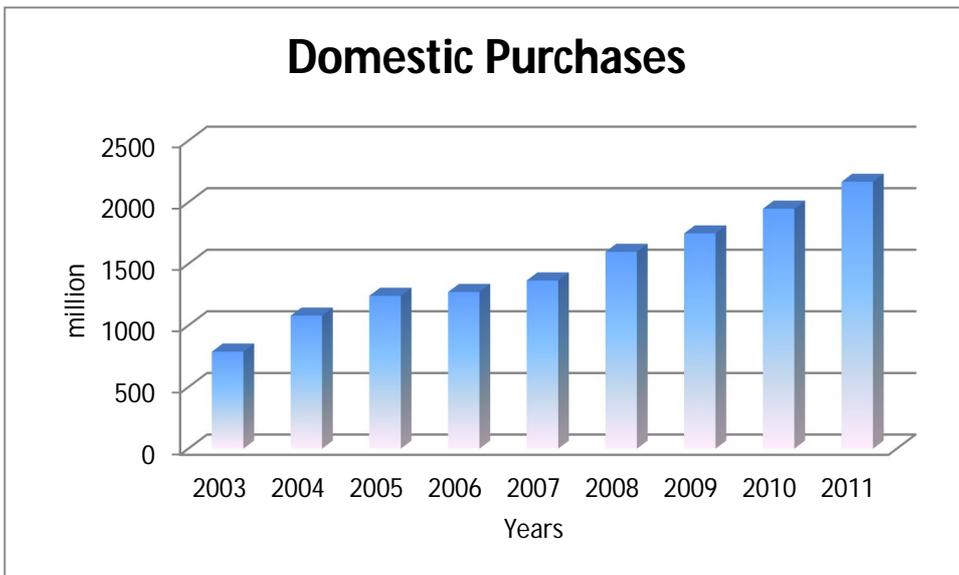


Figure 3. Number of Domestic Purchases Transactions by Visa, MasterCard and Other Credit Cards

Resource: The Interbank Card Center (BKM), 2012.

According to Figure 3, the number of domestic purchases transactions done by credit cards was 788 million in 2003. In 2011, the figure increased to 2167 million. This figure also includes the expenses of the tourists. The number of domestic cash transactions by Visa, MasterCard and other cards is shown in million units in Figure 4.

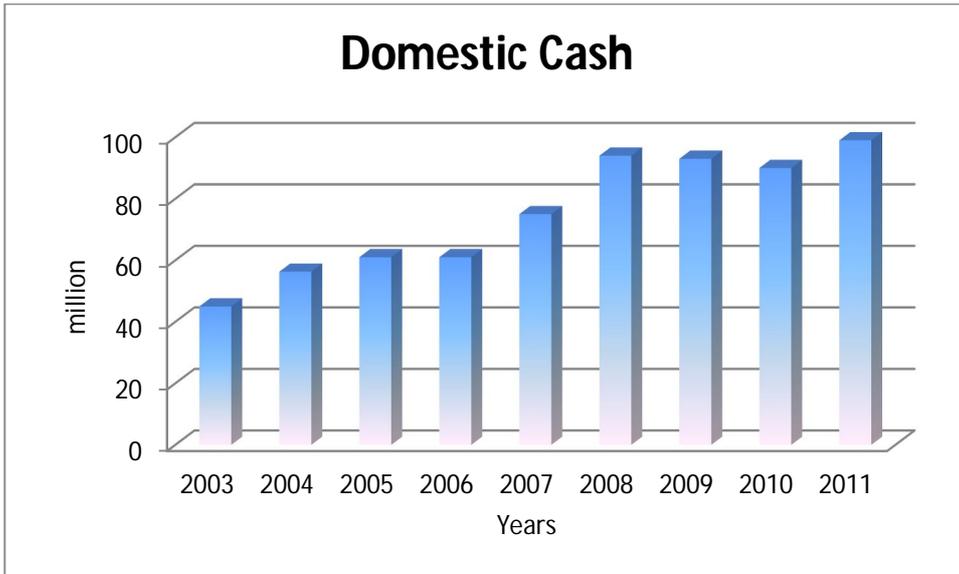


Figure 4. Number of Domestic Cash Transactions by Visa, MasterCard and Other Credit Cards
Resource: The Interbank Card Center (BKM), 2012.

As it is seen in Figure 4, the number of domestic cash transactions in 2003 was 45 million and this number continued to rise by 2008. It started to decrease after 2009 and it was 90 million in 2010. Fluctuations in both internal and external economy affected this decrease. But the number increased again to 99 million in 2011. This figure also includes the usage of the tourists.

The volume of domestic purchases transaction by Visa, MasterCard and other credit cards is seen in Figure 5.

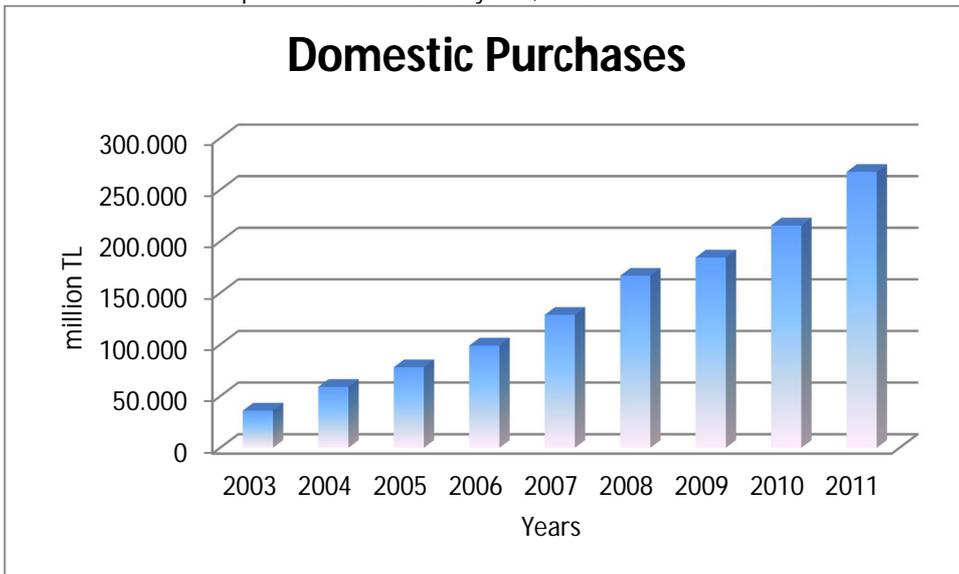


Figure 5. Domestic Purchases Transaction Volume of Visa, MasterCard and Other Credit Cards
Resource: The Interbank Card Center (BKM), 2012.

The volume of domestic purchases transaction by credit cards was 36.064 million TL in 2003. This number increased by 2011 and reached to 267.372 million. This figure also includes the usage of the tourists. In Figure 6, the number of domestic cash transaction volume by Visa, MasterCard and other cards is shown in million units.

Domestic Cash Transaction Volume of Visa, MasterCard and other credit cards is seen in Figure 6.

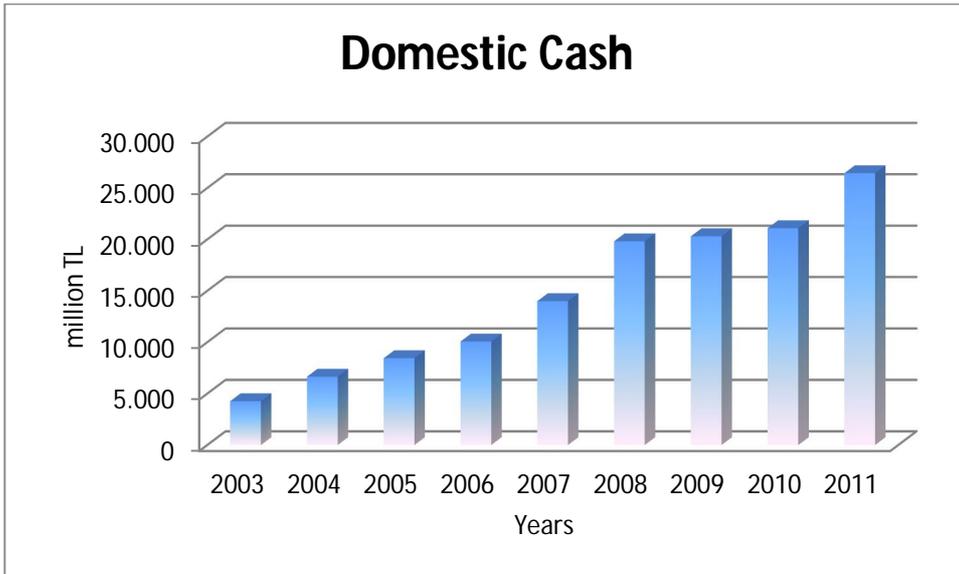


Figure 6. Domestic Cash Transaction Volume of Visa, MasterCard and Other Credit Cards

Resource: The Interbank Card Center (BKM), 2012.

According to Figure 6, domestic cash transaction volume by credit cards was 4.270 million TL. This number increased to 19.824 million TL by 2008, and reached up to 26.447 million TL with a sudden increase in 2011. This figure also includes the usage of the tourists.

Card payment system also conducts the foreign exchange inflow and outflow. The amount of card payment system foreign exchange inflow can be seen in Figure 7.

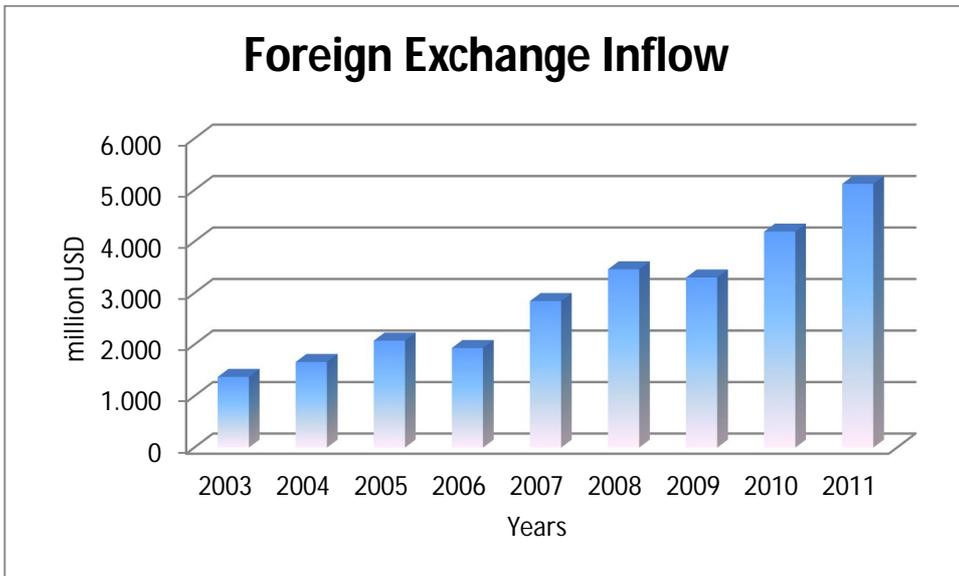


Figure 7. Card Payment System Foreign Exchange Inflow (Credit Card)

Resource: The Interbank Card Center (BKM), 2012.

As it is seen in Figure 7, the amount of card payment system foreign exchange inflow in 2003 was USD 1373 million. In 2006, it was USD 1.935 million with a slight decline. But the number reached up to USD 5.121 million with a sudden increase in 2011. The amount of card payment system foreign exchange outflow can be seen in Figure 8.

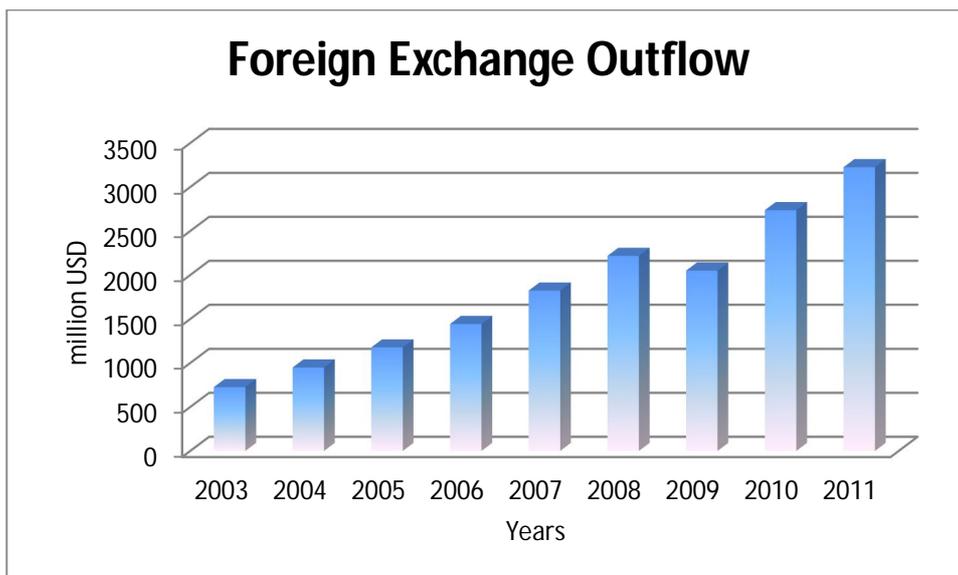


Figure 8. Card Payment System Foreign Exchange Outflow (Credit Card)
Resource: The Interbank Card Center (BKM), 2012.

As it is seen in Figure 8, the amount of card payment system foreign exchange outflow goes parallel with the amount of card payment system foreign exchange inflow. The amount of card payment foreign exchange outflow in 2003 was USD 726 million. By the year of 2011, it increased to USD 3.225 million.

The Trend Analysis of the Credit Cards in Turkey

Trend is defined as increase or decrease in a long term time series. As a systematical component of time series and having the meaning of long term tendency, trend is generally considered as a linear component and it never repeats its movements in time. On the other hand, in a time series, the non-periodic fluctuations around the trend line are observed, as well. These fluctuations are called cyclical fluctuations and they might have any length under the condition of being longer than one year (Gursakal 1998).

The Estimation of Visa Credit Card with Trend Analysis

The trend equation of Visa credit card is computed as $Y=8167205+2451746X$. The slope of the trend line is positive. When the trend equation is examined, the annual increase of new Visa credit card amount is observed as 2.451.746. When the results of regression are examined, it is found that the results of the estimation are statistically significant. ($R^2=0.98$).

Table 1. The standard error, t-statistic and P-values of Computed Trend Analysis of Visa Credit Card

	Standart Error	t-Statistic	Probability (P) Value
C	577972.0	14.13080	0.0000
TREND	102708.3	23.87096	0.0000

The amount of Visa credit card and trend values are seen in Table 2 and Figure 9. Cycle analysis has been above the general trend for four years and below the general trend for five years.

Table 2: The number and trend values of Visa Credit Card in Turkey

Years	Visa Card(number)	Trend Values	Ratio
2003	9.572.460	10.618.951	90.1
2004	13.202.147	13.070.697	101.0
2005	15.989.986	15.522.443	103.0
2006	17.800.385	17.974.189	99.0
2007	20.878.744	20.425.935	102.2
2008	24.332.198	22.877.681	106.4
2009	25.201.351	25.329.427	99.5
2010	27.378.115	27.781.173	98.5
2011	29.478.043	30.232.919	97.5

Resource: The Interbank Card Center (BKM), 2012

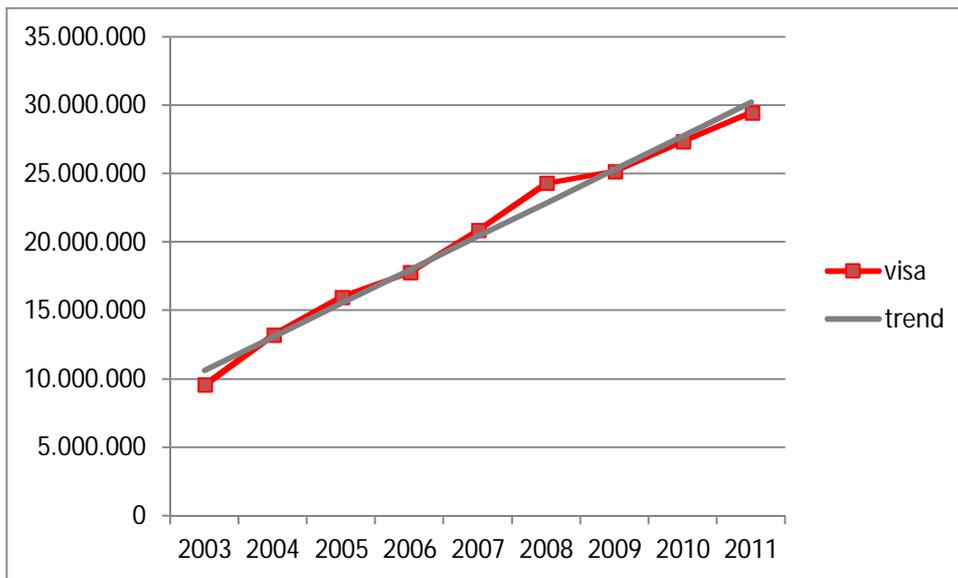


Figure 9: The Trend of Visa Credit Card Number

The Estimation of MasterCard with Trend Analysis

The trend equation of master credit card is computed as $Y=10039482+ 1253053X$. The slope of the trend line is positive. When the trend equation is examined, the annual increase of new MasterCard amount is observed as 1.253.053. When the results of regression are examined, it is found that the results of the estimation are statistically significant. ($R^2=0.95$).

Table 3. The standard error, t-statistic and P-values of Computed Trend Analysis of MasterCard

	Standart Error	t-Statistic	Probability (P) Value
C	589938.4	17.01785	0.0000
TREND	104834.8	11.95265	0.0000

The amount of MasterCard and trend values are seen in Table 4 and Figure 10. Cycle analysis has been above the general trend for five years and below the general trend for four years.

Table 4: The number and trend values of MasterCard in Turkey

Years	MasterCard (number)	Trend Values	Ratio
2003	10.255.667	11.292.535	90.8
2004	13.450.664	12.545.588	107.2
2005	13.963.095	13.798.641	101.2
2006	14.623.148	15.051.694	97.2
2007	16.416.829	16.304.747	100.7
2008	18.824.985	17.557.800	107.2
2009	18.712.739	18.810.853	99.5
2010	19.125.697	20.063.906	95.3
2011	21.369.911	21.316.959	100.2

Resource: The Interbank Card Center (BKM), 2012

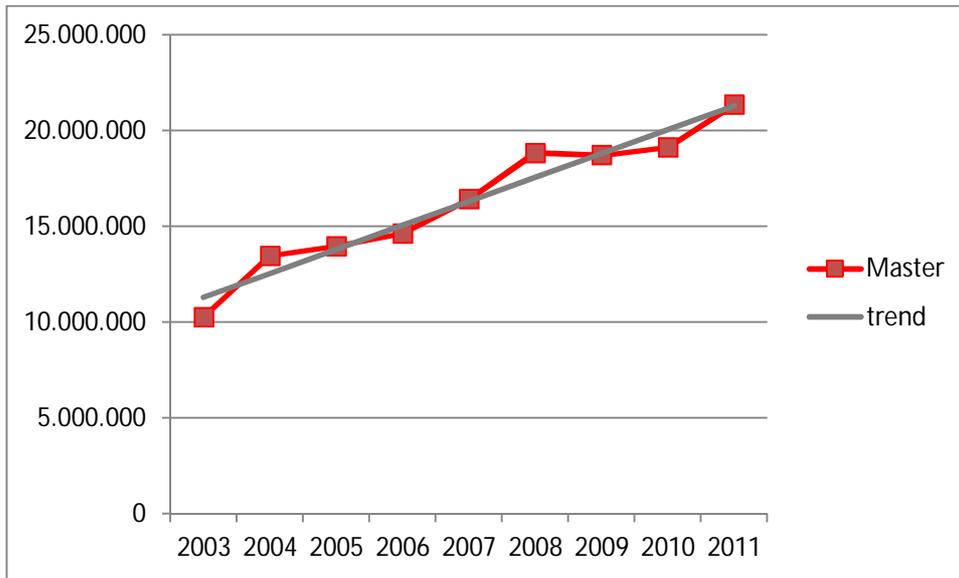


Figure 10: The Trend of MasterCard Number
The Estimation of Other Credit Cards with Trend Analysis

The trend equation of the other credit cards is computed as $Y = -157700 + 71950.18X$. The slope of the trend line is positive. When the trend equation is examined, the annual increase of the other credit card amount is observed as 71.950,18. When the results of regression are examined, it is found that the results of the estimation are statistically significant. ($R^2=0.79$).

Table 5. The standard error, t-statistic and P-values of Computed Trend Analysis of Other Credit Cards.

	Standart Error	t-Statistic	Probability (P) Value
C	77168.80	-2.043572	0.0803
TREND	13713.26	5.246762	0.0012

The amount of other credit cards and trend values are seen in Table 6 and Figure 11. Cycle analysis has been above the general trend for five years and below the general trend for four years. When the data is examined, a significant decline in card amount is observed in 2006. An increase of the card amount started in 2007 and in 2008, a sudden increase was observed. Therefore, sudden breakages can be seen in the graphics.

Table 6. The number and trend values of Other Credit Cards in Turkey

Years	Other Credit Cards (number)	Trend Values	Ratio
2003	35.040	-85.749,82	-40,9
2004	28.317	-13.799,64	-205,2
2005	25.162	58.150,54	43,3
2006	9.800	130.100,72	7,5
2007	39.606	202.050,90	19,6
2008	236.842	274.001,08	86,4
2009	478.524	345.951,26	138,3
2010	452.312	417.901,44	108,2
2011	512.855	489.851,62	104,7

Resource: The Interbank Card Center (BKM), 2012

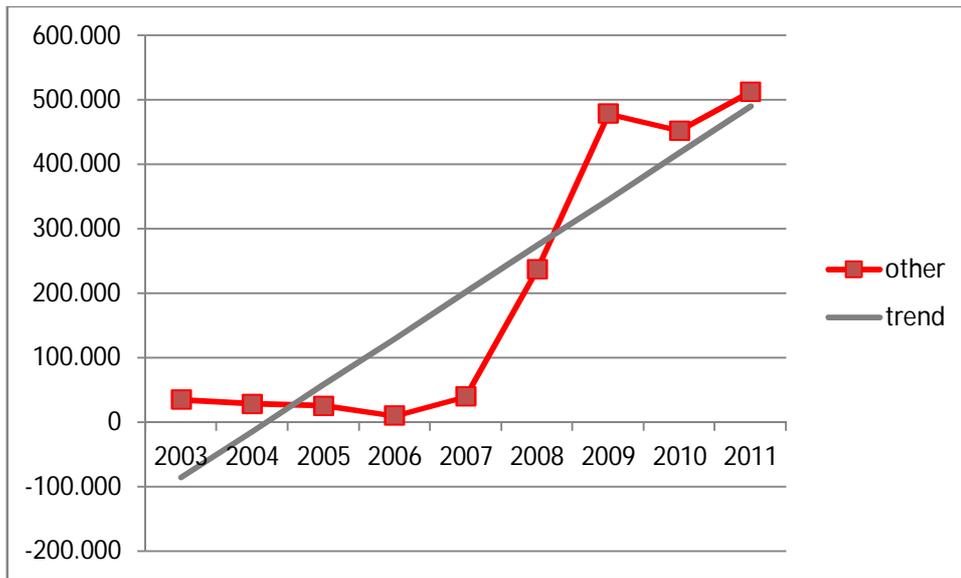


Figure 11. The Trend of Other Credit Cards Number

Conclusion

Credit cards are payment and reward tools providing cardholders with the opportunity to buy products or services without paying cash in the merchant. In addition, credit cards convert the debt into loans by the options of installments or deferred credit. Besides of the credit function, they supply cardholders various advantages such as discounts, rewards, assistantship services and easy e-shopping. Another significant feature of credit cards is that the usage of them keeps proper records against underground economy.

However, especially in Turkey, interest starts to accrue due to the uncompleted payments or partly completed payments. This situation puts cardholders in a worse position in terms of payments.

Despite of all these factors, as it is seen on the study, the number of the POS machines, annual domestic transactions and domestic purchases transaction turnover by Visa, MasterCard and the other credit cards have shown increase both in shopping and cash withdrawal. Additionally, total amounts of foreign exchange inflow and outflow have increased thanks to credit card payment system.

In the study, it is found that the trend lines of the number of Visa, MasterCard and other credit cards have showed positive trends. When trend equations are examined by the period under review, the annual number of Visa cards has increased to 2.451.746, the annual number of MasterCard has increased to 1.253.053, and the number of the other credit cards has increased to almost 71.950.

In conclusion, it is inevitable that the usage of the credit cards has become much more widespread as a result of modern life. The usage of credit cards with a controlled increase provides its users lots of conveniences and credit cards are going to be much more popular unless liquidity problem occurs.

Bibliography

Law no. : 5464 Bank Cards and Credit Cards Law

Aydin, H. İ. (2011). Consumer Loans and Credit Card Interest Rates, *Credit Card Market in Turkey* (223-241). Central Bank of the Republic of Turkey Publications.

Aysan, A. F. (2011). Credit Card Sector: Questions, Challenges, *Credit Card Market in Turkey* (7-30). Central Bank of the Republic of Turkey Publications.

Aysan, A. F., Yildiran, L., Kara, G. İ., Muslim, A. N., Dur, U. (2011). Regulations and Competition in Credit Card Market in Turkey, *Credit Card Market in Turkey* (201-222). Central Bank of the Republic of Turkey Publications.

Basaran, B., Budak, G. S., Yilmaz, H. (2012). Analysis of Personal Attitude Differences Toward Credit Cards, *International Journal of Alanya Faculty of Business*, Vol:4, No:1.

Erol, H. (2011). Credit Card Effective Interest Rate and Cost, *Credit Card Market in Turkey* (141-168). Central Bank of the Republic of Turkey Publications.

Gungor, G. C. (2011). Discount Rates Applied in Instant and Installment Payments in Turkey, *Credit Card Market in Turkey* (121-140). Central Bank of the Republic of Turkey Publications.

Gungor, G. C. & Yildirim, A. (2011). Investigation on the Factors Affecting the Credit Card Interest Rates, *Credit Card Market in Turkey* (61-98). Central Bank of the Republic of Turkey Publications.

Gur, E. T. & Kucukbicakci, R. (2011). Development by Country Basis in Credit Card Sector: Interest Rates Applications and Credit Card Pricing and Commission, *Credit Card Market in Turkey* (169-200). Central Bank of the Republic of Turkey Publications.

Gursakal, N. (1998). Computer Applied Statistics II, *Marmara Bookstore Publishing*: 1, Bursa.

Karahan, F. G. (2011). Credit Card Regulations and Their Effects on Credit Card Interest Rates, *Credit Card Market in Turkey* (99-120). Central Bank of the Republic of Turkey Publications.

Karahan, F. G. & Cakmak, B. (2011). Developments in Credit Card Sector in Turkey, *Credit Card Market in Turkey* (31-60). Central Bank of the Republic of Turkey Publications.

Rochet, J. C. & Tirole, J. (2003). An Economic Analysis of the Determination of Interchange Fees in Payment Card Systems, *Review of Network Economics*, Vol.2, Issue: 2.

Uzgoren, N., Ceylan, G., Uzgoren, E. (2007), A Model Study Based on Setting The Factors Affecting The Credit Card Usage in Turkey, *Journal of Management and Economics*, Vol.14, Issue: 2.

<http://www.tuketicifinansman.net>; (accessed on: May 10, 2012).

<http://www.tcmb.gov.tr/yeni/bgm/yfakk/kkazamifaiz.html> (accessed on: May 15., 2012).

Session H

The Impact of the Economic and Financial Crises on the European Public-Private Partnerships

Anca Mândrăleanu (Academy of Economic Studies Bucharest, Romania)

Doru Coretchi (Academy of Economic Studies Bucharest, Romania)

The recent global economic and financial crisis has generated challenges at all levels of economic policy decisions. Governments need to act simultaneously on different fronts: sensitive activity sectors need to be bailed out, the general downfall in economic activity has to be counteracted and vulnerable population groups has to be protected from declining incomes. At the same time the government revenues are falling, the domestic and foreign financing is shrinking, with medium to long-term consequences for budgets and debt.

In many countries, anti-crisis public measures focus on higher public investment or investment in public objectives, like investment in infrastructure projects as an important mean to maintain economic activity during the crisis and support a rapid return to sustained economic growth. An instrument to realize these investments is the Public-Private Partnership (hereafter PPP).

There is growing interest regarding the role of PPP as a counter-cyclical fiscal policy tool, as long as it can be used to support private sector recovery and generate employment. However, the growing number of PPP's in previous years, as well as their contractual structures, can bring fiscal risks for public authorities that can be aggravated by the financial crisis.

Nevertheless, PPP's are vulnerable to the economic impact of the crisis. Although the final consequences and duration of the crisis are not yet known, the effects on PPP's can already be identified and estimated. The crisis has made the conditions for this instrument more difficult. Despite some signs of recovery, the volumes and values of the PPP projects currently closing is still significantly below the level reached before the crisis.

Key words: Public-Private Partnership, EU-funding, economic crisis, investment, infrastructure

Introduction

This paper aims at presenting the impact of the economic and financial crisis on PPP in the European Union (hereinafter, EU) generally and, particularly, in Romania, as well as the challenges to be overcome in order to activate the potential of PPP as an instrument for European economic recovery.

In this context, the EU is forced to bring a series of responses to the crisis effects on PPP, as well as several institutional contributions to the benefit of all member states, like the definition of a special regulatory framework, support initiatives, mobilization and activation of financial resources, (EU-funds, European Investment Bank, TEN-T instruments), both within and outside the EU, creating the prerequisites for the European organizations' access to markets beyond the EU- borders. In the near future, as well as on the long-term, several measures and actions shall be taken in order to stimulate the PPP.

Defining the Public-Private Partnership

A PPP is an arrangement between the public and the private sector, where the private supplies assets and services traditionally provided by the public sector. Without having a general consensus on a precise definition of PPP in the literature by now, we shall define the PPP as being characterized by following features (Burger, 2009):

- 1) An agreement between a government and one or more private partners whereby the private partner undertakes to deliver an agreed upon quantity and quality of service;
- 2) In return for the delivery of the agreed upon quantity and quality the private partner receives either a unitary charge paid by government or a user charge (e.g., a toll) levied by the private partner on the direct recipients of the service;
- 3) An emphasis on a whole-of-life approach. The private partner is usually responsible for both the construction and operational phases of the project;
- 4) Some degree of risk sharing between the public and private sector that in theory should be determined on the basis of which party is best able to manage each risk, thus ensuring that the PPP optimizes the Value for Money (VfM).

Role and challenges of PPP under economic and financial crisis

At EU level, PPP's can offer more leverage to important projects and boost the innovation capacity together with driving the competitiveness of European industry in sectors with significant growth and employment prospects. However, just at the time when the more systematic use of PPP's would bring considerable benefits, the crisis has made the conditions for these instruments more difficult. It is therefore urgent and important to look at new ways to support the development of PPP's.

By the end of 2007, the PPP market had changed dramatically, coming close to stopping in its tracks. The spread of the banking crisis has brought about a re-evaluation of whether funders can provide long term, highly leveraged project finance, given the lack of confidence in refinancing options and in capital markets. Deals have closed, but on significantly higher margins and more aggressive terms, with general difficulty in reaching financial close in a timely manner on even the best of projects. Equally, the public sector has been suffering with a reduction in tax revenues and big holes in government budgets, together with rising unemployment and social expenditure. Thus, governments have had to look hard at their economic policies and decide whether they should use spending on infrastructure as an anti-cyclical measure (EPEC, 2009).

Many governments have used spending on infrastructure, including on PPP, as an anti-cyclical method of stimulating the economy. In addition, the EU Commission's recent Communication on PPP (published in November 2009) has promoted the use of PPP as an economic tool. In this environment, the majority of European countries are likely to significantly step up their PPP programs or commence major PPP programs for the first time.

Nevertheless, PPP's are vulnerable to the economic impact of the crisis. Although the final consequences and duration of the crisis are not yet known, the effects on PPP's can already be identified and estimated. The crisis has made the conditions for this instrument more difficult. Despite some signs of recovery, the volumes and values of the PPP projects currently closing is still significantly below the level reached before the crisis (European Commission, 2009). EPEC (EPEC, 2009) summarizes the impact of the current credit situation on the PPP market, seeing the key points in: the drastically reduced liquidity resources, due to the collapse of the inter-bank lending market, the competition between project finance and PPP lending for scarce capital allocations, the low speed of transactions closing, the high bank margins, the significantly reduced credit periods, the withdrawal of the banks from the Project Finance market and also reorientation domestic markets and the lack of viable capital market solution.

EIB (European Investments Bank, 2010) takes a closer look at the evolution of PPP's in the EU during the financial crisis that began in 2007, providing a descriptive assessment of the evolution of PPP in Europe.

Year	Number of projects	Value of projects (in € millions)
1990	2	1386.6
1991	1	73.0
1992	3	610.0
1993	1	454.0
1994	3	1148.4
1995	12	3264.9
1996	26	8488.2
1997	33	5278.0
1998	66	19972.4
1999	77	9602.6
2000	97	15018.5
2001	79	13315.3
2002	82	17436.2
2003	90	17357.1
2004	125	16879.9
2005	130	26794.3
2006	144	27129.2
2007	136	29597.9
2008	115	24198.0
2009	118	15740.4
Total	1340	253744.9

Table 1- Evolution of Public Private Partnership in the European Union

Source: European Investments Bank, 2010, PPP in Europe - Before and during the recent financial crisis

The table shows that PPP's in Europe increased substantially before 2008, but considerably declined afterwards. The decrease in the number and value of PPP contracts in 2008 and 2009 lead back to the levels before the PPP peak in 2006/07. The number of PPP's in 2008 and 2009 was similar to the one in 2004. Even stronger was the decline in the value of PPP contracts during the financial crisis: the value of PPP projects closed in 2009 was close to 2000 levels. The total value of PPP transactions amounted for EUR 15.8 billion in 2009, with a decrease of almost 50% compared to 2007. The total value of closed deals has declined more than the number of deals. At the same time, the PPP market in Europe continues to diversify across countries and sectors. In 2008, the UK share in the total number of EU-PPP's fell below 50%. In many respects, however, the reduction in the European PPP market observed during the financial crisis can be seen as a reversal of an extraordinary spike in the years preceding the crisis (European Investments Bank, 2010).

The responses of the EU to the crisis effects on PPP

The crisis is placing renewed pressure on public finances in many Member States, and at the same time makes it more difficult to secure long term private investment in capital intensive projects. EU financing through the Structural Funds, the European Investment Bank or TEN- T instruments can help to mobilize PPP solutions for essential investment in projects even at a time of reduced availability of national public or private resources. The EU also influences the environment in which PPP operate through its regulatory framework (European Investment Bank, 2004).

The regulatory framework

Several sets of Community rules have a direct or indirect impact on PPP. Going forward, it will be important to ensure that the applicable rules are appropriate and supportive while fully respecting the principles of the Internal Market.

In the past, there was a concern that Member State governments could use PPP as a way to conceal their expenditure and new liabilities on public balance sheets, loading up costs for the future, in contradiction with the Stability and Growth Pact rules. Similar concerns might be raised in the current context of public debts incurred due to the crisis. Eurostat developed rules on the statistical accounting of PPP, which clearly determine in which cases a PPP's asset(s) should be recorded on the government's balance sheet.

PPP are structured around a public contract or as work or service concessions. When public contracts or works concessions are involved, they are subject to the provisions of the public procurement directives if their value exceeds the Community thresholds. Following extensive modifications in 2004, EU public procurement legislation now provides for a range of procedures that contracting authorities can employ when awarding contracts. Notably, to enter into dialogue with tenderers in particularly complex cases, the EU rules now allow opting for competitive dialogue. Its use may be appropriate in case of PPP where the contracting authority may not always be able to determine the technical specifications and the appropriate price level in advance.

The European Union-level Public Private Partnership - the Joint Technology Initiatives (JTI)

The Seventh Framework Program for Research introduced a new type of European public- private partnership at program level: the JTI based on Article 171 of the EC Treaty. This new instrument was created to promote European research in fields where the objectives pursued are of such a scale and nature that traditional instruments are not sufficient. The first JTI have been set up in five fields: innovative medicines, aeronautics, fuel cells and hydrogen, nanoelectronics and embedded computing systems.

The Structural Funds

PPP projects can be partly funded by resources from the Structural Funds. Nevertheless, few Member States so far seem systematically to design programs that bring Community funding into PPP structures. There is a perception that combining different sets of EU and national rules and practices and timetables in one project may be complex and act as a disincentive. However, in many cases a PPP may offer the optimal approach for implementing projects. Strengthening Member States' institutional capacity and providing more practical guidance on combining Community funding with PPP should help national administrations to have more recourse to PPP when taking decisions about financing future major projects. The Structural Funds for the period 2007-2013 offer important opportunities to Member States to implement operational programs through PPP organised with the EIB, banks, investment funds and the private sector in general.

The European Investment Bank (EIB)

The EIB, the EU's long term lending institution, has actively sought to support efficient PPP schemes across Europe, and in particular in transport infrastructure. EIB has financed PPP projects of up to 30 bn euro until the end of 1980's (European Investment Bank, 2004). Furthermore, the EIB has established together with the Commission and Member States the European PPP Expertise Centre (EPEC), which aims to strengthen the organisational capacity of the public sector to engage in PPP through network activities and policy support to its members.

The Commission will work closely with the EIB and the private sector in order to increase the overall leverage effect of EIB funding, for instance through the blending of grants from the EU budget and EIB loans.

Conclusion

Developing PPP as a financial and economic instrument becomes critical as the financial and economic crisis is taking its toll on the ability of the public purse to raise adequate financial means and allocate resources to important policies and specific projects. The interest of the public sector in innovative financing instruments has increased and so has the political readiness to create conditions for more efficient ways of delivering infrastructure projects, whether in the transport, social, energy or environmental sectors. On the other hand, the private sector's interest in pursuing PPP could be limited by the prevailing regulatory framework and new economic constraints, as well as other longer established underlying factors such as limitations in the public sector's capacity to deliver PPP programs in many parts of Europe.

Especially under the current economic conditions, the combination of public and private capacities and money within PPP's can help the process of recovery and the development of markets. It is therefore urgent and important to look at new ways to support the development of PPP's.

EU can bring a significant contribution for overcoming the present context, as the crisis is placing renewed pressure on public finances throughout the member states and, at the same time, makes it more difficult to secure long term private investment in large scale projects. EU financing through the Structural Funds, the European Investment Bank or TEN- T instruments can help to mobilize PPP solutions for the investment in projects even at a time of reduced availability of national public or private resources. Another EU contribution can be the influence on the environment in which PPP's operate through its regulatory framework.

More than ever, developing PPP remains the challenge for the time to come.

Bibliography

Burger, P. (2009). *The Effects of the Financial Crisis on Public-Private-Partnerships*, IMF Working Paper, WP/09/144, 4-9.

Davies, P. (2009). *A Review of Lending Appetite for Public Private Partnership Financings*, Talking Points, January (London: Public Sector Research Centre PricewaterhouseCoopers).

DLA Piper (2007). *European PPP Report, 2007*, p.5-6

EPEC (2009). *The financial crisis and the PPP market- potential remedial actions*, European PPP Expertise Center, 6-7.

Euromed Transport Project (2008). *Micro Study on Public Private Partnerships in the Transport sector- Promotion of Private Sector Involvement in the provision of transport infrastructure in the Mediterranean countries*, 20-23.

European Commission (2009). *Mobilising private and public investment for recovery and long term structural change: developing Public Private Partnerships*, 3-15.

European Commission (2004). *Green Paper on Public-Private Partnerships and Community Law on Public Contracts and Concessions*, COM (2004) 327 final (Brussels: European Commission).

European Investment Bank (2010). *PPP in Europe - Before and during the recent financial crisis*, July 2010, European PPP Expertise Center, 6-7.

European Investment Bank (2004). *The EIB's Role in Public-Private Partnerships (PPPs)*, 11-13.

OECD (2008). *Public-Private Partnerships: In Pursuit of Risk Sharing and Value for Money*, (Paris: Organisation for Economic Co-operation and Development Publishing).

“Factor Market Distortions Across Time, Space and Sectors in China”

Xiaodong Zhu (University of Toronto, Canada)

In this paper we measure the distortions in the allocation of labour and capital across provinces and sectors in China for the period 1985-2007. Most existing studies have measured factor market distortions by using some index of dispersion in individual factor returns. However, the map between these dispersion measures and the efficiency loss due to distortions is not clear, especially when there is more than one factor. In this paper, we measure the factor market distortions as the reduction in aggregate TFP due to distortions and decompose the overall distortions into *between-province* and *within-province inter-sectoral* distortions. For the period between 1985 and 2007, the distortions in factor allocation reduced aggregate TFP by about 30% on average, with the within- and between-province distortions accounting for similar portion of the reduction. Despite the large amount of labour reallocation across provinces, the cost of between-province distortions was relatively constant over the period. The cost of within-province distortions declined between 1985 and 1997, contributing to 0.42% TFP growth per year, but then increased significantly in the last ten years, reducing the aggregate TFP growth rate by 0.73% a year. Almost all of the within-province distortions can be accounted for by the misallocation of capital between the state and the non-state sectors. We provide evidence that the recent increase in capital market distortions is related to the government policies that encourage investments in the state sector at the expense of investments in the non-state sector.

Keywords: China; factor market; distortion; productivity;

A New Reconfiguration of Migration from Mexico to the USA, Trends and Prospects in a Global Context

Francisco Pérez Soto (Universidad Autónoma Chapingo, Mexico)

There is a reconfiguration process of Mexican migration to USA. Today, Mexican migrant population represents about 11 million people which mean almost 10% of total population in México. Expulsion centers are still rural areas of Mexican traditional origin centers but urban areas have been incorporated as well as areas from south south-east of the country with high levels of indigenous people. In terms of gender, it is balanced, 56% males and 44% females. In respect to destiny, Texas, California, Arizona, New Mexico and Indiana are still important but now Mexican immigrants are a great majority in 43 states of the Union. Traditional cross points have lost importance and others more dangerous such as Altar Sonora, Sonoyta, Agua Prieta and Ciudad Juarez have appeared with a higher level of dangerous for migrants and a high demand for coyotes to cross the border.

The starting point for the large migration of Mexicans to the United States is the existence of large asymmetries, GDP per capita annual United States is one of the highest (56 000 US dollars per year), while Mexico barely reaches 16, 000 per year. Schooling is the expression of another major asymmetry of these societies. While United States recorded average levels of schooling of 16 years, Mexico has an average of 7 years. The occupational structure tells us that, while in the US 3% of the economically active population (EAP) remains in the primary sector, in Mexico about 23% of the EAP works in the primary sector. In the case of Human Development Index (HDI) we noted also important differences of more than one point, which is high, and with respect to life expectancy at birth although it seems that there are no big difference, it is significant at the level of life, because for extremely poor people, it is easier to improve statistics and as we get better, it is increasingly difficult to climb a point.

Another important factor is the gradual but inexorable aging population process: in 1980 the population 65 years and older as a percentage of total EUA was 11.2%, for 2000 was 13% and for 2010 is 16.1%, while Mexico has a much younger population.

Key words: Migration, human development index

“Dynamic Response to Environmental Regulation in the U.S. Coal Industry”

H. Faghani Dermi (Washington University in St. Louis, United States)

In this paper, we study the effect of Clean Air Act Amendments (CAAA), enacted in 1990, on the U.S. coal industry. We are interested in the dynamic effects of environmental regulation on the decisions of entry and closures (temporary, permanent) of coal mines. We estimate the underlying structural parameters of the model and use them to simulate the effect of environmental regulation on the coal industry. In the counterfactual environment, we look at the effect of no clean air act on the coal industry. In particular, we measure the effect of CAAA on production, temporary closure, permanent closure, and entry in the U.S. coal industry.

Session I

“Deep Habit Formation in Consumption: Evidence from Scanner Data”

Benjamin Verhelst (Ghent University, Belgium)

This paper uses scanner data at the individual customer level, compiled from the loyalty card database of a large European retailer, to empirically assess deep habit formation in consumption. Whereas superficial habits are formed over a single, composite consumption good, deep habits are formed over narrowly defined, individual product categories. Deep habit formation constitutes a possible source of price stickiness and helps to mimic procyclical labour and real wage dynamics that are present in macro data. To gauge the existence and the extent of deep habits in consumption, we use a dynamic time-space recursive model for sales at the product category level. This spatial panel model enables us to test for both internal and external deep habit formation at the same time. The former captures inertia or persistence in consumption, and is included in the empirical specification as a time lag. The latter captures preference interdependence across households (i.e. keeping up with the Joneses) and is captured by a spatial lag. Our results confirm that both internal and external habits are formed at the product category level for all but some individual product categories. Households show considerable persistence in their consumption decisions over time, and are greatly influenced by the decisions of neighboring households.

“Expenditure Factor in the Economy of Russia”

(P.G.) S.V. Khudyakov

Department of Technological Innovations. Plekhanov Russian University of Economics

(Ph.D. Prof.) M.S. Krass

Financial University under the Government of the Russian Federation

(Ph.D.) S.E. Tsvirko

Financial University under the Government of the Russian Federation

(Ph.D.) A.Y. Platko

Department of Economic Theory. Moscow State Engineering University (MAMI)

Abstract

The following national income dynamics' models are considered: Keynes model and the modified model, which takes into account an expenditure factor in the economy of Russia. It is shown, that with significant amounts of public expenditures and high costs the economy can move to the degradation stage (bifurcation point of the differential equation's solution). The aspects of the public expenditures in the European Union countries under the conditions of the current crisis are discussed. The main causes of high costs in the economy of Russia are indicated. The key provisions of the economic strategy for the Russian economy's move to the sustainable development are discussed.

Key words: model, equation, solution, bifurcation, expensiveness, public expenditure, crisis, public debt, integral curve, node.

Introduction

The macroeconomic models with links between aggregate material and financial variables play the special role in the studies of any periods of economic evolution. They are theoretical ones, are designed to study the general properties of the economy and its components, are based on the deduction of conclusions from the formal prerequisites. The purpose of the paper is to summarize the general peculiarities of the Russia's economy development and to expand its forecast of possible economy evolution.

The objectives of this work are the following:

A) Development of a relatively simple model of economic dynamics taking into account one of the most important attributes of the modern economy of Russia - its expensiveness.

B) The use of this model as a tool for analysis and forecast in the main scenario of the possible development of the economic situation.

General models of economic dynamics are theoretical research tools. As a research tool, they generally use the apparatus of differential equations and difference equations. In one-sector models the economy in the long-run is characterized by a set number of aggregate variables. The classical models of these variables include a set of functions of time t (Krass, 2005):

- a) national income $Y(t)$;
- b) public expenditure $E(t)$;
- c) consumption in production sphere $S(t)$;
- d) investments $I(t)$.

The basic model

The basic approach uses the dynamic balance model of Keynes (model 1). It is based on a system of ordinary differential equations of the first order, which includes the mentioned above variables:

$$Y(t) = S(t) + I(t) + E(t), \quad (1)$$

$$S(t) = a(t)Y(t) + b(t), \quad (2)$$

$$I(t) = k(t)Y'(t). \quad (3)$$

The first equation represents the balance: the sum of all costs should be equal to the national income. The second equation implements well known principle that the overall consumption consists of internal consumption as a part of national income with a factor $a(t) < 1$ plus final consumption $b(t)$. Finally, the size of the investment is determined by the product of the norm $k(t)$ (its volume is characterized by the level of technology and infrastructure of the state) and the marginal national income - the equation (3), where the stroke denotes the derivative with respect to time.

Substitution of (2) and (3) into equation (1) leads to the linear inhomogeneous first order differential equation for the unknown function of national income $Y(t)$:

$$Y'(t) = [(1 - a(t))/k(t)] \cdot Y(t) - [b(t) + E(t)]/k(t). \quad (4)$$

In general case, the solution of the equation (4) is given by a rather complicated formula that includes the mentioned above set of functions a)-d), which are to be known (Krass, 2005). For simplicity, we assume that these variables are constants independent on time t . Then we obtain an ordinary differential equation with constant coefficients:

$$Y'(t) = [(1-a)/k] \cdot Y(t) - (b+E)/k. \quad (5)$$

This equation has a fairly simple solution:

$$Y(t) = (Y_0 - Y_{eq}) \cdot \exp[(1-a)t/k] + Y_{eq}, \quad (6)$$

where Y_0 is the initial value of the function $Y(t)$ at $t = 0$; Y_{eq} is equilibrium (stationary) solution, it is obtained from equation (5) at $Y'(t) = 0$:

$$Y_{eq} = (b+E)/(1-a). \quad (7)$$

The integral curves of the equation (5), or, equivalently, the graph of (6) at different combinations of Y_0 and Y_{eq} are shown in the Fig. 1. Since the exponent in (6) is positive, there are possible two cases:

- 1) At time $t = 0$ the initial value of the national income Y_0 exceeds the equilibrium value Y_{eq} ; then the national income grows in time, i.e. there is a positive trend in the economy.
- 2) The initial value Y_0 is lower than the equilibrium state Y_{eq} , i.e. $Y_0 < Y_{eq}$. In this case integral curves go down from the equilibrium solutions Y_{eq} , i.e. the national income reduces over time and there is a degradation of the economy.

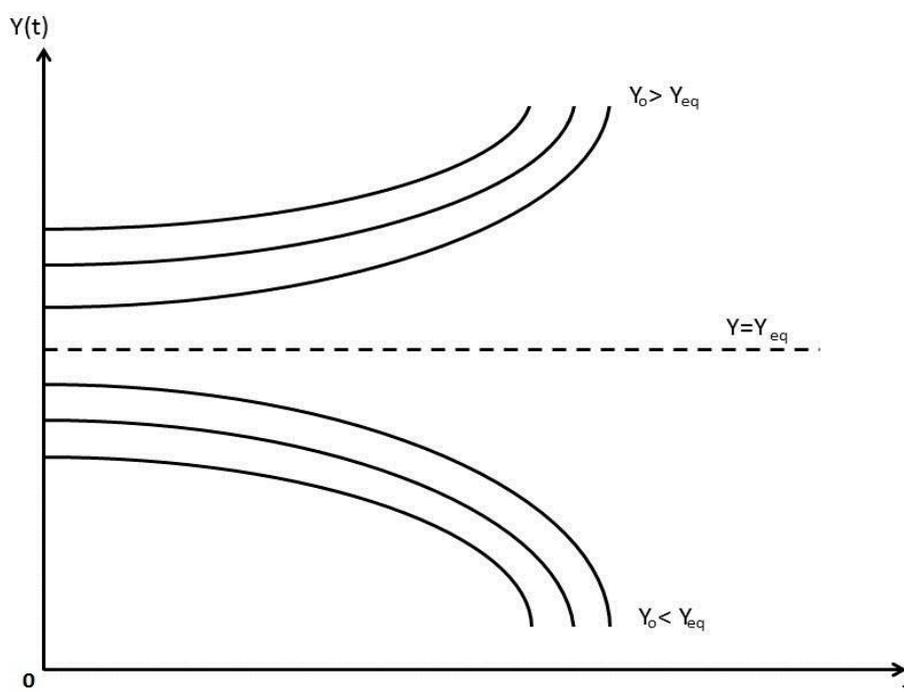


Fig.1. The integral curves of equation (5)

Analysis of the structure of the solution (6) - (7) leads to a fairly simple economic interpretation. A rise in the consumption and public expenditures and increase of E led to growth of equilibrium solutions Y_{eq} ; that in turn requires the increase of the initial state of the system to higher initial value of national income at which positive economic dynamics is possible: $Y_0 > Y_{eq}$. This condition is not always achievable, i.e. under the conditions of high internal consumption and public expenditures the probability and the risks of the degradation scenarios for the economy are rising. In addition, the increase in the norm k lowers the growth of national income even in the event of positive economic dynamics. It should be noted that in Russia public expenditures range from 40% to 60% of national income in accordance with different data. The costs for the environment (Krass, 2010) and the costs to support environmental technologies using new resources are also included into public expenditures. In Russia they are much inferior to Western countries. Introduction of stringent environmental standards leads to a drastic restriction of production that uses "dirty" and high-cost technologies. Of course, the structure of public expenditures is far from optimum recently. Firstly, the reduction in public expenditures by reforming of the existing inefficient and cumbersome centralized infrastructure is actual. Secondly, it is necessary to undertake redistribution of these costs: a) toward greater environmental trends in reducing costly resourcing through the creation and use of new technologies; and b) in favor of the regions. Tightening of environmental standards leads to an active search, development and use of innovative resources-saving technologies; that, in turn, reduces the rate of in-plant consumption a , which facilitates reduction of the stationary solutions Y_{eq} and stipulates speeding of the growth of national income $Y(t)$ (see(6) - (7)) and improvement of the economy quality (Krass, Yurga, 2011).

Recently, the economies of Greece and Italy implemented a negative scenario of high values of public expenditures E and final consumption k and prerequisites to the rapid growth of public debt; that leads to the financial crisis (the threat of decline in national income, the case $Y_0 < Y_{eq}$ in the Figure 2). That is why the EU is undertaking emergency measures to

radically reduce these charges. It could transform the economic dynamics from the critical stage to the stage of growth of national income (case $Y_0 > Y_{eq}$ in Figure 2).

The analysis of the model (4) - (7) is called the basic, it is well known in economic theory. According to the general classification, the differential equation (5) is autonomous (the explicit dependence on the time is absent). Point $Y = Y_{eq}$ on the phase plane is a point of unstable equilibrium (unstable node).

The role of public expenditures in economic dynamics

The role of the state in the economy has an important place in economic science and practice of actual economic policy. The question of the optimization of the state role is very urgent for Russia which is on the stage of the modernization of the economy and the transition to a predominantly innovative development.

Estimations of public expenditure (% of GDP in the Russian Federation) are different. For example, in determining the Index of Economic Freedom (2011 Index of Economic Freedom) by Research Institute of The Heritage Foundation and the magazine The Wall Street Journal this figure in 2011 was given equal to 34.1%, in 2010 - 33.4%. According to the former President of Russia D.A. Medvedev, the share of public expenditures in GDP is about 40%. In the same period the analogous China's index was twice less. According to The Heritage Foundation, in 2011, a group of states with rates of 30 to 40% of public expenditures in GDP is diverse and includes the economies such as: Albania, Algeria, Australia, Azerbaijan, Bhutan, Bolivia, Bulgaria, Canada, Egypt Estonia, Georgia, Japan, Jordan, Kenya, Kuwait, Latvia, Lebanon, Liberia, Lithuania, Luxembourg, Macedonia, Malawi, Nigeria, Oman, Romania, Slovakia, South Korea, Switzerland, Uzbekistan, Venezuela.

Experts note that there is no common approach to the public sector of the economy. In some countries it is very large (Greece, Italy, France); in the other countries it is almost absent (Japan, Luxembourg); somewhere it is concentrated around a small number of business areas and industries (the Netherlands); but somewhere "spread" throughout the economy (France, Portugal). In some countries it is highly efficient (Sweden, France); in others it is not effective (Belgium, USA); in a number of countries there is unified management of public sector enterprises (Sweden); and somewhere the system works around a "point" (each object) management (USA).

Thus, there are different national models, and the success of their implementation is the key issue. According to Artemov A.V., Brykin A.V., and Shumaev V.A.(2007) the following three models of the public sector can be selected: Western European, North American (US. and Canada), and Asian (Japan and South Korea). The Western European model is characterized mainly by a rather large volume, high-performance and generously funded public sector, which has diversification of industrial structure. In the North American model, on the contrary, there is a typical underdeveloped and inefficient public sector, specializing mainly in the public functions, defense and social infrastructure. Clear line between private business and the state is inherent for both models. This line is blurred in the Asian model; interlocking of interests of the state and the business goes through representatives in government and corporate structures. The result of such model is formally a small public sector with the appreciable financial and organizational support from the government.

It is advisable to consider the composition of public expenditures in the Russian Federation in comparison with some other countries. The corresponding data is presented in the Table. 1.

Table 1. The structure of public expenditure budget in 2008 (percent)

	Government services	Defense	Economic services	Housing and communal services	Health	Culture and religion	Education	Social protection
Russia	31,2	10,7	9,3	4,7	9,6	1,6	9,3	21,0
Australia	11,4	9,9	12,4	4,4	18,0	2,4	14,3	27,1
Austria	13,3	5,0	10,0	2,1	15,8	2,0	10,9	40,9
Belarus	13,4	6,2	26,4	5,9	8,5	2,5	11,6	25,6
Hungary	18,8	6,5	13,2	3,4	9,8	2,9	10,7	34,9
Germany	13,6	6,0	7,7	2,9	14,2	1,4	9,1	45,1
Canada	12,5	7,8	9,1	3,8	19,0	2,6	15,0	30,1
Netherlands	15,9	6,9	10,7	4,1	13,0	2,9	11,4	35,0
Poland	12,8	8,5	11,5	3,3	11,0	2,9	12,3	37,8
United Kingdom	9,9	11,6	6,8	4,6	16,2	2,4	13,8	34,9
USA	12,8	17,6	10,4	1,8	20,5	0,8	16,6	19,4
Ukraine	7,1	8,3	12,6	2,6	8,2	1,9	13,9	45,3
France	13,5	5,7	5,3	5,2	14,9	2,9	11,1	41,4
Japan	12,9	6,4	10,4	5,1	19,9	0,3	10,8	34,1

Source: (Goskomstat, 2011).

Table 1 shows that government expenditures in the Russian Federation in 2008 formed a significant amount of public expenditures. Russia lags behind many countries in the share of health expenditures, social protection, education, recreation, culture and religion expenditures.

The model of the high-cost economy

In principle, the impact of the high cost can be formally analyzed by means of varying of internal consumption a in national income or public expenditures E . However, to enhance the economic aspect of the further analysis, we assume that the expensiveness of the economy can be described by a single aggregate dependence $S_{ex}(t)$, included in the non-productive consumption function $S(t)$:

$$S(t) = a(t)Y(t) + b(t) + S_{ex}(t). \quad (8)$$

We assume that the function of cost $S_{ex}(t)$ is determined by the national income $Y(t)$ and the limiting value of $Y'(t)$ in a linear relationship:

$$S_{ex}(t) = \alpha Y(t) + \beta Y'(t), \quad \alpha > 0, \quad \beta \geq 0. \quad (9)$$

The functional dependence of the form (9) is logical, since virtually all excessive costs in Russia are implicitly treated as a value of income and growth.

The high-cost of Russia economy is caused mainly by severe and extremal conditions of environment, long distances in the very large country, low efficiency of infrastructure and control. Without prejudice to generality, we assume in the model approximation that the value of $S_{ex}(t)$ is completely removed from the amount of the national income, which is reflected in (8). Moreover, there are prerequisites to believe that currently the policy of expensiveness of the Russia's budget aims to increase the intensity of this process; so in (9) it is necessary to adopt dependence of the coefficient β in the following form:

$$\beta > 0, \text{ if } Y'(t) > 0; \quad \beta = 0, \text{ if } Y'(t) < 0. \quad (10)$$

Substitution of (8) and (9) in equation (1) and (2) leads to a differential equation with constant coefficients with respect to the value of national income $Y(t)$:

$$Y'(t) = [(1 - a - \alpha) / (k + \beta)] \cdot Y(t) - (b + E) / (k + \beta). \quad (11)$$

Equation (11) is an analogy of the basic equation (5), but differs in the coefficients. Its solution is similar to the solutions (6), and can be considered as a modified Keynes model (model 2):

$$Y(t) = (Y_0 - Y_{eq}^*) \cdot \exp[(1-a-\alpha)t/(k+\theta)] + Y_{eq}^* \quad (12)$$

where as before, Y_0 is the initial value of the national income at $t = 0$, and Y_{eq}^* is new equilibrium solution, corresponding to the conditions (8) and (9):

$$Y_{eq}^* = (b+E)/(1-a-\alpha) \quad (13)$$

The differential equation (11) as well as the equation (5) is autonomous.

We now turn to the analysis of the solution (12), (13). It is necessary to consider two cases of the sum of the coefficients $a + \alpha$.

A) $a + \alpha < 1$.

The integral curves of (11) for this case are shown in Fig. 2. Firstly, for the same values of the parameters a , k , b and E new equilibrium solution (13) is greater than the base value (6) due to the decrease in the value of the denominator by the amount of α (respectively dashed and solid horizontal lines):

$$Y_{eq}^* > Y_{eq} \quad (14)$$

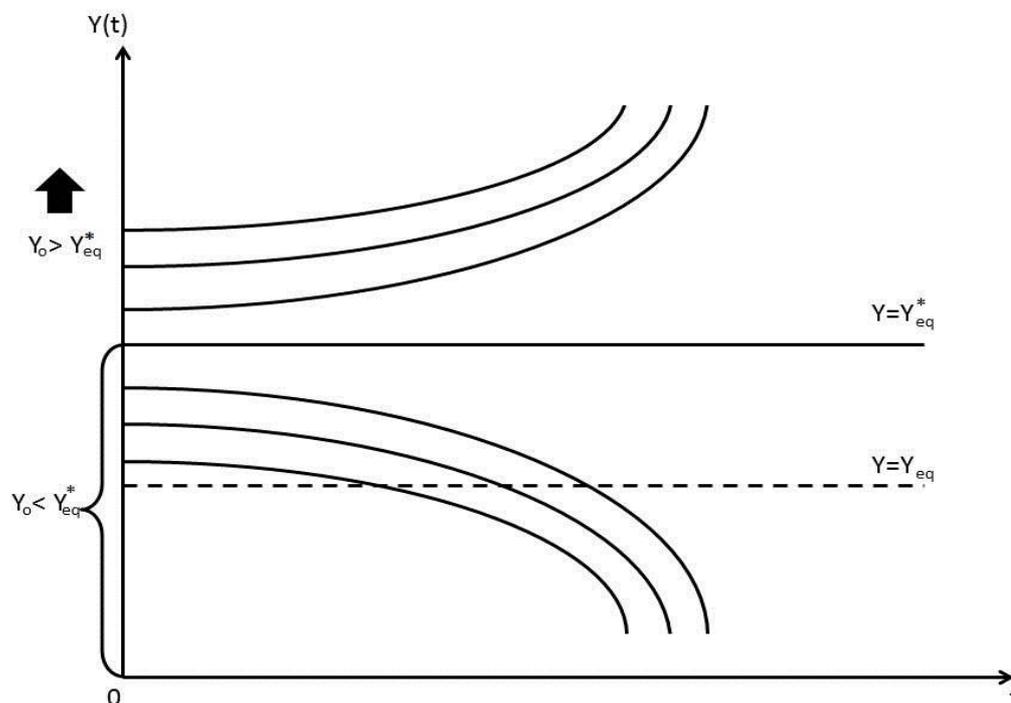


Fig. 2. The integral curves of the equation (11) at $a + \alpha < 1$

As a consequence, in order to ensure the positive dynamics of national income it needs higher initial values Y_0 , which may be difficult to achieve. I.e. if the values a and α increase, the probability of the deteriorating economy scenario increases when $Y_0 < Y_{eq}^*$ (Fig. 2). As in the reference solution (6), for the solution (12) - (13) the point $Y = Y_{eq}^*$ on the phase plane is a point of unstable equilibrium (unstable node).

Secondly, the factor in the exponent in formula (12) has decreased compared to the base solution (6), which leads to slowdown over time of the national income at $Y_0 > Y_{eq}^*$, as well as to the reduction if $Y_0 < Y_{eq}^*$.

B) $a + \alpha > 1$.

This case is realized at large values of budget expensiveness (see the first term in the formula (9)). Then $Y_{eq}^* < 0$, i.e. there is no positive stationary (equilibrium) solution Y_{eq}^* . The exponent index is negative

$$(1-a-\alpha)t/(k+\theta) < 0.$$

The national income decreases and is negative. In this case the negative economy only is possible, i.e. there is disturbance of economy. The integral curves of the equation (11) at $a + \alpha < 1$ are shown on the Fig. 3.

The negative values of equilibrium solution Y_{eq}^* and of national income $Y(t)$ can be interpreted as necessity of internal and external borrowings. But this action leads to significant growth of the public debt and to a set of other attendant negative consequences (Tsvirko, 2003).

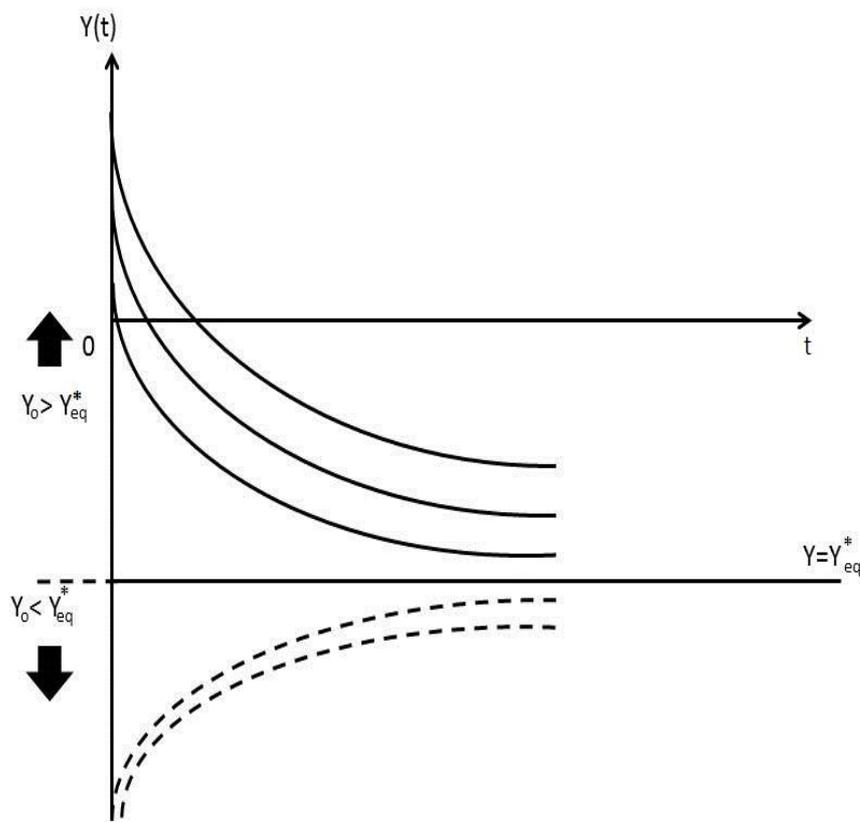


Fig. 3. The integral curves of the equation (11) at $a + \alpha > 1$

In this case the point $Y = Y_{eq}^*$ represents a point of steady equilibrium (stable node). The point on phase plane

$$a + \alpha = 1 \quad (15)$$

is the point of bifurcation of the solution (12)-(13). The unstable node on the phase plane at $a + \alpha < 1$ changes into stable node at $a + \alpha > 1$.

Conclusion

The main causes of high expenditure economy of Russia can be specified as follows:

- Lack of a coherent economic strategy and effective public control over expenditures, prices and inflation;
- Monopoly in the markets and the virtual absence of a competitive energy market in Russia;
- Self-sufficient and overwhelming role of the bureaucracy in the economy. Of course, this factor causes high values of coefficients α and β in the formula of formalized spending (7). According to the latest statistics of the Union of the Industrialists and Entrepreneurs of Russia, bureaucratic pressure on business over the last 6 years has quadrupled;
- Departmental priority in planning and strategic macroeconomics problems' solving;

The really quite often Russian and foreign experts consider that the governmental expenses and, in particular, in performance of investment projects rather low.

But this factor is objective to large degree as it is caused by incomparably big industrial and agricultural expenses in Russia. It is caused by extreme environmental conditions. For example, productivity of wheat in the Western Europe in 2-3 times exceeds a similar indicator in Russia. Thus Russia exports wheat. Besides, any building in Russia demands fundamental preparation as depth of freezing reaches one and a half meter. And all Europe presumes to place even drainpipes directly under sidewalk. Certainly, in others expenditure factors too exist, but only in Russia 70% of territory - it is "permafrost", and productivity and quality of agricultural production are more low for many indicators in comparison other countries. It causes essentially low power efficiency in Russia throughout centuries.

As a result of the expenditure growth, today the prices of foodstuffs and consumer goods in Russia are far ahead of Western counterparts with disparate levels of income and wages of the general population. Conservation of high costs in public expenditures and in non-productive consumption inevitably leads to an actual reduction in the final consumption $b(t)$. This means a drop in the standard of living for the majority of the population, as well as movement to the collapse of

the economy. We can say that the current state of the economy is sufficiently close to the bifurcation point (15). This is the point of failure to return to a growing economy; after that the inevitable rapid destruction of the existing unsustainable economic system will follow.

Thus, it is necessary to consider problems expenditure economy of Russia not only as result not rather efficient management, and as the objective factor of extreme environmental conditions. This factor causes expenditure economy of Russia and as consequence of a problem in management. But as Porter M wrote in the book "The competitive Advantages of Nations» "in process of overcoming of the lack not only is eliminated this lack, but also the technology will be developed with which help the given lack can be overcome».

In our opinion the decision of the given problem can be received at orientation of Russia first of all for export not gas and oil, not wheat and other articles of food (which not competitive will be always capable because of extreme environmental conditions), and the highly technological products and manufacture services. For decrease in expenditure factors of Russia economy it is necessary to sell energy carriers to potential investors only in Russia under the prices to defined requirements of manufacture expansion.

Bibliography

Artemov A.V., Brykin A.V., Shumaev V.A. (2007). Management of the economy based on public sector.

Management in Russia and abroad, 6, 89-106.

SSC. http://www.gks.ru/bgd/regl/b10_51/lssWWW.exe/Stq/07-04.htm

Goscomstat. http://www.gks.ru/bgd/regl/b10_51/lssWWW.exe/Stq/07-04.htm (Date of address: 19.12. 2011).

Krass M.S. (2005). *Mathematics in economics. Foundations of mathematics*. Moscow, FBK-Press, 472 pp.

Krass M.S. (2010). *Modeling of ecological and economic systems*. Moscow, INFRA-M, 272 pp.

Krass M.S., Yurga V.A. (2011). The model of expended Russia economy. *Oeconomia, Aerarium, Jus*, 1(01), 31-36.

Medvedev considers a very high share of government spending in GDP <http://ria.ru/economy/20111028/473531953.html>

Tsvirko S.E. Justification of the debt predictive scenarios (2003). *Models of economic systems and information technology. Proceedings Vol. 11*. Finance Academy under the Government of the Russian Federation, Moscow, 213-228.

OECD Factbook 2011: Economic, Environmental and Social Statistics - ISBN

978-92-64-11150-9 - © OECD 2011. Public finance - Government deficits and debt - Government expenditures, revenues and deficits. http://stats.oecd.org/Index.aspx?DataSetCode=SNA_TABLE11

Stephen G., Cecchetti, Madhusudan Mohanty, Fabrizio Zampolli (2011). The real effects of debt. *Working papers № 352, September*. 34 pp. www.bis.org/publ/work352.htm.

“Socially Disadvantaged Groups and Microfinance in India”

Lore Vandewalle (University of Göttingen, Germany)

In this paper we provide an empirical analysis of the performance of microfinance groups, known as Self-Help groups, based on an original census we carried out in a poor area of Northern India. We examine whether traditionally disadvantaged villagers, such as members of lower castes or landless farmers, are less likely to have access to groups. We also analyze their performance in terms of access to bank loans, which is an important benefit of the groups. We find evidence of the attrition process being selective against lower castes: they have a lower probability of becoming a permanent member of a group. The net effects in terms of their expected access to a bank loan remain however relatively limited. By contrast, even though landless farmers are more likely to fail or leave the groups, they tend to benefit disproportionately. In expected terms, they receive more than two times the amounts of bank loans given to farmers owning more than one acre. Overall, the program therefore has positive and important distributional implications.

“Risk Perception in Jordan”

Mahmaod Al Rawad (Al-Hussein Bin Talal University, Jordan)

Adel Al Khattab (Al-Hussein Bin Talal University, Jordan)

Jehad Aldehayyat (Al-Hussein Bin Talal University, Jordan)

Abstract

The study investigates the risk perception within Jordanian society by adopting the psychometric paradigm, which involves using a survey strategy to obtain required data. The methodology included two phases. The first phase utilizes semi-structured interviews to identify the most relevant risks to the Jordanian society. The second is the distribution of self-administered questionnaire on a wide spectrum of the Jordanian society. This research provides a valuable and crucial insight into the current risk perceptions of the Jordanian public. Specifically, risks that are of more concern to Jordanian society are identified. Furthermore, the findings of the current research act as a guide for policy makers in Jordan in order to enable them to see what are the risks that laypeople in Jordan are concerned with.

1. Introduction

Over the past few decades, risk perception has attracted much interest from both policymakers and researchers (Keller *et al.*, 2012). However, the first systematic study of the risk perception was reported by Sowby in 1965 as an attempt to understand people reaction to nuclear power and other new technologies. Since that date risk perception became an interesting area of research and several models and theories have been developed in an attempt to understand how individuals and groups perceive risks associated with different technologies and activities, such as, cultural theory and psychometric paradigm which will be explained later with more details

Nowadays, risk perception has become increasingly important not only in risk management and psychology fields, but also in several fields and areas, for example, health and safety (e.g. Lundborg, 2007; Lundborg and Andersson, 2008), food risk and the use of nanotechnology in food industry (e.g. Leikas *et al.*, 2007; Siegrist *et al.*, 2007), transportation (e.g. Delhomme *et al.*, 2009; Nordfjærn, 2011; Şimşekoğlu *et al.*, 2012), environmental risk and climate changes (e.g. Keller *et al.*, 2012; Abarra, 2012) and several other fields. This importance could be contributed to two main reasons. First relates to the communication of risks. Given that risk communication aims to provide ordinary individuals with the necessary information they need to make informed decisions about risks to their health, safety and environment (Thomson *et al.*, 2003). Secondly, it is essential to know what concerns people and why, so that these views can be "incorporated into important political decisions" (Thomson *et al.*, 2003:25), and an appreciation of the fears and concerns of people from different technologies and activities can be used to good effect in the improvement of these technologies and activities if possible.

Despite the vast and expanding research efforts in this area, the analysis of the current literature shows that much of the research conducted, mainly, in developed countries or western countries, such as, Australia (Eiser *et al.*, 1990; Rohrmann, 1994), Turkey and Norway (Şimşekoğlu *et al.*, 2012; Thomson *et al.*, 2003), Chile (Bronfman *et al.*, 2007) Finland (Räsänen *et al.*, 2012), France (Bastide *et al.*, 1989), Japan (Hinman *et al.*, 1993), Sweden (Sjöberg, 1999, 2000), United Kingdom (Eiser *et al.*, 1990), and United States (Fischhoff *et al.*, 1997) and less or no attention has been given to the Middle Eastern region. Therefore, this research takes one step in addressing this research gap by providing an insight to the Jordanian society risk perception.

Jordan presents a challenging area for analysis given the unique geographical location, which makes Jordan surrounded by zone of tension. This arises from the fact that Jordan shares the borders with Iraq, Palestine, Syria and Saudi Arabia. This unique location directly affects Jordan economically, politically and socially, given the fact that Jordan is a small country in comparison with its neighbouring countries. Moreover, any tense situation in the region will have its impact on Jordan at the level of economy, society and politics. Hence, this research investigates the risk perception within Jordanian society by adopting the psychometric paradigm which involves using a survey strategy to obtain required data. The methodology includes two phases. The first phase utilized the semi-structured interviews in order to identify the risks that are most related to the Jordanian society. The second phase of the study involved using self-administered questionnaire which has been distributed to wide spectrum of the Jordanian society

2. Background

The beginning of risk perception research, as pointed out by Sjöberg *et al.* (2004), can be traced to the nuclear debate of the 60s when Sowby (1965) suggested risk comparisons which for a while were believed to be very important to risk communication. In 1969 Starr showed that risk acceptance was related not only to technical estimates of risk and benefits but also to a subjective dimension, such as, voluntariness. However, even though Starr's choice of data was criticized, his study has gone some way towards enhancing our understanding of risk perception.

However, Weber and Hsee (2000) identified three approaches by which researchers studied laypeople risk perception. Firstly, the axiomatic measurement paradigm approach involves studies which have mainly focused on the way in which people subjectively transform objective risk information, such as, mortality rates or financial losses and their likelihood of occurrence, in ways that reflect the impact that these events have on their lives. Secondly, studies within the socio-cultural paradigm have examined the effect of group- and culture-level variables on risk perception. Finally, the

psychometric paradigm has identified people's emotional reactions to risky situations that affect judgments of the riskiness of physical, environmental, and material risks in ways that go beyond their objective consequences. Within the *axiomatic measurement paradigm*, Starr (1969) developed and tested a model based on the economic model of rational behaviour and inspired from the notion that man learns by trial, error and subsequent corrective actions to arrive at a reasonable balance between the benefit from an activity and its risk (Slovic, 2000). Accordingly, based on this process, Starr argued that, society has arrived at a balanced point between the amounts of risks and benefits the society willing to offer for the specific technologies or activities. This means that the current risk levels can be considered acceptable for the society at an aggregate level. Starr attempted to examine this model by using published economic data for some common activities. Thus, he defined risk associated with any activity as the fatality rate per hour of exposure from this activity. On the other hand, the benefits were defined in terms of the average amount of money spent on the specific activity by a single participant or the average contribution the activity made to a participant's annual income. One of his main findings was the *law of acceptable risk*. This stated that the public seems willing to accept risk from voluntary activities, such as skiing, roughly 1000 times greater than it would tolerate from involuntary activities, such as from food preservatives, which may provide the same level of benefit. Furthermore, the acceptable level of risk was inversely related to the number of persons exposed to that risk. Finally, the law of acceptable risk shows that the level of risk tolerated for a voluntarily accepted hazard was quite similar to the level of risk from disease (Starr, 1969). However, Starr's revealed preferences model suffered from a variety of limitations. For example, Fischhoff *et al.* (1978) pointed out that the revealed preferences model assumes that past behaviour reflects present preferences, though, with the rapid increase in technology and the improvement in human life, one cannot say that our future preferences will be the same as before. In addition, Otway and Cohen (1975) have shown that the quantitative conclusions derived from an analysis the same as Starr used are extremely biased to the way in which measures of risk and benefit are computed from the historical data. Besides, the market price may not reflect the real cost or risk, so for example, the price of cigarettes does not take account of smokers' higher probability of heart disease or cancer (Slovic, 2000). However, the main contribution from the revealed preferences model is that it provided an impetus for future research within the cognitive paradigm.

Douglas and Wildavsky (1982) developed the cultural theory of risk perception when they tried to study the relationship between risk and culture. They addressed the influence of culture on both the perception of risk and on its acceptability. The researchers provide convincing evidence that group conflicts over risk are best understood in terms of plural social constructions of meaning, and that competing cultures give different meanings on situations events, objects, and relationships (Weber and Hsee, 2000). According to Douglas' theory, people can be classified based on two dimensions grid and group. There are four types or worldviews: *egalitarian*, *individualistic*, *hierarchic*, and *fatalistic* (Sjöberg, 2000). The concept of group refers to the extent to which an individual becomes incorporated into relationships with others and the grid refers to the rules, norms, constraints and customs, which maintain distinctions between individuals. This approach, however, as with the previous approach, has been criticized from authors who view attitudes toward risk as the result of conflict and of interaction of different cultural influences on an individual or group; therefore they consider this approach as too simple to explain and understand laypeople risk perception (Guillaume and Charron, 1999). The psychometric paradigm, on the other hand, is the most common approach used in risk perception studies (Sjöberg *et al.*, 2004; Bronfman *et al.*, 2007). It was developed by Paul Slovic and a team of researchers from Oregon when they attempted to replicate Starr's study. However, rather than just ask about risk and benefit, the team utilised personality theory, and extended their study through asking people to characterise the personalities of hazards by rating them on various qualities or attributes (e.g. catastrophic potential, volutariness, controllability and dread) that had been hypothesised to influence risk perception and acceptance (Slovic, 2000). In addition, the researchers used a variety of psychometric scaling methods to produce quantitative measures of perceived risk. They aimed to gain an insight into people's perceptions of the frequency and probability of risks, with a view to establishing the extent to which they are biased of contain inaccuracies and to understand the cognitive process underlying such judgements. By means of factor analysis, it was shown that people's risk perception of various risks sources are related several factors. These included (Slovic, 1992):

- Dread Risk- This is characterised by a perceived lack of control, dread, catastrophic potential, fatal consequences, and inequitable distribution of risks and benefits
- Unknown Risk- defines a hazard judged to be unobservable, unknown, new, and delayed in their manifestation of harm, and
- Numbers Exposed- reflects the perceived number of people exposed to the risk.

Numerous studies carried out within this approach have shown that perceived risk is quantifiable and predictable. This makes the psychometric paradigm suitable for identifying similarities and differences between groups with regard to risk perceptions. Studies have also shown that risk means different things to different people. For example, when experts judge risk, their responses refer to the technical estimates of annual fatalities. On the other hand, laypeople's judgments of risk are related more to other hazard characteristics, such as, catastrophic potential and threat to future generation (Slovic, 2000).

However, similar to the previous approaches to risk perception, the psychometric paradigm has received a fair amount of criticisms. For instance, one of the main criticisms of the psychometric paradigm is that the model has relied on a top-down approach, which makes some authors claim that the result produced by this approach is likely to reflect the researcher's initial intuitions (Otway and Tomas, 1982). In addition, the limited samples in the previous research, which usually rely on students or specific groups, bias the results. However, some researches have attempted to avoid this limitation by using data from a representative sample of respondents (e.g. Bronfman *et al.*, 2007).

Most of the reviewed literature have utilised the psychometric approach. This research also adopts the psychometric approach in studying risk perception in Jordan. By using this approach, the researcher aimed to, firstly, reflect as closely as possible, the real risk perception in Jordan. Secondly, to benefit from the previous studies related to risk perception in other countries, the present study sought to make comparisons between Jordan and other countries cited in the literature.

2.1. The Influence of Gender, being a Parent, Age and Occupational Status

In reviewing risk perception studies it can be said that most of these based their respondent samples on unplanned groups rather than targeting specific groups, such as, students or convenience samples. However, some trend in risk perception studies tends toward socio-economic comparisons, in which researchers have aimed to assess how different groups in the same culture perceived risk. One of these was conducted by Rohrmann (1999) in his studies of risk perception and attitudes in Germany, Australia, New Zealand and China. His samples were targeted toward professional groups, which included people from a technological, ecological or feminist originations and scientists from different fields such as psychology, technology, and geography. Rohrmann found that there was a different risk perception among countries as well as among the groups that he used in his studies. He also found that the differences between countries were less pronounced than between the studied groups within one country. Hence, the current paper acknowledged the differences between different groups in the society. Therefore, the current research adopted intercultural risk perception by study the risk perception among different groups and segments of the Jordanian society including; gender, age, Occupation and being a parent.

The influence of gender has been well documented (e.g. Andersson and Lundborg, 2007; Lundborg and Andersson, 2008; Slovic *et al.*, 1997; Flynn *et al.*, 1994; Slovic *et al.*, 1997). For instance, Andersson and Lundborg (2008) stated that the perception of road-traffic accidents differ by participant gender. Similarly, Lundborg and Andersson (2008) found that females perceive smoking to have a greater risk than men. Further, gender difference was significant for nuclear waste, and nuclear power plants hazards. On the contrary, women were more likely to agree that it can never be too expensive to reduce the risks associated with chemicals (Slovic *et al.*, 1997).

Method

The present research utilises the methodology introduced originally in the Fischhoff *et al.* (1978) US study. However, the original design was adapted significantly to produce a much wider and more relevant set of risks that are more applicable to Jordan respondents.

2.2. Sample:

A total of 515 persons participated in this study. The subjects formed two different groups, and the categories were undergraduate students and other professionals groups (including university professors, teachers, doctors, and semi skilled and skilled workers). The participants' distribution is shown in *Table 1*.

Table 1. Participants by group.

Gender	Students		Professional		Total	
	M	F	M	F	M	F
Frequency	80	60	265	110	345	170
Percentage	57%	%43	%70	%30	%67	%33

We attempted to keep some balance regarding the participant from both gender, however, male respondents rate tend to be higher than the female, as can be seen on the Table 1.

The age distribution was as follow:

Table 2. Participants by Age.

Age	< 20	21-30	31-40	41-50	> 51	Total
Frequency	63	94	121	152	85	515
Percentage	12%	18%	23%	30%	17%	100%

2.3. Setting and Data Collection Procedure

Data were collected in two stages. The first stage involved a semi structured interview with 30 participants to identify the most relevant risks to the Jordanian society. Based on the semi structured interview findings a list of 25 different risks was identified *see Table 3*.

Table 3. List of Identified Risks

Risk Item	Risk Item	Risk Item	Risk Item
Alcohol	Vaccination	Warfare	Nuclear Power
Handguns	Refugee Influx	Smoking	Illegal Drugs
Car accident	Global Warming	Unemployment	Food Preservatives
Inflation	Robbery	Gen Technology	Side effect (Drugs)
National conflicts	Earthquake	Assault	Extreme Poverty
Pesticides	Flood	Fire	Terrorist Attack
Industrial Pollution			

Approximately one month after conducting the interviews, two research assistants administered the surveys to the target population. The survey was distributed over two month period of time. An overall number of 600 questionnaires were handed to the participants. In order to guaranty a high response rate the researchers choose to deliver and receive the questioner by hand. The distribution of the sample is shown in Table 2.

2.4. Measures

The questionnaire was divided into two main sections. In the first section, participants reported personal demographical variables including (age, gender, occupation, marital status, number of children). The second section participants were asked to rate different type of risks based on seven different risk attributes that been widely used in risk perception research (Voluntariness of risk, Immediacy of effect of risk , Knowledge about Risk, Control over risk, Newness of risk, Chronic- Catastrophic, Common- Dread).

3. Results

To examine how people perceive risk in Jordan, the questionnaire data were first subjected to principal-components factor analysis (PCA) in order to reduce the number of variables to a smaller number of factors for modelling purposes. Further, to detect a structure in the relationship between variables (Bronfman *et al.*, 2007). As pointed out by Slovic (2000), the early work within the psychometric paradigm, led to the representation of hazards within a two-dimensional space derived from factor analysis. The factors in this space reflect the degree to which the risk from a particular hazard is understood and the degree to which the risk evoked a feeling of dread. Factor loadings across the seven risk characteristics are illustrated in *Table 3*.

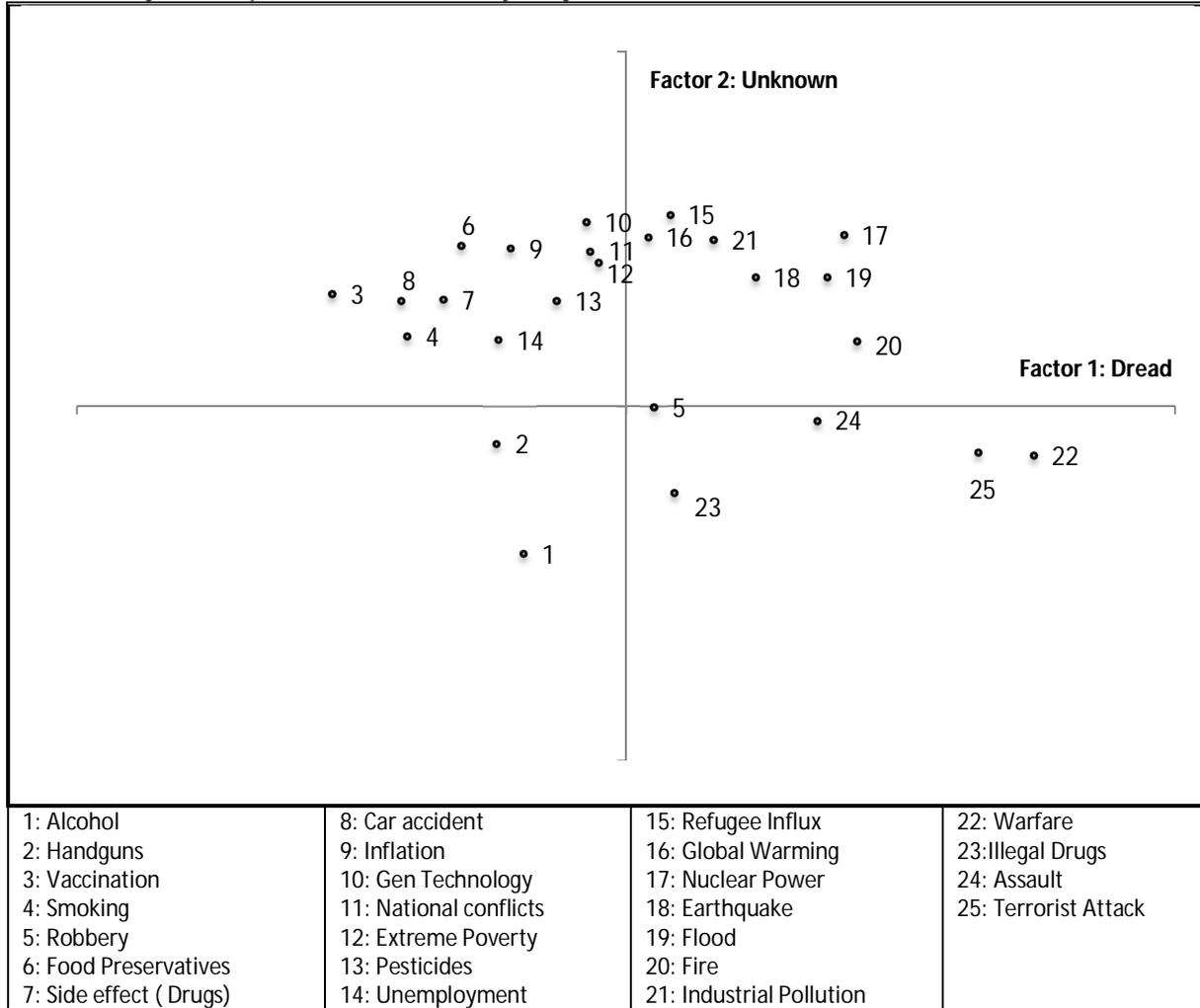
Table 3: Factor Loadings across Seven Risk Attributes

Risk attributes	Factor 1	Factor 2
Knowledge	0.727	0.272
Newness	-0.657	0.077
Common/ Dread	0.214	0.708
Control	0.264	-0.464
Immediacy	0.857	0.065
Chronic/ Catastrophic	-0.118	0.844
Voluntariness	-0.655	0.357

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a Rotation converged in 3 iterations.

The above table shows the degree to which each risk attributes is correlated with each of two underlying factors. The absolute values of the risk attributes' weight should be more than 0.45 to represent a factor (Rust and Golombok, 1989). Hence, it can be seen that the first factor represents four risk attributes these are; *knowledge* about risk, the *newness* of the risk, *immediacy* and *voluntariness* of the risk, the second factor is found to be highly correlated with three risk attributes, *common/dread*, *chronic/catastrophic* and *controllable*. Further, the factor score for each of the studied hazard were obtained and listed in new column and used to plot the hazards according to their location from their designated factor. Research has shown that laypeople's perceptions of risk tend to be closely related to the position of a hazard within the factor space (Slovic, 2000). A cognitive map of the participants' perception of risk is provided in *Figure 1*.

• **Cognitive Map for the Jordanian Society 1: Figure**



The above Figure helps to clarify the nature of the two factors. The upper extreme of *factor1* is associated with the perception of unknown, new, delayed and involuntary items. The lowest case of the first factor is associated within perceptions relating to known, old, immediate and voluntary attributes. On the other hand, the upper extreme of *factor 2* is associated with the perception of uncontrollable, catastrophic and dreaded risks. The lower case of *factor 2* is associated with controllable, chronic and common risks.

The most prominent result to emerge from *Figure 1* is the positions and close proximity of the risk items 22 'Warfare' and 25 'Terrorist attack'. Clearly, the current Jordanian sample viewed the risks from these activities as more dreadful, more catastrophic and more uncontrollable than any of the others. Items such as 'Nuclear power'(17) and 'Fire'(20) are also placed relatively high on the dread dimension of factor 2; but these items are also high on factor 1 being perceived as newness, more delayed, and unknown than *Terrorist attack* (25) and *Warfare* (22). On the other hand, the highest items on factor 2; *Refugee Influx* (15) and *Gene technology* (10), are relatively mid-range on factor1.

It is also interesting to note those items placed in the bottom left quadrant of the cognitive map. That is, items low on both factors perceived to be common, controllable and known risks include *Alcohol* (1) and *Handgun* (2)

4. Discussion

The present research explored the risk perception of the Jordanian society by way of a self-administered questionnaire utilising the psychometric paradigm as a basis for the research. The aim was to conduct an exploratory examination of Jordanian risk perceptions of various activities and technologies and compare it with other countries.

The most significant finding of the current research was that warfare and terrorist attack were by far the most dreaded risks. This finding contrasts dramatically with the findings from most other countries where nuclear power seems to dominate that position (e.g. Slovic *et al.*, 1997; Hinman *et al.*, 1993; Fischhoff *et al.*, 1978; Sjöberg *et al.*, 2000; Thomson *et al.*, 2003). Clearly, in the present circumstances, this particular finding is not surprising given the fact that Jordan was involved in war in three occasions (1948, 1967 and 1974). In addition, the present study has been conducted after a major war in the approximate area between USA and Iraq and in the shadow of the Arab Spring. These conflicts may have caused the fear of warfare to increase among the current Jordanian respondent.

It is also not surprising that the results suggested that flood and storms risks were among the highest on the dreaded dimension. Given that the climate and geophysical particularities of Jordan is desert, it is not surprising that the results

suggested that the risk of flood was among the highest on the dreaded dimension. However, deserts are known to experience two very opposite climate conditions, sandstorms in the summer and floods in the winter. Another interesting finding highlighted in the current study is that of perceptions about risk related to gene technology. This risk was perceived by Jordanian respondents to be unknown, new, delayed and involuntary. This contrasts sharply with a Nelson (2001) who found that European societies in general tend to perceive this risk to be extremely dreaded, catastrophic and uncontrollable. However, in the United States people were found to perceive this risk as known and old. This research was based on the psychometric paradigm and as such potential limitations would be reflected by the well documented limitations of this approach. A significant limitation of this approach is the assumption that people can provide meaningful answers to difficult and sometimes impossible questions (e.g. what are the risks of gene technology?). Furthermore the reported results depend mainly on the set of hazards studied, and not a more generalised approach to risk perception. These criticisms apply for this study, although a great amount of effort has been made during the design stage in order to obtain a represented and yet a balanced set of hazards that were refined through the use of semi structured interview.

References

- Aberra, Y. (2012) Perceptions of climate change among members of the House of Peoples' Representatives, Ethiopia. *Journal of Risk Research*, Vol.15 (7), pp. 771-785.
- Andersson, H. & Lundborg, P. (2007) Perception of own death risk: an analysis of road-traffic and overall mortality risks. *Journal of Risk and Uncertainty*, Vol.34 (1), pp. 67-84.
- Bastide, S., Moatti, J.-P., Pages, J.-P. & Fagnani, F. (1989) Risk perception and the social acceptability of technologies: the French case. *Risk Analysis*, Vol.9 (2), pp. 215-223.
- Bronfman, N. C., Cifuentes, L. A., DeKay, M. L. & Willis, H. H. (2007) Accounting for Variation in the Explanatory Power of the Psychometric Paradigm: The Effects of Aggregation and Focus. *Journal of Risk Research*, Vol.10 (4), pp. 527-554.
- Delhomme, P., Jean-François V & Cécile M (2009) Are drivers' comparative risk judgments about speeding realistic? . *Journal of Safety Research*, Vol.40, pp. 333-339.
- Douglas, M. & Wildavsky, A. (1982) *Risk and Culture: As Essay on the Selection of Technological and Environmental Dangers*, Berkeley, University of California press
- Eiser, J. R., Hannover, B., Mann, L., Morin, M., Van der Pligt, J. & Webley, P. (1990) Nuclear attitudes after Chernobyl: a cross-national study. *Journal of Environmental Psychology*, Vol.10, pp. 101-110.
- Eiser, J. R., Hannover, B., Mann, L., Morin, M., Van der Pligt, J. & Webley, P. (1990) Nuclear attitudes after Chernobyl: a cross-national study. *Journal of Environmental Psychology*, Vol.10, pp. 101-110.
- Fischhoff, B., Slovic, P., Lichtenstein S., Read, S. & Combs, B. (1978) How Safe is Safe enough? A Psychometric Study of Attitudes toward Technological Risk and Benefits. *Policy Science*, Vol.9.
- Guillaume, B., and Charron, S., (1999) Exploring Implicit Dimensions Underlying Risk Perception of Waste from Mining and Milling of Uranium Ores in France. France Institute for Protection and Nuclear Safety.
- Hinman, G. W., Rosa, E. A., Kleinhesselink, R. R. & Lowinger, T. C. (1993) Perceptions of nuclear and other risks in Japan and the United States. *Risk Analysis*, Vol.13, pp. 449-455.
- Keller, C., Bostrom, A., Kutttschreuter, M., Savadori, L., Spence, A. & White, M. (2012) Bringing appraisal theory to environmental risk perception: A review of conceptual approaches of the past 40 years and suggestions for future research. *Journal of Risk Research*, Vol.15 (3), pp. 237-256.
- Leikas, S., Lindeman, M., Roininen, K. & Lohteenm ki, L. (2007) Food risk perceptions, gender, and individual differences in avoidance and approach motivation, intuitive and analytic thinking styles, and anxiety. *Appetite*, Vol.48 (2), pp. 232-240.
- Lundborg, P. (2007) Smoking information sources and risk perceptions—new results on Swedish data. *Journal of Risk and Uncertainty*, Vol.34, pp. 217-240.
- Lundborg, P. & Andersson H. (2008) Gender, risk perceptions, and smoking behavior. *Journal of Health Economics*, Vol.27, pp. 1299-1311.
- Nelson, H. (2001) Risk Perception, Behaviour, and Consumer Response to Genetically Modified Organisms: Toward understanding American and European public reaction. *The American Behavioural Scientist*, Vol.44, pp. 1371-1388.
- Nordfjærn, T., Jørgensen, S. & Rundmo, T. (2011) A cross-cultural comparison of road traffic risk perceptions, attitudes towards traffic safety and driver behaviour. *Journal of Risk Research*, Vol.14 (6)
- Oltedal, S., Moen, B.-E., Klempe, H. & Rundmo, T. (2004) Explaining risk perception: An evaluation of cultural theory. Rotunde, Department of Psychology, Trondheim, Norway, Norwegian University of Science and Technology
- Otway, H. & Cohen, J. (1975) Revealed Preferences: Comments on the Starr benefit-Risk Relationships. *Research Memorandum*, Vol.75-5
- Otway, H. & Thomas, K. (1982) Reflection in Risk Perception and Policy. *Risk Analysis*, Vol.1 (2)
- Räsänen, P., Näsi M & Sarpila O (2012) Old and new sources of risk: a study of societal risk perception in Finland. *Journal of Risk Research*, Vol.15 (7), pp. 755-769.
- Rohrmann, B. (1994) Risk Perception of Different Societal Groups: Australian finding and cross-national comparison *Australian journal of psychology*, Vol.46 (3), pp. 150-163.
- Rohrmann, B. (1999) *Risk Perception Research: Review and Documentation*, Melbourne, University Press.
- Rust, J. & Golombok, S. (1989) *Modern Psychometrics: The Science of Psychological Assessment*, London, Routledge. Department of Psychology, Trondheim, Norway, Norwegian University of Science and Technology
- Siegrist, M., Cousin, M. E., Kastenholz, H. & Wiek, A. (2007) Public acceptance of nanotechnology foods and food packaging: The influence of affect and trust. *Appetite* Vol.49 (2)

- Şimşekoğlua, O., Nordfjærnb T & Rundmob T (2012) Traffic risk perception, road safety attitudes, and behaviors among road users: a comparison of Turkey and Norway *Journal of Risk Research*, Vol.15 (7), pp. 787-800.
- Sjöberg, L. (1999) Political Decisions and Public Risk Perception. *the third international public policy and social science conference*. Oxford, St Catherine's College.
- Sjöberg, L. (2000) Factors in Risk Perception. *Risk Analysis*, Vol.20 (1).
- Slovic, P. (1987) Perception of Risk. *Science*, Vol.236, pp. 280-285.
- Slovic, P. (1993) Perceived Risk, Trust, and Democracy. *Risk Analysis*, Vol.13, pp. 32-39.
- Slovic, P. (2000) *The Perception of Risk*, London, Earthscan Publications.
- Slovic, P., Finucane, M. L., Peters, E. & MacGregor, D. G. (2004) Risk as analysis and risk as feelings: Some thoughts about affect, reason, risk, and rationality. *Risk Analysis*, Vol.24 (2), pp. 311 - 322.
- Slovic, P., Malmfors, T., Mertz, C., Neil, N. & Purchase, F. (1997) Evaluating Chemical Risks: Results of a Survey of the British Toxicology Society. *Human and Environmental Toxicology*, Vol.16, pp. 289-304.
- Sowby, F. (1965) Radiation and Other Risks. *Health Physics*, Vol.11.
- Starr, C. (1969) Social Benefit versus Technological Risk. *Science*, Vol.165, pp. 1232-1238.
- Thomson, M., Önkâl-Atay, D. & Güvenç, G. (2003) A Cognitive Portrayal of Risk Perception in Turkey: Some Cross-national Comparisons. *Risk Management*, Vol.5 (4), pp. 25-35.
- Weber, U. & Hsee, K. (2000) Culture and Individual Judgment and Decision Making. *Applied Psychology, an international review*, Vol.49 (1), pp. 32-61.

“Quality Criteria in Official Development Aid”

Sergio Irazo (Universidad Autónoma de Madrid, Spain)

Abstract

The paper aims to identify potential International Cooperation issues subject for improvement through the implementation of quality criteria. The first section identifies basic economic development variables and the role of quality in economic development.

Analysis was performed on quality and productivity variables in order to establish potential existing liaisons and revealing that the productivity of an economy grows as the density of quality certifications in the economy grows. Analysis reveals stronger correlation in countries with higher GDP per capita.

Productivity data refers to the compound annual growth rate (“CAGR”), from year 2000 to year 2009, of the gross value added (“GVA”) by employee of each country. Gross value added at factor cost is derived as the sum of the value added in the agriculture, industry and services sectors as estimated by the World Bank. Total employment data included in the World Bank database shows the total number employed ages 15 and over, as estimated by the International Labour Organization (“ILO”).

Quality data was prepared on the base of the density of quality certifications. It contains the CAGR, from year 2000 to year 2009, of total ISO 9001 quality certifications per 10.000 employees by country.

Data was classified according to income groups as listed in the Development Aid Committee (DAC) list prepared by the OECD and approved in 2009.

(i) Group 1&2, includes countries with GDP p.c. lower than US\$ 935

(ii) Group 3, includes countries with GDP p.c. between US\$ 936 and US\$ 3.705

(iii) Group 4, includes countries with GDP p.c. between US\$ 3.706 and US\$ 11.455

(iv) Group 5, includes all other relevant countries with GDP p.c. higher than US\$ 11.456 (i.e., countries that don't qualify as ODA recipients).

Estimations indicate that, in developed countries, for every 5% increase in the density of quality certifications productivity increases by 2%. The pattern of the prediction curve also reveals diminishing returns at high levels of growth in the density of certifications.

Keywords: International Cooperation, Economic Development, Quality, Forecasting, DAC countries, Official Development Aid.

Section 1- Introduction

International Cooperation (“IC”) and the multilateral system is the best system that we have in order to approach and find adequate solutions to challenges confronting developing countries in the current International arena. This mechanism is supported by civil society as a means of promoting an equitable and impartial distribution of funds to populations in need (SMFA, 2009), and aimed to improving the quality and efficiency of the Official Development Aid (“ODA”)⁶⁸. In order to maintain public support of this tool of international relations there must be an effort to guarantee transparency and quality information about the management and use of these public funds.

The Paris Declaration and the Accra Agenda for Action (“AAA”) were designed to promoting an improvement of effectiveness in ODA. These documents have deeply influenced ODA policy and they are the main sources for change within the IC community. The principles described within these documents have triggered a process for quality improvement that requires adaptation of all countries, both donors and recipients of ODA.

During this adjustment process, several reports highlighting deficiencies and weaknesses in IC have been produced. These reports reveal that ODA underperforms commitments by donor countries like France, Germany or Italy (OECD, 2011).

Scope of the paper

This paper aims to identify potential IC issues subject for improvement through the implementation of quality criteria. The paper consists in two sections:

1. Section 2 identifies basic economic development variables and the role of quality in economic development.
2. Sections 3 and 4 analyze the estate of ODA and propose a line of action for Spanish IC consistent with a model for quality improvement within IC policy.

⁶⁸ Ayuda oficial al desarrollo (“AOD”), in Spanish.

Section 2 – The importance of quality

A. Quality

There is plenty of literature regarding the concept of “Quality” and the impact of quality and lack of quality in production and processes. Among all definitions set for quality, the one offered by Joseph M. Juran stands out for its simplicity: “Quality consists in the lack of errors” (Juran & Gryna, 1988). If any type of deficiency causes economic losses and/or dissatisfaction the goal of any type of product and service should include the maximization of quality offered by the overall set of characteristics.

Authors like Philip B. Crosby (1979) or William E. Deming (1986) have emphasised the Concepts of “Zero defects” or “Total quality” as the only goal for production of products and services.

Quality, as we know it today, begins with the introduction of capitalism in modern society and with the industrialization, due to the increase of production volumes and commercial activity. According to Paul G. Agnew, first permanent Secretary of the American Engineering Standards Committee (“AESC”)⁶⁹, economic activity made evident the urgent need for standards to eliminate bottlenecks and to facilitate flows, especially in transition hubs amid factories and markets, between customers and suppliers (Yates & Murphy, 2009). Quality also implies the fulfilment of customer and stakeholder’s needs, expectations and requirements. Furthermore, one important goal of standardization and quality has been and improvement of health and safety regulations of employees by replacing laws that were hampering accident prevention⁷⁰ (CDC, 1999). The first American Standard Safety code was approved by the in 1921, only two years after its was founded (ANSI, 2011).

Table 1 – Historical local, national and international standardization committees

Association	Abbrev.	Country	Founding year
Engineering Standards Committee	BESA	United Kingdom	1901
International Electro-technical Commission	IEC	EE.UU.	1904
American Engineering Standards Committee	AESC	EE.UU.	1918
International Standards Association	ISA	EE.UU.	1926
International Standards Organization	ISO	Suiza	1946

Source: Internet research: Available at: www.ansi.org and www.iso.org

B. Economic development

The definition for “development” of a nation and the main indicators for its measurement have been traditionally linked to economic terms (Varela de Ugarte, 2007). Indeed, the most extensive historical homogeneous data compilation includes socio-economic variables such as GDP and population. It is not until the 70s or 80s when information and data about a broader number of topics were covered and compiled by multilateral organizations (Banco Mundial, 2011). The most accepted belief back then was that improvements in GDP per capita were followed by improvements in health, education and other components of social welfare (García-Verdugo, s.a.).

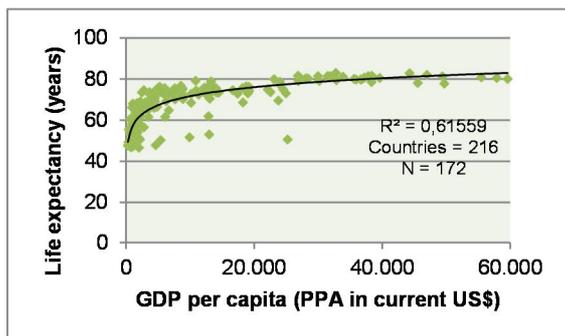
This hypothesis has sense. If we analyze relations among those variables in a global level we can observe strong correlations between GDP per capita, life expectancy and education. Furthermore, there is a negative correlation between income and infant mortality.

Dispersion graphs show a logarithmic pattern of the prediction curve in the case of GDP per capita and both life expectancy and education. In the case of GDP per capita and infant mortality the prediction curve has a stronger correlation when following an exponential pattern. These graphs indicate a greater frequency of cases in countries with lower levels of income.

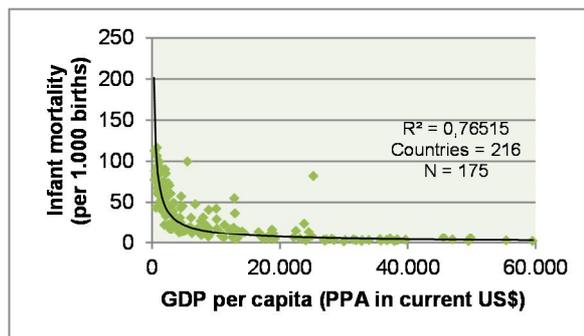
⁶⁹ AESC is the first standardization committee created in the United States on a national level. It was founded in October 1918 and the first permanent secretary was named in 1919.

⁷⁰ In 1913 estimated labour mortality rate in the USA was 61 annual deaths for every 100.000 employees. Such rate, although measured in a different way, dropped to 4 annual deaths for every 100.000 employees in 1997. During that period of time, workforce increased from 39 million to approximately 130 million.

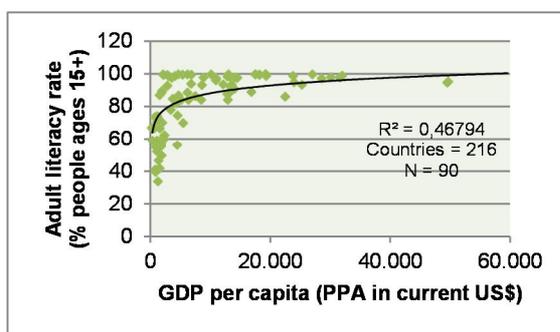
Graph 1 – Relation between income and life expectancy. 2009



Graph 2 – Relation between income and infant mortality. 2009



Graph 3 – Relation between income and education. 2009



Source: World Bank: International comparison program (ICP) database. © 2011 [data extracted on the 23 October 2011]. Available at: <http://data.worldbank.org>. Analysis performed by the author.

(See notes ⁷¹ and ⁷²)

Nevertheless, the analysis indicates that an increase in income is not necessarily followed by proportional improvements of health and education⁷³.

If we look at the evolution of a selection of 12 random countries⁷⁴ we can observe that those countries with higher literacy rates in 1980 had higher GDP per capita in that year and maintain a higher ranking position, in terms of GDP per capita, after 30 years.

⁷¹ Dispersion Graph 1 shows gross domestic product (“GDP”) per capita and life expectancy at birth of all countries of the world for the year 2009. Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life derived from estimations by the World Bank with data from United Nations Population Division: World Population Prospects: The 2008 revision, Eurostat: Demographic Statistics, Secretariat of the Pacific Community: Statistics and Demography Programme, Census Reports and other statistical publications from national statistical offices.

⁷² Infant mortality rate included in the ICP data of Graph 4 is the number of infants dying before reaching one year of age, per 1,000 live births in a given year. Estimates developed by the UN Inter-agency Group for Child Mortality Estimation (UNICEF, WHO, World Bank, UN DESA, UNPD).

⁷³ The correlation between CAGR of GDP per capita and CAGR of literacy rates of selected countries for the 30-year period has a value close to 0 ($R^2 = 0,02$).

⁷⁴ Countries randomly selected according to available information for the period ranging from 1980 to 2009.

Table 2 – Income and education of sample countries. 1980-2009

País	GDP pc (PPA)		CAGR	Literacy rate		CAGR
	1980	2009	1980/2009	1980	2009	1980/2009
Hungary	4.930	19.260	4,81%	98,9	99,4	0,02%
Trinidad and Tobago	6.930	23.800	4,35%	95,0	98,7	0,13%
Argentina	4.760	14.100	3,82%	93,9	97,7	0,14%
Panama	2.790	12.210	5,22%	88,1	93,6	0,21%
Mexico	3.750	13.610	4,55%	83,0	93,4	0,41%
South Africa	4.010	10.010	3,20%	76,2	88,7	0,56%
Brazil	3.330	10.140	3,91%	74,6	90,0	0,67%
Malaysia	2.240	13.410	6,37%	69,5	92,5	0,99%
Indonesia	610	3.910	6,62%	67,3	92,2	1,13%
Turkey	2.120	14.040	6,74%	65,7	90,8	1,12%
Comoros	580	1.080	2,17%	47,9	74,2	1,52%
Mozambique	210	880	5,06%	27,1	55,1	2,47%

Source: World Bank: International comparison program (ICP) database. © 2011 [data extracted on the 23 October 2011]. Available at: <http://data.worldbank.org>. Analysis performed by the author.

(See notes ⁷⁵, ⁷⁶ and ⁷⁷)

In other words, due to existing difficulties and expected overstrain required for scaling up from low-income levels, modern approaches to development take into account other social variables. Thus, improvement in health and education, among other factors, has become more relevant during last decades.

Nevertheless, data shows that those countries with higher levels of GDP per capita enjoy better levels of health and education, hence actions directed to improve the relative position of income per capita would be reflected in the improvement of other basic development variables.

⁷⁵ The GDP data extracted from the ICP is gross domestic product converted to international dollars using purchasing power parity rates as estimated by the World Bank. An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data is in current international dollars.

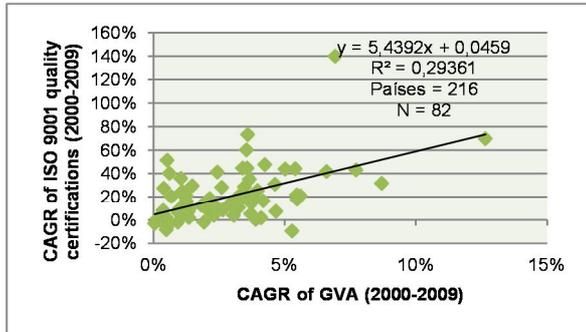
⁷⁶ Adult literacy rate included in the ICP is the percentage of people ages 15 and above who can, with understanding, read and write a short, simple statement on their everyday life as estimated by United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics.

⁷⁷ Last available data for Brazil and Indonesia corresponds to year 2008 (2007 for South Africa).

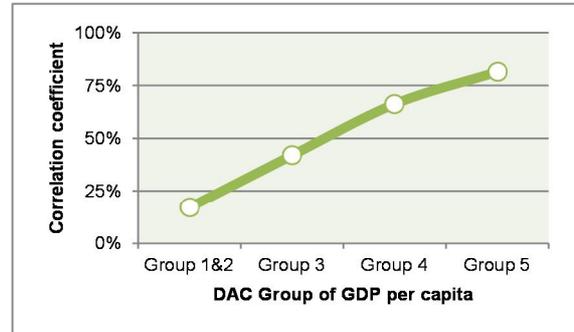
C. Quality and its contribution to development

Once the concept of development has been defined we proceeded to study the implications of quality in the economic development of nations.

Graph 4 – Relation between quality certifications and productivity growth



Graph 5 – Relation between quality and productivity depending on income



Source: World Bank and ISO survey 2009: International comparison program (ICP) database. © 2011 [data extracted on the 24 October 2011]. Available at: <http://data.worldbank.org>. Data o ISO 9001 quality certifications obtained from the ISO survey 2009 and provided by AENOR. Analysis performed by the author.

(See note ⁷⁸)

Analysis was performed on quality and productivity variables in order to establish potential existing liaisons and revealing that the productivity of an economy grows as the density of quality certifications in the economy grows, although this relation is much more clear and direct in developed countries than in less developed countries⁷⁹.

Exploring the simple regression between these variables we can initially observe a weak correlation. Nevertheless, when we break down the analysis with regard to the GDP per capita we find a stronger correlation between quality and productivity as the income of a country increases.

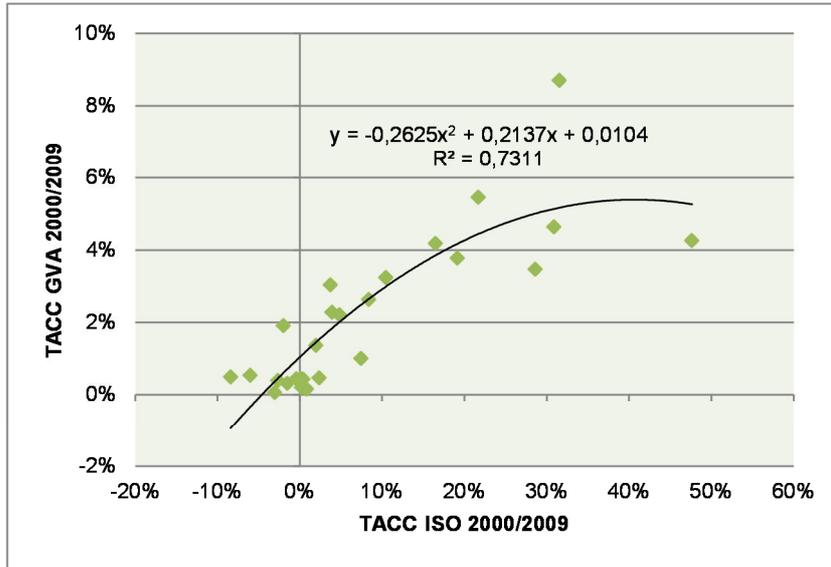
Estimations indicate that for every 5% increase in the density of quality certifications productivity increases by 2%. The pattern of the prediction curve also reveals diminishing returns at high levels of growth in the density of certifications. As productivity is the value of output per every unit of input introduced we find that there is a substantial improvement of productivity when quality is enhanced.

Lack of quality entails to a level of failures and errors in the management of services and processes that imply an excess of costs or avoidable losses. Quality improvements have a direct impact in economy, allowing for a better use of resources.

⁷⁸ Productivity data refers to the compound annual growth rate (“CAGR”), from year 2000 to year 2009, of the gross value added (“GVA”) by employee of each country. Gross value added at factor cost is derived as the sum of the value added in the agriculture, industry and services sectors as estimated by the World Bank. Total employment data included in the ICP shows the total number employed ages 15 and over, as estimated by the International Labour Organization (“ILO”). Quality data was prepared on the base of the density of quality certifications. It contains the CAGR, from year 2000 to year 2009, of total ISO 9001 quality certifications per 10.000 employees by country.

⁷⁹ Analysis reveals stronger correlation in countries with higher GDP per capita. Data was classified according to income as listed in the DAC list prepared by the OECD and approved in 2009. (i) Group 1&2, refers to countries with GDP pc. lower than US\$ 935 (ii) Group 3, refers to countries with GDP pc. between US\$ 936 and US\$ 3.705 (iii) Group 4, refers to countries with GDP pc. between US\$ 3.706 and US\$ 11.455 (iv) Group 5, includes all other relevant countries with GDP per capita higher than US\$ 11.456, i.e., countries that don’t qualify as ODA recipients.

Graph 6 – Relation between quality and productivity in developed countries. 2009



Source: World Bank and ISO survey 2009: International comparison program (ICP) database. © 2011 [data extracted on the 24 October 2011]. Available at: <http://data.worldbank.org>. Data o ISO 9001 quality certifications obtained from the ISO survey 2009 and provided by AENOR. Analysis performed by the author.

In other words, restrictions in the growth of quality certifications penalize the productivity of an economy.

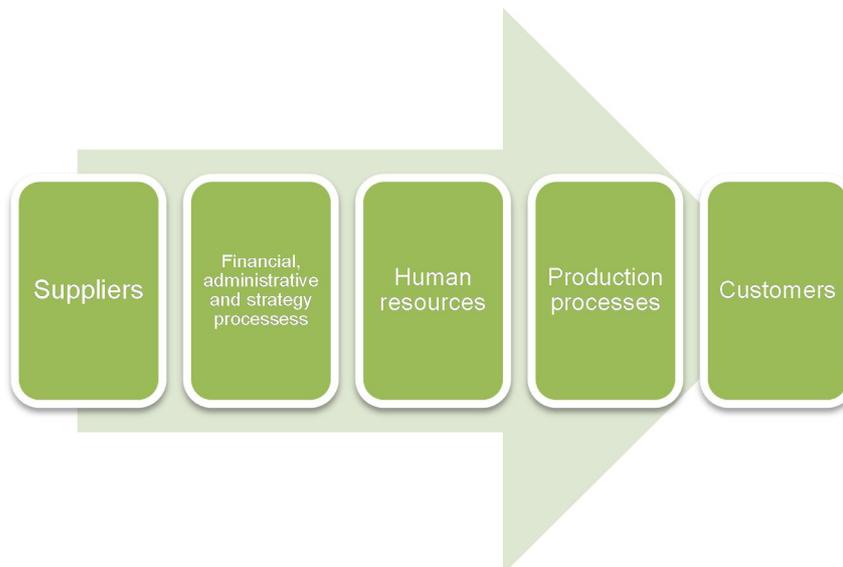
D. The use of quality tools and its benefits

As explained above, economies that take advantage of quality tools perform better. We have been able to measure the impact of quality certifications in productivity but the areas for potential improvements by the implementation of quality tools affect all the elements of the value chain of organizations.

Depending on the type of tools used and the way these tools are used the results can be better or worse, more or less useful and appropriate for each situation. A better advantage can be obtained when we have a correct diagnosis of the problem we want to solve, thus advancing desired results by means of the application of well-known criteria and techniques.

It is necessary to emphasize that quality tools available in the market are not always useful or necessary for every type of situation and/or organization. Each problem requires a unique approach and every potential quality improvement requires the tool that best fits.

Graph 7 – Generic value chain of an organization



In order to obtain satisfactory results, the use of quality tools, techniques and processes require the complete implication of an organization, especially from managers with greater responsibilities. Companies that used management tools such as relationship marketing, strategic planning, total quality of balanced scorecard, obtain better results and more satisfaction when the tool is used as part of a major initiative, with the involvement of the whole organization⁸⁰.

“Improvement of the process increases uniformity of product, reduces rework and mistakes, reduces waste of manpower, machine-time, and materials, and thus increases output with less effort. Other benefits of improved quality are lower costs... happier people on the job, and more jobs, through better competitive position of the company” (Deming, Quality, productivity and competitive position, 1982).

Most valued tools for managers are those oriented to customers and those focused to strategy planning (Rigby, 2001).

Graph 8 – Best management tools



Source: (Rigby, 2001)

(See note ⁸¹)

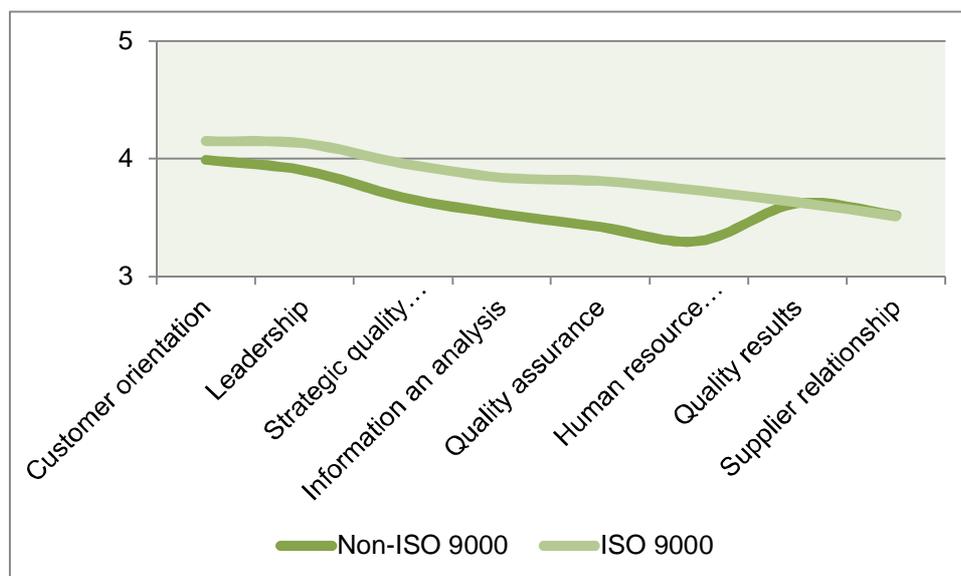
Furthermore, companies that introduce standards of quality in their management processes obtain better results throughout the value chain of the organization (Hong & Phitayawejjwiwat, 2005)⁸².

⁸⁰ Based on research performed by Bain & Company during 7 years, from 1993 to 1999. Survey response rate of last year's edition was 1,8% with the participation of 214 managers over 11.824 forms sent.

⁸¹ The graph shows the number of categories for which every tool was assessed and obtained a score above the average, at least one year or consistently during the 7 years of the survey. The 5 categories that were tested for each tool were: (i) financial results (ii) client portfolio (iii) operating capabilities (iv) competitive positioning (v) organization integration.

⁸² Article published in the Journal of Industrial technology in 2005 with the participation of 245 companies of different industries with and without ISO 9000 certification.

Graph 9 – Results of ANOVA analysis of the impact of ISO 9000 certification



Source: (Hong & Phitayawejjwiwat, 2005)

It is also necessary to consider that the implementation and use of this type of tools has some costs for organizations, as well, in terms of time, effort and of money.

E. Quality tools for IC improvement

Some quality tools are better based in the international market and used in a greater number of organizations (Abadia Tirado & Pola Maseda, 2009). In some cases these tools are already adapted to the International Cooperation sector.

- **EFQM excellence model:** Principles of excellence and best practices that help organizations achieve quality goals. The European Commission supports this model.
- **Standards ISO 9000/1:** It's a family of standards relating to quality management systems. Requirements for ISO 9000/1 are independently certified.

There are other tools frequently used in the sector which are not specifically designed for quality management but that require processes directed towards an improvement of transparency and reporting.

- **Official NGO certification by the SAIC:** It's a mandatory requirement in order to receive public aid. Subsidies are regulated by cooperation agreements, equivalent to a Service Charter ("SC"). An SC is a document signed by the Public Administration that sets out commitments and requirements for the provision of services.
- **Framework for Bilateral Agreements ("FBA")⁸³:** It's a new methodology used by the SAIC that joins up the shared strategy of Spanish international cooperation for specific countries, including budgeted resources, goals and mechanisms for account reporting of all actors involved. It regulates the relation between the Spanish public administration and the recipients of Spanish ODA. This format is inspired by the Common Assessment Framework ("CAF")⁸⁴, which is a tool supported by the European Institute of Public Administration.
- **SGE 21:** Is a European social responsibility management system that allows a third party to independently audit processes in order to obtain a certification in Ethical Management and Social Responsibility. It consists of aligning all different company activities and interests of private organizations, which are committed with environmental protection, sustainable growth, and promotion of social responsibility.
- **UNE 165011:** It's a standard of ethical management for NGOs made by AENOR and approved with a strong consensus among NGOs, universities and public institutions.
- **Transparency guide of the Loyalty Foundation:** Set of norms designed to help and guarantee security of private aid donors.
- **Quality NGO standard:** Designed for NGOs operating in Spain.
- **International standard ISO 26000:** Provides guidance for principles underneath Social Responsibility.
- **Specification SR 10:** Establishes conditions for a Management system of social responsibility of organizations within International standards. This specification can be audited by independent third parties and belongs to the International Certification Association iQnet.
- **Rule SA 8000:** Its and International rule subset to audition and certified by the Council on Economic Priorities ("CEP") about working labour conditions. This rule guarantees an ethical production of goods and services.

⁸³ Marco de Asociación País ("MAP") in Spanish.

⁸⁴ Marco común de evaluación ("MCE") in Spanish.

Section 3 – International Cooperation and Quality

A. Quality standards for Spanish IC

Ministers of developed and developing countries responsible for promoting development and Heads of multilateral and bilateral development institutions, signed a declaration in Paris, on 2 March 2005 and an Agenda for Action in Accra, on 4 September 2008, with the goal of improving the efficiency of developing aid. The 5 principles included in the declaration are based on best practices from the lessons of experience.

These principles have pierced in the IC community and their goals and strategies revolve around such principles. Standards of quality determined by the OECD, the EU and by the main IC Agencies of donor countries are based on the Declaration of Paris.

Graph 10 – Main principles about Aid Effectiveness signed in Paris



Source: (High Level Forum on Aid Effectiveness, 2005, 2008)

Quality in Spanish IC has been developed in stages, with an initial phase starting with its regulation by the International Cooperation and Development Act of 1998. This law was drafted in order to address an urgent need in Spain for the adaptation of Cooperation practices to European standards. A second phase continued in 2003 with the Subsidy Act of 2003, as a framework regulation for public subsidies, and the development of 3-year master plans for Spanish IC from 2005 onwards.

Table 3 – Sources of Quality criteria for ODA

Source	Year	Institution
International Cooperation and Development Act, 23/1998, 7 July	1998	Government of Spain
Millennium goals	2000	United Nations
Subsidy Act, 38/2003, 17 November	2003	Government of Spain
Royal Decree 2217/2004, 26 November, on competitions, functions, composition and organization of the Council for International Cooperation and Development	2004	Government of Spain
Decree AEC 1303/2005, 27 April, regulating the Framework for the granting of subsidies to NGOs , for International cooperation purposes	2005	AECI
Master plan of Spanish Cooperation 2005-2008	2005	Government of Spain
Paris Declaration	2005	High Level Forum
National pact against poverty	2007	Spanish political parties
Accra Agenda for Action	2008	High Level Forum
Council for International Cooperation and Development	2008	Spanish Parliament
Master plan of Spanish Cooperation 2009-2012	2009	Government of Spain
London y Pittsburg Declarations	2009	G-20
Evaluation of the Paris Declaration implementation	2010	DGPOLDE
Evaluation of the Paris Declaration implementation	2011	OECD

Source: Prepared by the author based on the documents described above

The country has managed to equip itself with legal and technical instruments to undertake any initiative directed to the improvement of the quality.

All political parties represented in the Parliament of Spain met in December of 2007 and signed the National Pact against Poverty ("NPP")⁸⁵. The pact guarantees the coherence of Spanish policy in IC issues and reinforces the joint will to obtain results from commitments in the long term. One of the main points agreed in the pact includes a provision to introduce any type of instrument aimed to improve the quality of Spanish IC (National Pact, 2007).

B. Quality assessment of Spanish IC

We must start by studying the current situation of the Spanish IC in order to establish a criterion of action for quality improvement.

ODA is defined as the monetary flows made available to countries and territories deemed as high-priority areas due to their condition of low income or average income nations. The Development Aid Committee ("DAC") of the OECD prepares a list since 1961, showing the countries eligible to receive ODA. The list is reviewed every 3 years.

Spain defines potential aid flow recipients with OECD criteria. Spanish ODA is channeled mainly through centralized bodies. Nevertheless there is a considerable volume of aid dependent from decentralized institutions. Spanish ODA mainly consists of non-refundable bilateral flows, provided through investment projects and technical cooperation. EU and UN are the main institutions funded by Spanish multilateral ODA flows.

⁸⁵ Pacto de Estado contra la Pobreza ("PEP") in Spanish

Table 4 – Net Spanish ODA by type of aid. 2009

(Euro millions)	ODA 2009
Other resources	1.411
Investment projects	808
Technical cooperation	668
Aid for programmes	305
Bilateral ODA	3.192
European Union	887
United Nations	269
IDA	228
Other agencies	152
Multilateral ODA	1.536
Total ODA	4.728

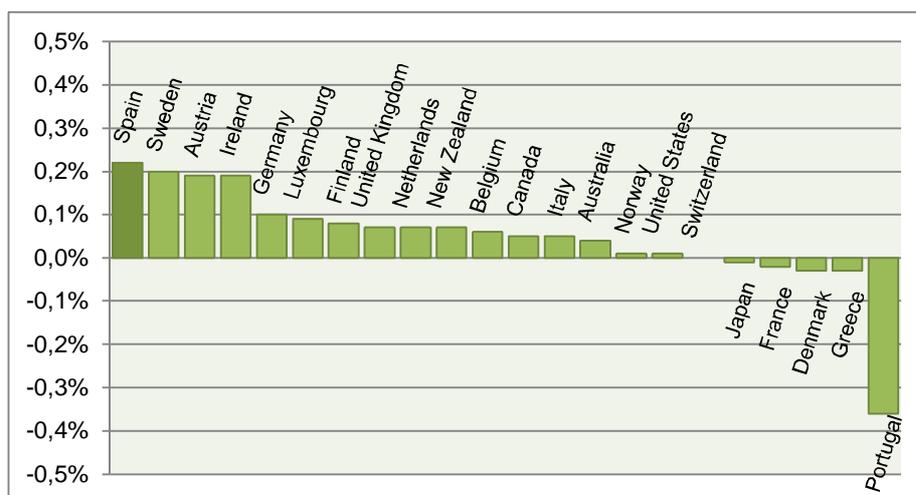
Source: ICAP follow-up report (SMFA, 2009)

Spain rose to 6th position in the ranking of countries providing higher volume of ODA to CAD list countries and 8th in terms of ODA as a percentage of GDP.

Spanish ODA has experienced an unprecedented growth during the last decade. During the 5 year period ranging from 2004-2005 Spain has been the country with the highest ODA growth as a percentage of GDP among all DAC donor countries of the OECD. The volume increased from EUR 1.985 million in 2004 (0,24% of GDP) to EUR 4.728 million in 2009 (0,46% of GDP), representing a growth of 0,22%.

The country turned from being a modest benefactor to one of the most supportive countries of the world to the ODA system, only in a few years⁸⁶.

Graph 11 – ODA growth as a % of GDP. 2004-2009

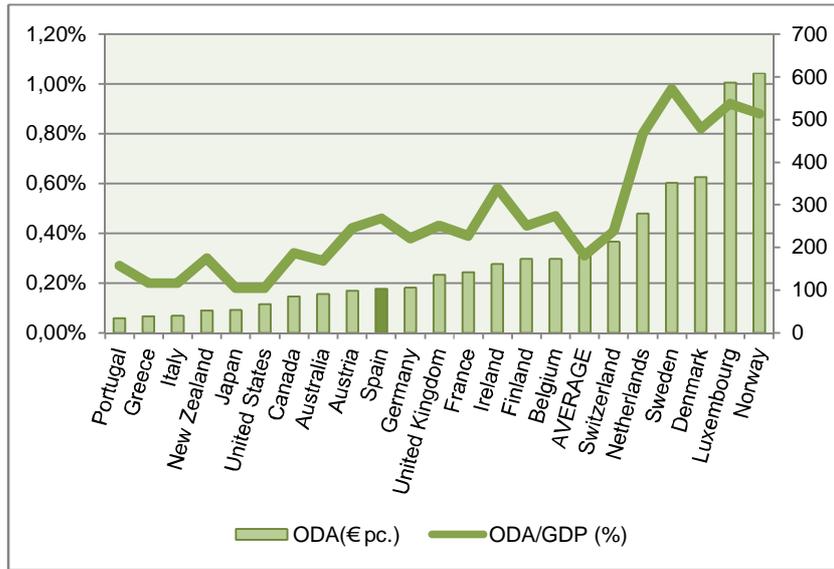


Source: ICAP follow-up reports (SMFA, 2004) y (SMFA, 2009). Analysis performed by the author.

This effort represents a true challenge for the institutional administration and organization of funds since the volume managed has more than doubled in a relatively short period of time (from €46 pc. in 2004 up to €103 pc. in 2009).

⁸⁶ In 2009, only 5 countries met MDG of contributions of at least 0,70% of GDP: Sweden (0,98%), Luxembourg (0,92%), Norway (0,88%), Denmark (0,82%) and Netherlands (0,80%).

Graph 12 – ODA per capita managed by DAC donor countries. 2009



Source: World Bank: International comparison program (ICP) database. © 2011 [data extracted on 23 October 2011]. Available at: <http://data.worldbank.org>. ODA data obtained from ICAP follow-up report (SMFA, 2009). Analysis performed by the author.

Diverse topics related to technical assistance have an impact on the implementation of quality issues in ODA related projects and funding. These key factors are both internal and external to the IC and deal with issues that define the viability and sustainability of projects.

The analysis of the current situation of Spanish IC should consider capability-based strategies in order to design an achievable set of quality and efficiency goals.

Organizations have a greater control of internal areas. Improvements made in these areas can have a greater impact in the quality of the technical assistance.

Scheme 1 – Areas of impact for the viability of IC technical assistance projects



Source: (Varela de Ugarte, 2007). Analysis performed by the author

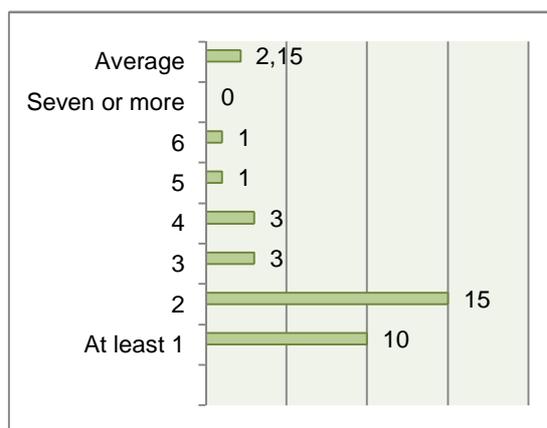
(See note ⁸⁷)

1) External analysis

Nowadays, IC is subject to diverse reviews of its performance both by domestic and international organizations. These assessments represent the best ground scenario for an analysis of the current situation.

Reports performed by the OECD on the progress in implementing the Paris Declaration reveal that IC is moving forward towards the goals set by the High Level Forum in 2005. Nevertheless, underperformance of Aid can be displayed in the latest survey on the PD.

Graph 13 – Number of goals of the PD met by donor countries / institutions



Source: (OECD, 2011). Analysis performed by the author

(See note ⁸⁸)

⁸⁷ Chapter 5 of the book by Fernando Varela offers a description about the main factors that condition the viability and the sustainability of international cooperation projects. The Scheme above uses those factors organized in two categories proposed by the student: (i) external issues to the organization leading the project and (ii) internal issues of the organization leading the project.

Reports performed by the OECD on the progress in implementing the Paris Declaration reveal that Spanish IC is moving forward towards the goals set by the High Level Forum in 2005. Nevertheless, underperformance of Spanish Aid can be displayed in 5 of the 10 indicators.

Table 5 – Summary of effectiveness indicators of Spanish ODA. 2005-2010

Indicators	2005	2007	2010	Progress	Goal
3.- Aligning aid flows on national budgets	42%	20%	51%	+9	85%
4.- Strengthening capacities through coordinated support	10%	45%	75%	+65	50%
5a.- Using country public financial management systems	17%	52%	54%	+37	38%
5b.- Using country procurement systems	14%	57%	65%	+51	n.a.
6.- Avoiding parallel implementation structures	59	70	47	-12	20
7.- In-year predictability	26%	30%	49%	+23	63%
8.- Untying aid	75%	61%	68%	-7	75%
9.- Programme-based approaches	14%	14%	12%	-2	66%
10a.- Coordinated donor missions	9%	23%	44%	+35	40%
10b.- Joint country analytic work	12%	42%	87%	+75	66%

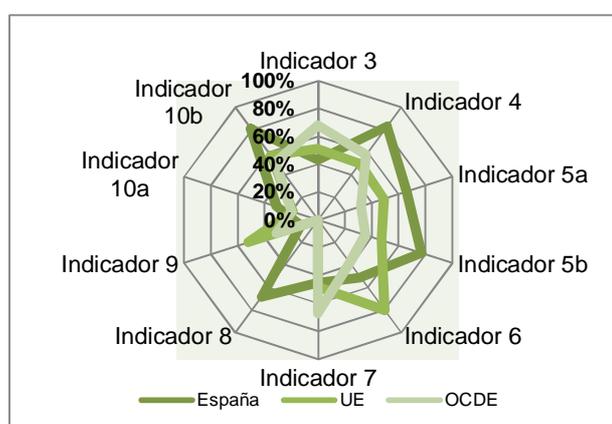
Source: (OECD, 2011)

Spain displays better performance compared to UE institutions and OECD average only in half of the indicators.

Major weaknesses can be found in:

1. The alignment of ODA with local needs of the recipient country
2. Harmonization of ODA through common channels
3. Control and predictability of ODA

Graph 14 – Comparison of progress in the implementation of the Paris Declaration



Source: (OECD, 2011). Analysis performed by the author.

Table 6 – Comparison of Spanish assessment against other countries

Indicators	Spain	UK	Norway
Indicator 3	51%	48%	46%
Indicator 4	75%	65%	45%
Indicator 5a	54%	73%	82%
Indicator 5b	65%	75%	88%
Indicator 6	47	25	4
Indicator 7	49%	59%	58%
Indicator 8	68%	100%	100%
Indicator 9	12%	60%	42%
Indicator 10a	44%	53%	38%
Indicator 10b	87%	57%	69%

2) Internal analysis

The outcome of this analysis leads to a SWOT matrix positioning Spanish performance among peer countries of the EU and OECD.

⁸⁸ The graph shows analysis from the data of 33 donor countries and multilateral agencies contained in the latest report on progress in implementing the Paris Declaration published by the OECD. Data covers performance of 9 measured indicators against the agreed goal set by each country or institution.

Scheme 2 – SWOT matrix of Spanish IC assessment

WEAKNESSES	THREATS
<ol style="list-style-type: none"> 1. The alignment of ODA with local needs of the recipient country 2. Harmonization of ODA through common channels 3. Control and predictability of ODA 	<ol style="list-style-type: none"> 1. Lack of coordination in decentralized ODA
STRENGTHS	OPPORTUNITIES
<ol style="list-style-type: none"> 1. Use of country public Systems, both financial and procurement Management Systems. 2. Coordination with CAD countries for joint analysis and donor missions. 	<ol style="list-style-type: none"> 1. “SIGUE Plan”: Change of the technology platform in the Spanish Agency of International Cooperation (“SAIC”). 2. Framework for bilateral country agreements (“FBA”).

Source: (OECD, 2011). Analysis performed by the author

Section 4 – Conclusions

The aim of the proposed actions is to improve institutional effectiveness in order to reduce transaction costs and improve results for ODA projects. Three underlying assumptions were used to draw conclusions:

- Priority must be given to weak points of IC in order to redeploy resources and avoid failures in vulnerable areas.
- Priority should also be given to issues that have a greater impact y the viability and sustainability of projects.
- All measures must agree with the Paris Declaration principles.

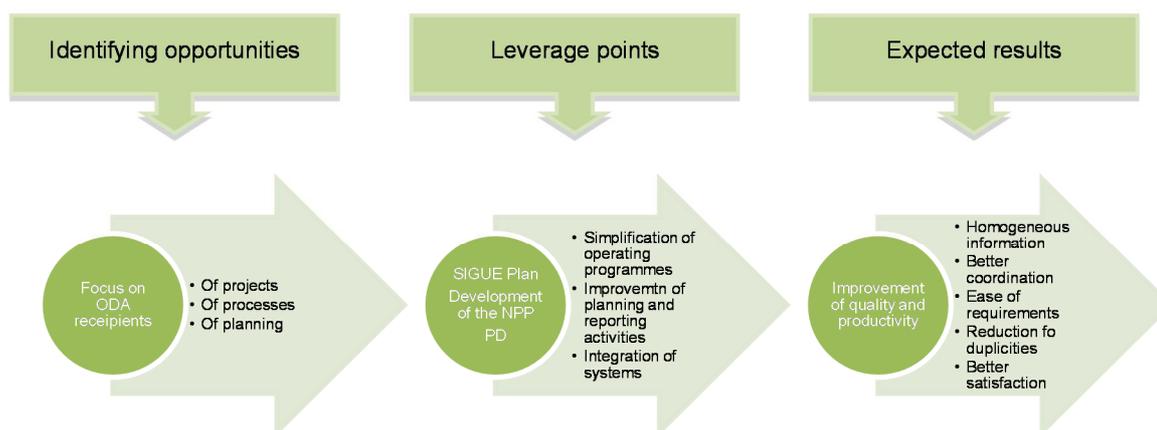
Table 7 – SWOT matrix for the drawing of a roadmap

	Threats	Opportunities
Weaknesses	Drastic change	Redeployment strategies
Strengths	Reinforcement measures	Use of capabilities

Source: Analysis performed by the author

The change of the technology platform is the best opportunity to accomplish improvements when implementing strategies due that the process involves all the stakeholders.

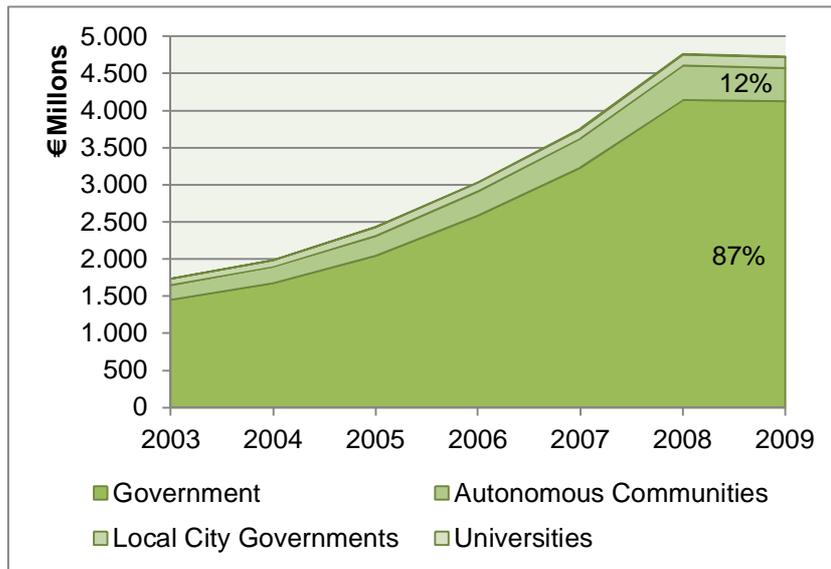
Scheme 3 – Priority actions



Source: Analysis performed by the author.

There is room for coordination improvement at all levels in planning and control of public aid announcements and administrative processes of the different actors involved in these types of schemes. More efficient coordination and interaction can be obtained by leveraging knowledge and best practices (Martinez & Santander, 2009). Improvement of coordination among different levels of the administration (Government, Autonomous Communities, Local City Governments and Universities), would help to achieve PD goals of (i) ownership (ii) alignment and (iii) harmonization of Spanish domestic activities in order to efficiently coordinate with the rest of donor countries and partners. Lack of internal coherence may hamper international coordinating efforts, thus hindering International processes.

Graph 15 – ODA progress by type of Administration



Source: ICAP follow-up report (SMFA, 2009)

Another barrier for the improvement of efficiency coordination of Spanish IC are the numerous types of financing schemes followed by the 17 Autonomous Communities of the country (Martinez & Santander, 2009). The Constitutional reform approved by the Spanish Parliament in 2011 will have to be developed in the next few years. This will require the implementation of common financing rules for all autonomous communities. The process will represent an opportunity for the harmonization and coordination of IC, in the different levels of the administration, in terms of financing of projects and synchronization of agendas.

The best leverage point to improve upon decentralization differences would be to integrate critical processes for IC into the same technology platform. Such integration would provide homogeneous information and would avoid duplicities and redundancies with the exchange of information among all stakeholders.

Table 8 – Main features of public information available about decentralized Spanish IC

Qualitative information	Quantitative information
It's not comparable	At a political level there is more information about what has to be done than about what has been done
It's not updated	Management information from Autonomous Communities and Local City Governments is very seldom found
It's not complete	
It's not exhaustive	

Source: (Lagares, Álvarez, & Cuns, 2011)

Avoiding errors in the founding process of projects, at all levels of the administration, would increase efficiency of resources.

The results of the analysis about quality and productivity indicate that quality requirements make sense as a condition for organizations in developed countries. In other words, quality certifications in low income countries do not have a significant impact in productivity, hence, if we are willing to improve productivity and efficiency in low income economies, quality specifications is not the correct tool to use. Quality tools are meaningful and have results when applied in developed countries.

Thus, another goal should be the improvement of quality through the implementation of common rules for stakeholders and processes that take place within donor countries. A higher level of coordination can and must be claimed in the Spanish Administration and suppliers, such as NGOs, working in Spain.

The scope of activities and potential improvements in the field of NGOs is ample. Only in 2009 EUR 670 million were channelled through this type of organizations (21,4% of total ODA) and the volume of resources is fragmented in a high number of organizations⁸⁹. Only in the Autonomous Community of Madrid had 150 NGOs listed as suppliers in that year. Autonomous Communities and Local City Governments give stronger support to this type of suppliers.

⁸⁹ Apart from organizations working only for the Autonomous Communities, Local City Governments and Universities, the SAIC has 1956 organizations listed as potential suppliers for ODA projects. Source: AECID: Official NGO registry © 2011 [Data extracted on 19 November 2011] Available at: <http://www.aecid.es/es/que-hacemos/ONGD/registro/>

State administration channelled approximately 11% of ODA in 2009 via NGOs (EUR 300 million), Autonomous Communities 64% (EUR 284 million) and Local City Governments 53% (EUR 87 million).

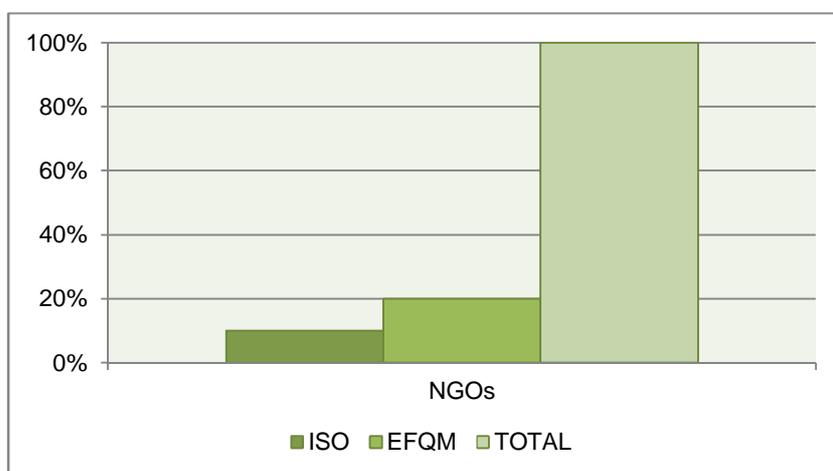
Table 9 – Bilateral Spanish ODA channelled through NGOs

	2007	2008	2009
Spanish bilateral ODA channelled through NGOs	594	644	671
Total net ODA	3.755	4.762	4.728
Total non-refundable bilateral ODA	2.439	3.330	2.890
NGO support / Total bilateral ODA (%)	24,4%	19,3%	23,2%

Source: ICAP follow-up report (SMFA, 2009)

Three of the top 5 NGOs recipients of public funds from SAIC have quality management certifications. Nevertheless, the volume of ODA funds received by NGOs and channelled through SAIC is less than 50% of the total volume moved by NGOs in the IC system. According to the quality observatory for NGOs, only 1 of every 3 NGOs has quality management certifications⁹⁰.

Graph 16 – NGOs with quality Management certification



Source: (Plataforma de ONG de Acción Social, 2011)

A greater number of organizations committed to quality in the IC system would result in a better use of resources, due to standardization of information and processes, simplification of requirements and reduction of duplicities.

Aid directed to quality improvements and coordination of organizations and administrations of recipient countries with those in donor countries would be more useful, as quality processes in less developed countries do not have a significant impact in their economy, especially in Group 1 countries.

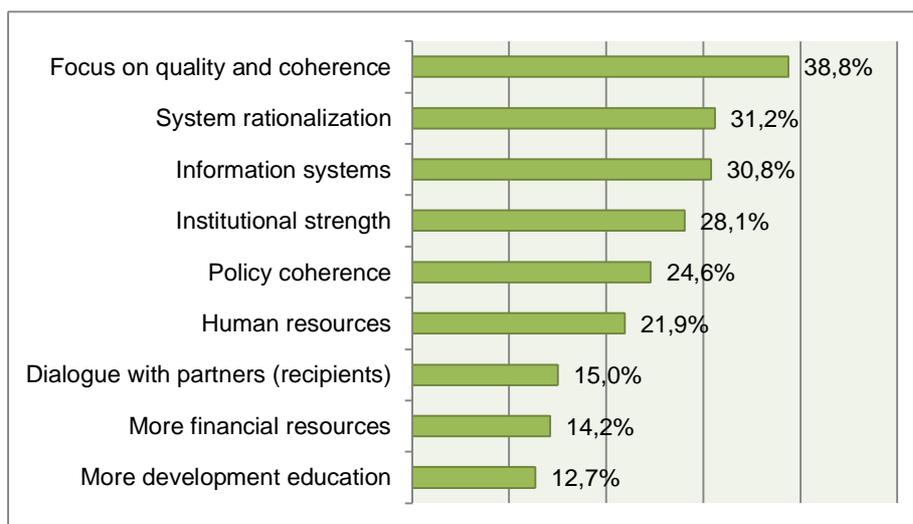
All quality handbooks mention that a distinct Quality Department is necessary within any organization in order to achieve quality goals. Some IC agencies, like the Dutch, have a quality control unit for ODA within the Ministry⁹¹. That department is in charge of the coordination and the operation of the quality management system as well as of analysis, monitoring and reporting. A similar department in the SMFA would help the progress and improvements of quality issues of Spanish ODA.

Moreover, a recent Survey in the sector reveals that quality is the number one concern within sector professionals and will be the main challenge for the parliamentary term. This is an ideal basis for a favourable support of such a measure within the IC community.

⁹⁰ Research of 109 surveyed organizations in 2010. From all answers 22 organizations had ISO certifications and 12 run EFQM systems. Plataforma de ONG de Acción Social. (11 March 2011). *One of every three NGOs obtains quality certifications*. Available at: www.plataformaong.org

⁹¹ Directie Effectiviteit en Kwaliteit ("DEK") in dutch.

Graph 17 – Challenges of the Spanish International Cooperation for the next 4 years



Source: (ACADE, 2011)

As we have seen in previous sections of this paper, most valued quality management tools, and tools that have a greater impact on results, are those focused on customer oriented processes and services.

Spanish IC has developed the FBA, a powerful scheme for channelling ODA processes towards coordination with recipient countries. Many FBAs are currently on the developing stage. The higher the weight of a country's ODA contribution, the most likely that the donor country can exert some influence on how things should be done.

Table 10 – Developing countries where Spanish ODA has more weight

US\$ million	Spanish ODA	Total ODA	Spanish ODA weight	FBA
Equatorial Guinea	21,8	25,1	87%	No
Dominican Republic	29,2	52,1	56%	In progress
El Salvador	125,7	259,7	48%	Si
Cuba	37,7	86,7	44%	In progress
Uruguay	12,2	32,4	38%	Si
Mauritania	44,7	122,2	37%	No
Tunisia	124,1	349,5	36%	No
Guatemala	113,4	341,4	33%	In progress
Ecuador	48,7	147,2	33%	Si
Paraguay	38,9	121,4	32%	Si
Argentina	24,1	78,9	31%	In progress
Nicaragua	142,4	472,9	30%	In progress
Peru	100,2	338,7	30%	In progress
Venezuela	12,9	46,9	27%	In progress
Algeria	54,4	200,3	27%	No
Morocco	190,7	704,7	27%	No
Guinea-Bissau	13,1	50,6	26%	No
Turkey	135,3	558,1	24%	No
Brazil	64,9	309,2	21%	In progress
Haiti	144,9	704,2	21%	No
Bolivia	97,6	485	20%	Si
Congo, Rep.	44,4	226,1	20%	No
Honduras	58,4	304,7	19%	In progress
Jamaica	1,2	6,4	19%	No

Source: OECD: statistical database for ODA © 2011 [data extracted on 17 August 2011]. Available at: <http://stats.oecd.org>. FBA data obtained from SMFA (DGPOLDE, 2011). Analysis performed by the author

Importance of the SIGUE Plan approved by the SAIC

The rapid growth of the volume of funds managed by the SAIC has made the agency move forward towards the enhancement of its technology platform in order to improve control and monitoring of aid and project flows.

A technological upgrade in the administration represents a strong and powerful leverage tool for organizational change and the opportunity to improve other areas and processes involving the rest of the IC stakeholders.

“The implementation of an ERP (Enterprise Resource Planning) in the Agency will allow for the integration of information contained in all computer applications and the simplification and harmonization of most its functions and processes including budget control, subsidy Management, financial analysis and reporting, maintenance, logistics, human resources, procurement, cash and Banks, or Project Management” (SMFA, 2011).

The new platform has potential improvement impacts in almost all the internal issues concerning IC technical assistance projects. Implementation of this new technological platform will represent a major organizational change never experienced before in the SAIC. The agency should take advantage of this situation in order to include all necessary elements that may assist progress on quality and efficiency issues at all levels of the administration and of the project value chain. The results off a good technological transition toward the new situation could lead Spanish IC to a top European and world performer of developing assistance during next decade.

Scheme 4 – Areas impacted by the change to a new technology platform



Source: (Varela de Ugarte, 2007). Analysis performed by the author (areas of impact by technological change are darker).

Bibliography

- ACADE. (2011). Estudio sobre el estado de opinión de la Cooperación Española. From www.asociacionacade.org
- Abadía Tirado, J., & Pola Maseda, Á. (2009). Guía para la implantación de un sistema de gestión de la calidad UNE-EN ISO 9001 en la Administración Pública Local.
- AECID. (2011). Retrieved 19-11-2011 from Registro de ONGD: <http://www.aecid.es/es/que-hacemos/ONGD/registro/>
- ANSI. (2011). About ANSI. Retrieved 11-10-2011 from: http://www.ansi.org/about_ansi/introduction/history.aspx?menuid=1
- CDC. (1999). Improvements in Workplace Safety — United States, 1900–1999. 48 (22), 461-468.
- Crosby, P. B. (1979). Quality is free. New York: McGraw-Hill.
- Deming, W. E. (1986). Out of the crisis. Boston: MIT Press.
- Deming, W. E. (1982). Quality, productivity and competitive position. Cambridge: MIT.
- DGPOLDE. (2011). Avances del proceso de establecimiento de Marcos de Asociación País. Madrid: MAEC.
- EUROPAID. (2008). Reforma de la cooperación técnica y las unidades de ejecución de proyectos en la ayuda exterior proporcionada por la Comisión Europea. Bruselas: CE.
- García-Verdugo, J. (s.a.). El concepto y medición del desarrollo humano. Madrid: UNED.
- Gobierno de España. (2009). Plan director de la Cooperación Española 2009-2012. Madrid: BOE.
- Gómez Galán, M., & Sainz Ollero, H. (2008). El ciclo del proyecto de cooperación al desarrollo (6ª edición ed.). Madrid: CIDEAL.
- High Level Forum on Aid Effectiveness. (2005, 2008). Paris Declaration and Accra Agenda for Action. (p. 13+8). Paris & Accra: OECD.
- Juran, J. M., & Gryna, F. M. (1988). Quality Control Handbook (4th edition ed.). New York: McGraw-Hill.
- MAEC. (2009). Estrategia Multilateral de la Cooperación Española para el Desarrollo. SECI, DGPOLDE. Madrid: EGRAF.
- Lagares, N., Álvarez, M., & Cuns, X. (2011). Cooperación para el desarrollo de la Administración General del Estado y Cooperación Oficial Descentralizada Autonómica: transparencia para la coordinación. Madrid: Fundación Carolina.
- Larrú Ramos, J. M. (2009). La ayuda al desarrollo: ¿reduce la pobreza? Madrid, España: Biblioteca Nueva, S.L.
- Martinez, I., & Santander, G. (2009). La cooperación al desarrollo de la Comunidad de Madrid. Madrid: ICEI.
- National Pact. (2007). National Pact Against Poverty. Madrid: CONGD.
- OECD. (2009). Managing Aid: Practices of DAC member countries. Paris, France.
- OECD. (2006). Report on progress in implementing the Paris Declaration. Paris.
- OECD. (2008). Report on progress in implementing the Paris Declaration. Paris.
- OECD. (2011). Report on progress in implementing the Paris Declaration. Paris.
- Plataforma de ONG de Acción Social. (2011). Una de cada tres entidades consigue certificarse en un modelo de calidad. From www.plataformaongs.org
- REDCREA. (2010). La evaluación de la implementación de la Declaración de París por la Cooperación Española. Madrid: DGPOLDE.
- Rigby, D. (2001). Management Tools and Techniques: A survey. California Management Review , 43 (2), 139-160.
- SMFA. (2004). ICAP follow-up report. Madrid: DGPOLDE.
- SMFA. (2009). ICAP follow-up report. Madrid: DGPOLDE.
- SMFA. (2011). ICAP follow-up report. Madrid.
- The World Bank. (2005). World Development Indicators. Washington, D.C.: IBRD.
- Toledano, J. M., Guimarães, J., Illán, C., & Farber, V. (2008). Buenas prácticas en la cooperación para el desarrollo. Madrid: Catarata.
- UN Millenium Campaign Europe. (2010). What About Spain. New York: End Poverty 2015.
- UNDP. (1990). Human development report. ONU. Oxford: Oxford University Press.
- Varela de Ugarte, F. (2007). La calidad de las intervenciones de desarrollo. Madrid: CIDEAL.
- World Bank. (31 de December de 2008). World Bank Data. Retrieved 12 de July de 2011 from World Bank Statistics: http://data.worldbank.org/indicador/SH.DYN.MORT?order=wbapi_data_value_2009+wbapi_data_value+wbapi_data_value-last&sort=desc
- Yates, J., & Murphy, C. N. (2009). The International Organization for Standarization (ISO). Oxon: Routledge.

Annex I – Statistical analysis of income and life expectancy variables⁹²

Description of the model

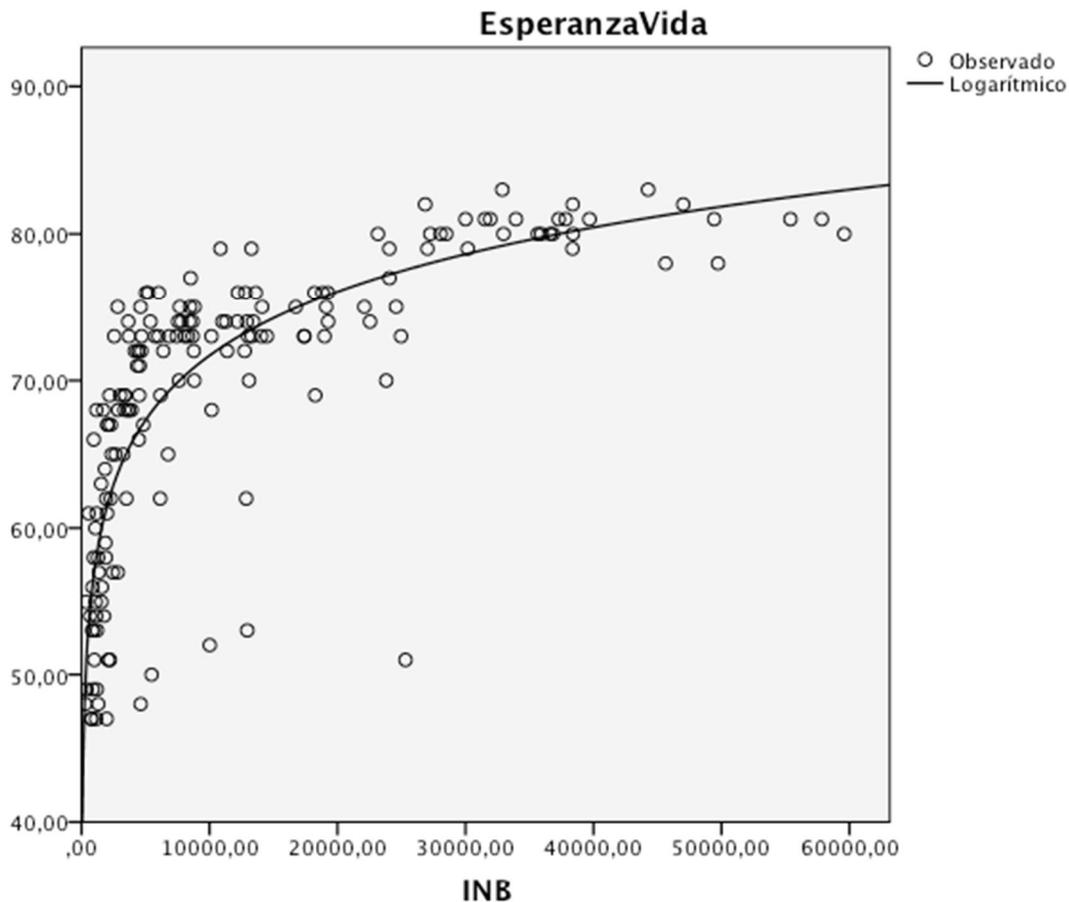
Name of the model		MOD_1
Dependent variable	1	EsperanzaVida
Equation	1	Logarithmic
Independent variable		INB
Constant		Included
Variable which values label observations in the graphs		Not specified

Model summary and parameter estimations

Dependent variable: EsperanzaVida

Equation	Model summary					Parameter estimations	
	R square	F	gl1	gl2	Sig.	Constant	b1
Logarithmic	,653	320,221	1	170	,000	13,546	6,313

The independent variable is INB.



⁹² Like all sections of this report SPSS output tables have been translated from Spanish. Terminology found in this annex might not be the same as SPSS software may produce in English.

Description of the model

Name of the model		MOD_3
Dependent Variable	1	MortalidadInf
Equation	1	Exponential ^a
Independent variable		INB
Constant		Included
Variable which values label observations in the graphs		Not specified

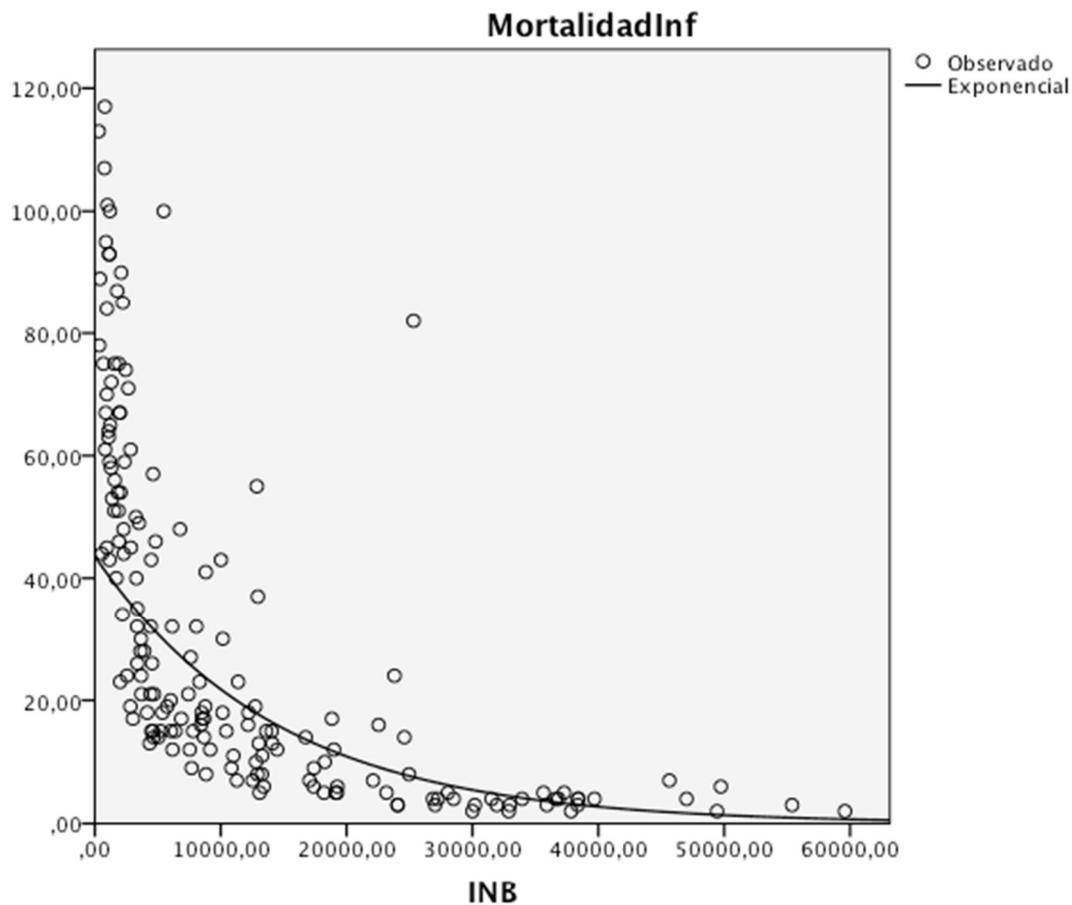
a. The model needs all non-lost values to be positive.

Model summary and parameter estimations

Dependent variable: MortalidadInf

Equation	Model summary					Parameter estimations	
	R square	F	gl1	gl2	Sig.	Constant	b1
Exponential	,672	355,120	1	173	,000	43,581	-6,934E-5

The independent variable is INB.



⁹³ Like all sections of this report SPSS output tables have been translated from Spanish. Terminology found in this annex might not be the same as SPSS software may produce in English.

Description of the model

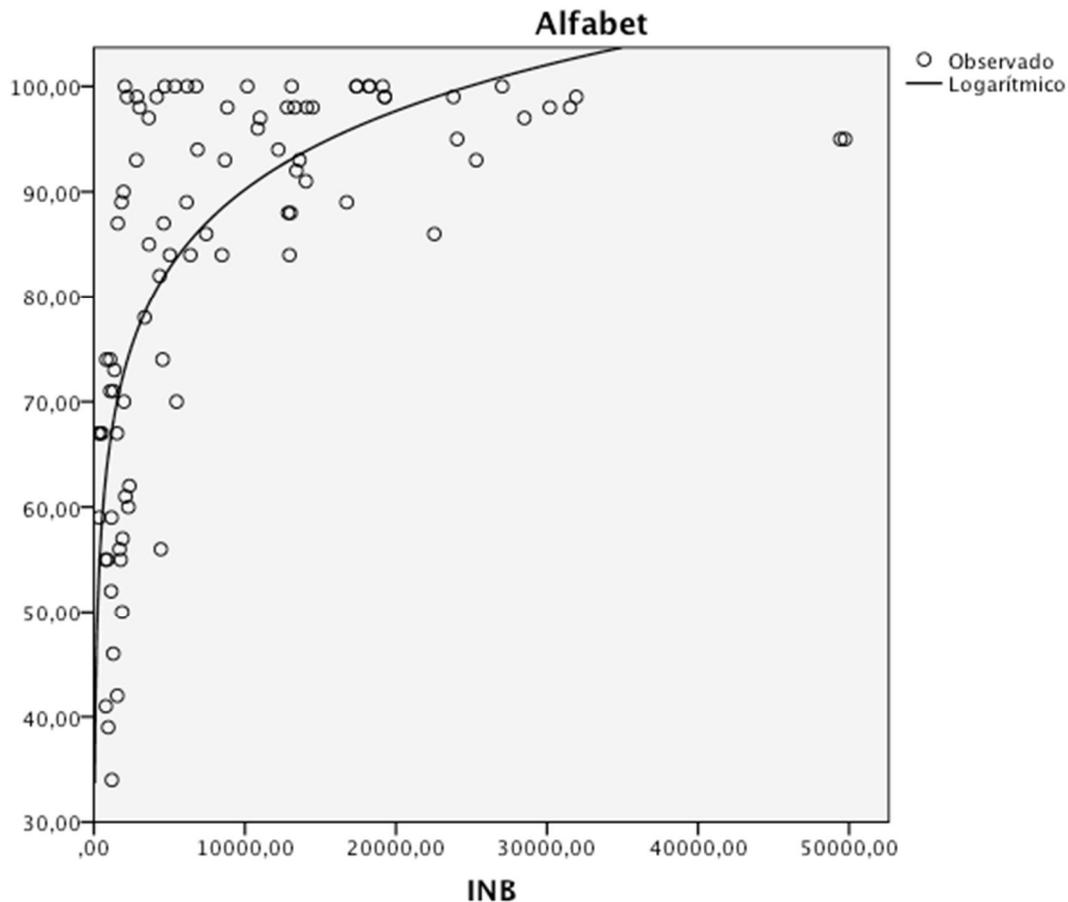
Name of the model		MOD_3
Dependent Variable	1	Alfabet
Equation	1	Logarithmic
Independent variable		INB
Constant		Included
Variable which values label observations in the graphs		Not specified

Model summary and parameter estimations

Dependent variable: Alfabet

Equation	Model summary					Parameter estimations	
	R square	F	gl1	gl2	Sig.	Constant	b1
Logarithmic	,539	103,003	1	88	,000	-9,013	10,772

The independent variable is INB.



⁹⁴ Like all sections of this report SPSS output tables have been translated from Spanish. Terminology found in this annex might not be the same as SPSS software may produce in English

Annex IV – Estimation of the prediction curve for quality and productivity⁹⁵

Description of the model

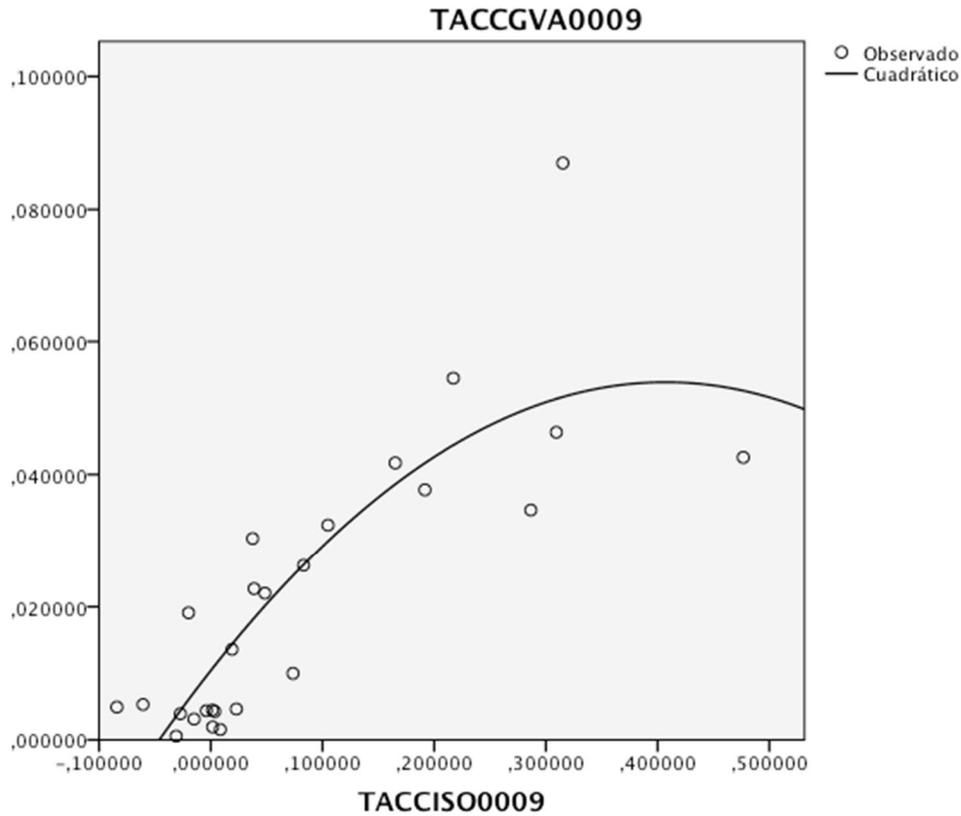
Name of the model		MOD_1
Dependent Variable	1	TACCGVA0009
Equation	1	Quadratic
Independent variable		TACCISO0009
Constant		Included
Variable which values label observations in the graphs		Not specified
Tolerance for term input into the equations		,0001

Model summary and parameter estimations

Dependent variable: TACCGVA0009

Equation	Model summary					Parameter estimations		
	R square	F	gl1	gl2	Sig.	Constant	b1	b2
Quadratic	,731	31,270	2	23	,000	,010	,214	-,263

The independent variable is TACCISO0009.



⁹⁵ Like all sections of this report SPSS output tables have been translated from Spanish. Terminology found in this annex might not be the same as SPSS software may produce in English

Annex V – World Bank and ISIC sector classification equivalence

ISIC Rev. 3	Description
Agriculture	
A - Agriculture, hunting and forestry	01 - Agriculture, hunting and related service activities 02 - Forestry, logging and related service activities
B - Fishing	05 - Fishing, aquaculture and service activities incidental to fishing

Source: Data from World Bank and ISIC. Prepared by the author.

ISIC Rev. 3	Description
Industry	
C - Mining and quarrying	10 - Mining of coal and lignite; extraction of peat 11 - Extraction of crude petroleum and natural gas; service activities excluding surveying 12 - Mining of uranium and thorium ores 13 - Mining of metal ores 14 - Other mining and quarrying
D - Manufacturing	15 - Manufacture of food products and beverages 16 - Manufacture of tobacco products 17 - Manufacture of textiles 18 - Manufacture of wearing apparel; dressing and dyeing of fur 19 - Tanning and dressing of leather; luggage, bags, saddlery, harness and footwear 20 - Manufacture of wood and of products of wood, straw and cork, except furniture 21 - Manufacture of paper and paper products 22 - Publishing, printing and reproduction of recorded media 23 - Manufacture of coke, refined petroleum products and nuclear fuel 24 - Manufacture of chemicals and chemical products 25 - Manufacture of rubber and plastics products 26 - Manufacture of other non-metallic mineral products 27 - Manufacture of basic metals 28 - Manufacture of fabricated metal products, except machinery and equipment 29 - Manufacture of machinery and equipment n.e.c. 30 - Manufacture of office, accounting and computing machinery 31 - Manufacture of electrical machinery and apparatus n.e.c. 32 - Manufacture of radio, television and communication equipment and apparatus 33 - Manufacture of medical, precision and optical instruments, watches and clocks 34 - Manufacture of motor vehicles, trailers and semi-trailers 35 - Manufacture of other transport equipment 36 - Manufacture of furniture; manufacturing n.e.c. 37 - Recycling
E - Electricity, gas and water supply	40 - Electricity, gas, steam and hot water supply 41 - Collection, purification and distribution of water
F - Construction	45 - Construction

Source: Data from World Bank and ISIC. Prepared by the author.

ISIC Rev. 3	Description
Services	
G - Wholesale and retail trade	50 - Sale, maintenance and repair of motor vehicles and motorcycles 51 - Wholesale trade and commission trade, except of motor vehicles and motorcycles 52 - Retail trade, except of motor vehicles; repair of personal and household goods
H - Hotels and restaurants	55 - Hotels and restaurants
I - Transport, storage and telecom	60 - Land transport; transport via pipelines 61 - Water transport 62 - Air transport 63 - Supporting and auxiliary transport activities; activities of travel agencies 64 - Post and telecommunications
J - Financial intermediation	65 - Financial intermediation, except insurance and pension funding 66 - Insurance and pension funding, except compulsory social security 67 - Activities auxiliary to financial intermediation
K - Real estate	70 - Real estate activities 71 - Renting of machinery and equipment and of personal and household goods 72 - Computer and related activities 73 - Research and development 74 - Other business activities
L - Public administration	75 - Public administration and defence; compulsory social security
M - Education	80 - Education
N - Health and social work	85 - Health and social work
O - Other community activities	90 - Sewage and refuse disposal, sanitation and similar activities 91 - Activities of membership organizations n.e.c. 92 - Recreational, cultural and sporting activities 93 - Other service activities
P - Activities of private households	95 - Activities of private households as employers of domestic staff 96 - Undifferentiated goods-producing activities of private households for own use 97 - Undifferentiated service-producing activities of private households for own use
Q - Extraterritorial organizations	99 - Extraterritorial organizations and bodies

Source: Data from World Bank and ISIC. Prepared by the author.

Annex VI – Research methodology about the impact of ISO 9000 certification in the quality management practices of companies

Research analysis Study variances of average scores given to 8 management areas of 245 industrial and services companies in Thailand, randomly selected from the Ministry of Industry database and being part of the sectors of wood, electronics, rubber, textiles, plastics, motor vehicles and others. The score scale ranged from 1=low to 5=high. Results indicate significant levels with $\alpha= 0,05$ for all researched areas except for quality results. Areas researched were⁹⁶:

- **Leadership:** Leadership is conceptualized as senior management's personal involvement; acceptance of responsibility; visibility; shared vision and goals.
- **Information and analysis:** Information and analysis is conceptualized as the availability of data; timeliness of data; and use of data.
- **Strategic quality planning:** Strategic quality planning is viewed as the integration of quality management and customer satisfaction into organizational plans; a long-term vision for achieving quality; and the understanding and deployment of quality goals.
- **Human resource development:** Human resource development is conceived as continuous training and education; empowerment; and the provision of resources and a conducive environment.
- **Quality assurance:** Quality assurance is conceived to be as new product design review procedures; designed-for-manufacturability procedures; control of specification procedures; preventive maintenance; and quality control activities along the value-added chain..
- **Supplier relationships:** Supplier relationships are measured by considering supplier selection criteria; the number of suppliers; the exchange of information and services; the involvement of suppliers in the development of new products; and the duration of the relationships with suppliers..
- **Customer orientation:** Customer orientation is seen as a commitment to satisfying customers; the integration of customer satisfaction into the firm's goals and vision; knowledge of customers' needs and expectations; and use of customer feedback in a new level of interaction with customers..
- **Quality results:** Quality results are measured by the consideration of levels of scrap and rework; throughput time; warranty costs; customer complaints; productivity; profitability; market share; costs; and competitive position.

⁹⁶ Literally extracted from Hong, J. W., & Phitayawejjwiwat, S. (2005). The Impact of ISO 9000 Certification on Quality Management Practices in Thailand. *Journal of Industrial Technology*, 21 (1), 2-6.

Annex VII – Paris Declaration: progress indicators

The following table shows the indicators agreed in the Paris Declaration for the monitoring of the progress of ODA effectiveness

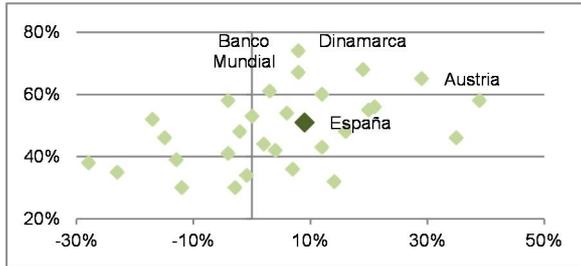
Núm	Indicator	2010 goal
1	Operational Development Strategies	At least 75% of partner countries have operational development strategies
2a	Reliable public financial management (PFM) systems	At least 50% of partner countries increase performance scores of their PFM one level (0,5 points)
2b	Reliable procurement systems	A third of the countries increase scores by 1 point (1 to 4 scale)
3	Aid flows are aligned on national priorities	Achieve at least 85%
4	Strengthen capacity by co-ordinated support	Achieve at least 50% of the technical assistance flows through coordinated programmes coherent with national development strategies
5a	Use of country public financial management systems	Reduction of 33% of ODA flows not using partner countries PFM systems
5b	Use of country procurement systems	Reduction of 33% of ODA flows not using reliable procurement systems
6	Avoid parallel implementation structures	Reduction of 33% of parallel PIUs
7	Aid is more predictable	Reduction of deviations between budgeted and disbursed ODA
8	Aid is untied	Constant improvements
9	Use of common arrangements or procedures	Achievement of at least 66% of ODA flows in base of common procedures
10a	Joint missions	A minimum of 40% of missions are joint
10b	Joint country analytical work	At least 66% of country analytical work in joint
11	Results-oriented frameworks	Reduction of 33% in the proportion of countries without transparent frameworks
12	Mutual accountability	All countries are subject to mutual assessment reviews in place

Source: (OECD, 2011)

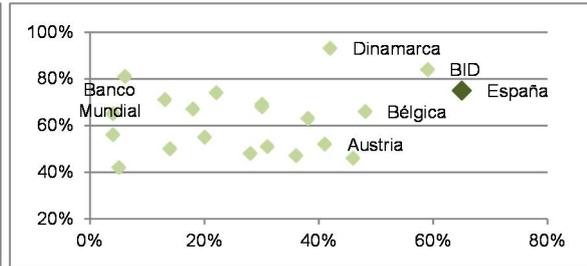
Annex VIII – Progress of indicators of the Paris Declaration

The following graphs represent the progress of the Paris Declaration indicators for donor countries and multilateral institutions. Y-axis shows the value of the indicator in year 2010 and X-axis shows the progress from 2005 to 2010.

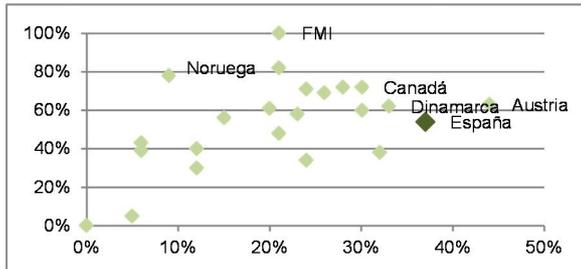
Graph 18 – Indicator 3 OECD report 2011



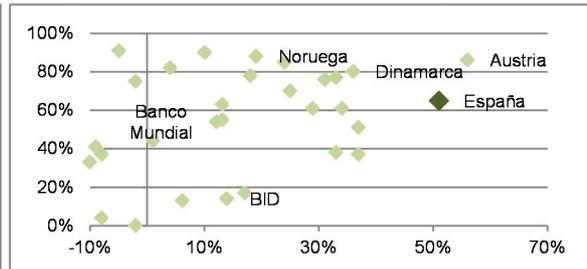
Graph 19 – Indicator 4 OECD report 2011



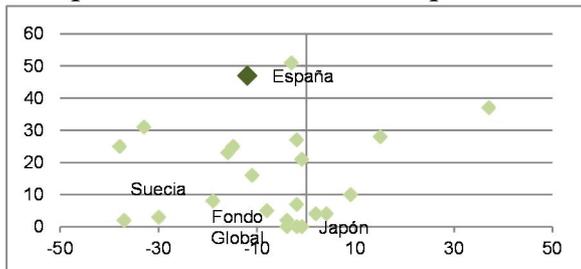
Graph 20 – Indicator 5a OECD report 2011



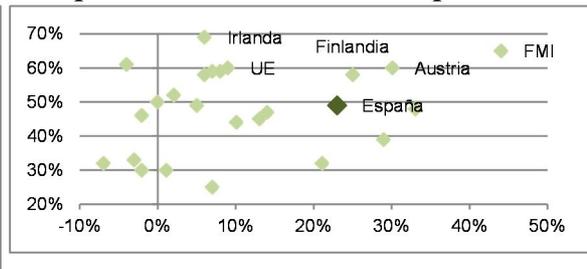
Graph 21 – Indicator 5b OECD report 2011



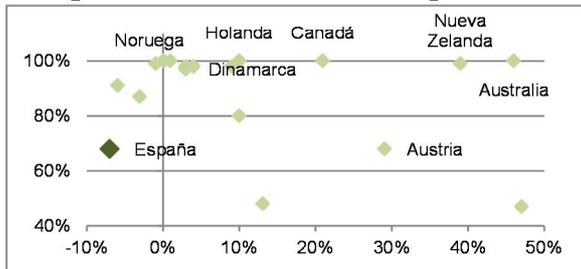
Graph 22 – Indicator 6 OECD report 2011



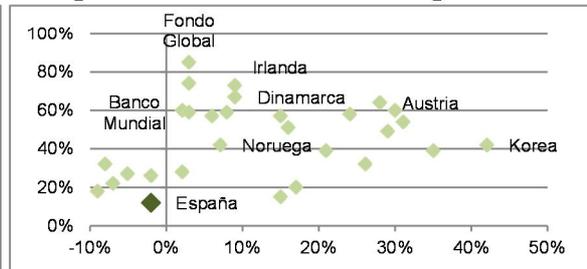
Graph 23 – Indicator 7 OECD report 2011



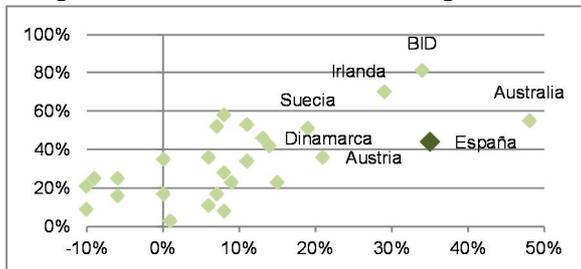
Graph 24 – Indicator 8 OECD report 2011



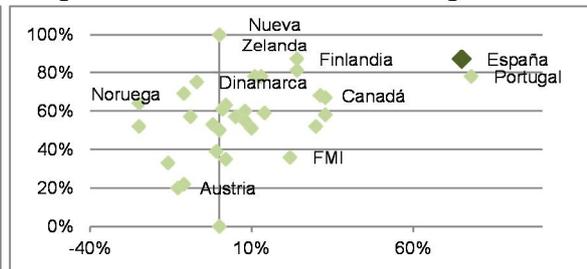
Graph 25 – Indicator 9 OECD report 2011



Graph 26 – Indicator 10a OECD report 2011



Graph 27 – Indicator 10b OECD report 2011



Source: OCDE: Report on progress in implementing the Paris Declaration. © 2011 [data extracted on 22 November 2011]. Available at: <http://stats.oecd.org>

Annex IX – Summary of the results of the analysis of Spanish ODA progress on implementing the Paris Declaration

The following table shows a summary of the findings of the analysis of 10 indicators on the progress on the implementation of the Paris Declaration in Spanish ODA.

	Strength	Comments
Indicator 3		Spanish ODA is not adequately progressing in the alignment with national priorities of recipient countries
Indicator 4		The progress of aid focused to strengthen capacity by co-ordinated support is adequate
Indicator 5a		The level of ODA channelled to the government sector using country PFM systems is within target
Indicator 5b		The level of ODA disbursed to the government sector using partner countries' procurement system is above average
Indicator 6		The level of parallel PIUs used to provide aid is high
Indicator 7		Disbursed government aid deviations against budget are high
Indicator 8		Tied aid has increased between 2005 and 2009
Indicator 9		A low proportion of Spanish ODA supports Programme-Based approaches
Indicator 10a		The level and progress of joint missions is adequate
Indicator 10b		The proportion of joint analytic work with DAC countries is high
	 Weak	 Normal
		 Strong

Source: (OECD, 2011). Analysis performed by the author

Annex X – NGOs with greater public funding for International cooperation

Table 11 – Main NGOs with over EUR 2 million in ODA flows. 2010

Num	NGO	Quality system	Total funding (€)
1	Red Cross	ISO 9000/1	10.749.357,00
2	Intermon Oxfam	EFQM	8.471.605,63
3	Solidaridad Internacional		6.139.717,62
4	Acción Contra El Hambre		5.980.556,00
5	Save The Children	ISO 9000/1	5.846.651,00

Source: Memoria anual de financiación de la AECID a ONGD 2010 and NGO web pages.

Annex XI – Other tools for Social Responsibility

Official Development Aid collaboration with private organizations is more and more frequent.

Among Public-Private-Partnerships in the Spanish IC sector Telefónica and BBVA were pioneers.

Within the Corporate Social Responsibility area there are certain rules and tools well know for committed organizations

- **International standard ISO 26000:** Provides guidance for principles underneath Social Responsibility.
- **Specification SR 10:** Establishes conditions for a Management system of social responsibility of organizations within International standards. This specification can be audited by independent third parties and belongs to the International Certification Association IQnet
- **Rule SA 8000:** Its and International rule subset to audition and certified by the Council on Economic Priorities (“CEP”) about working labour conditions. This rule guarantees an ethical production of goods and services.

Source: AENOR

Annex XII – Abbreviations

AAA	Accra agenda for action
AENOR	Spanish Association for Standardization and Certification
AESC	American engineering standards committee
ANSI	American national standards institute
CAF	Common assessment framework
CAGR	Compound annual growth rate
DAC	Development aid committee of the OECD
FBA	Framework for bilateral agreements
GDP	Gross domestic product
IC	International cooperation
ICP	International comparison program of the World Bank
IDA	International development association
ISIC	International standard industrial classification
ISO	International standards organization
ICAP	International cooperation annual plan
ODA	Official development aid
OECD	Organization for economic cooperation and development
PD	Paris declaration
SAIC	Spanish agency for international cooperation
SIGUE	Strategic management integration information system of the SAIC
SMFA	Spanish Ministry of Foreign Affairs
UN	United nations
USA	United States of America
UNESCO	United nations education, science and culture organization
UNICEF	United nations infant and child education fund
WHO	World health organization
pc	Per capita
\$	US dollars
€	Euros

All rights reserved. No part of this publication may be reprinted in any form (including electronically) without the explicit permission of the publisher and/or the respective authors. The publisher (LCBR) is in no way liable for the content of the contributions. The author(s) of the abstracts and/or papers are solely responsible for the texts submitted.