A Simulation Game of Economically Interacting Countries

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This paper describes a simulation game MABRICEJ of eight economically interacting countries. Each realization of the game defines possible option of future social and economic development for the participating countries and for the world as a whole. A vintage capital model is the base for mathematical description of economic system for each country. The game is designed to attract an attention of policy makers to the challenges facing their countries, makes it possible to evaluate how their decisions take into account the interaction between countries. The game goes step by step, starting from the situation of beginning year. Each step corresponds to country action on one year forward. The paper presents an analysis of several games held at the Russian Peoples' Friendship University.

Key words: simulation game, interacting countries, mathematical modeling, economic systems

Introduction

Many financial and economic models became unclaimed when the crisis came because they used the assumption that there are no sharp external changes. There were even calls to refuse modeling in decision making. But in times of crisis the world is in the process of bifurcation, when the future of the global economy essentially depends on the actions of key players in the world. Analysis of a possible future development can be done on the basis of simulation games. Mathematical modeling of economic systems is used in simulation games and it helps analyze decisions of the players.

Next section of this paper overviews a simulation game MABRICEJ of eight economically interacting countries. This game is built in response to criticism related to fact that the existing models in economics and finance didn't predict the global financial crisis. The title of the game is an abbreviation of selected countries whose interaction is important to consider in forecasting the world economy. In this chapter the game purposes are also specified.

Special section of the paper is devoted to overview a mathematical model description on which the simulation game of interacting countries is based. This section consists of two subsections. In first subsection a vintage capital model is described. This model is used for description of production sector of economy for each country. Namely, production function is based on the age distribution of production capacities. In second subsection a normative balance model of economy is described.

Next section gives overview of game rules. The game participants consist of a team of intermediaries and eight teams of country players. Country players are free to make any decisions which lie within the next two rules of the game. (1) At each step a written decision of the country for the next step should be submitted. The decision may consist of open and hidden parts. (2) agreements with other countries to take them into account when calculating the effects of intermediaries must be submitted by all parties involved. (2) Each of the parties have concluded a treaty between the countries, should present it to intermediaries. Then they considered this agreement in calculation of consequences of the step.

The last main section of the paper presents overview of realization of several games held at the Russian Peoples' Friendship University.

The conclusion section finished the paper.

Overview of the Game

At the end of 2006 on the eve of the global financial crisis I investigated a simple dynamical model of the Russian economy (Olenev 2007). This model was built by educational purpose to use parallel calculations in model identification, and thus was obtained an interesting result. Studies have shown that the Russian economy in the 2000s was not developed by building of new production capacities, but rather because of the restoration of the existing capacities of the enterprises that were created during the Soviet period. However potential of recovery of these old capacities is limited; therefore this type of growth is limited by time. It was determined the period when the restoration completes. It turned out that this will happen in 2008 (Olenev 2007, p. 98). After 2008 further development of Russia's economy is possible only by building new production capacities. Therefore, the global financial crisis in 2008 caused the decline of Russia's economy stronger than the other emerging countries of BRIC. This decline was blamed on the global crisis, even though my estimates show that the drop caused mainly by internal factors.

Of course it is difficult to predict global financial crisis by a model of one country if it is possible at all. Simulation game MABRICEJ appeared in 2009 as a response to the challenge of criticism on the existing mathematical models for economic and finance system which are not predicted the emergence of the global financial crisis in 2008. Suppose that current models cannot predict a crisis in new sectors of economy. But this does not cancel possibility of use such models in human-machine systems existing in simulation games. People involved in the game make decisions in these systems, and the implications of these solutions can be calculated by means of mathematical models describing the interaction of social, demographic, economic, financial, environmental, political, military, and other processes. However if the decision of players is beyond the used models it does not cancel their decisions but it gives exercises for modification of these models.

The title of the simulation game MABRICEJ was formed as abbreviation of Iran, USA, Brasilia, Russia, India, China, European Union, Japan. I chose these countries not only because they are major engines of world economy but also because they are the main representatives of now existing civilizations which have their own culture. Despite globalization they differ among themselves by organizational structure of the economy and society. For example, Iran (letter M in the game title) is a representative of the Muslim countries pursuing their own policy. United States (letter A) dominate the world economy. BRIC is a well-known acronym for the new developing countries. The European Union (letter E) with euro introduction has become a new great player on the world level. Japan (letter J) is developed country with great specificity.

In constructing a mathematical model underlying the simulation game it was assumed that the main purpose of the simulation game is to see what options may have a future. It is possible to define options of future development of macroeconomic, social and political indexes for the countries participating, and also for the world as a whole. By the game you can check the consistency of the various projects proposed by economists, politicians and futurists. As a result of the experience of the game it became clear that the game is a great new tool in training of students. The game was held as a homework assignment for students enrolled in the courses "Introduction to Mathematical Methods for Economic Forecasting," and "Mathematical Modeling in Economics and Ecology." Students participating in game gain skills of researcher, studying unconventional thinking and teamwork.

Overview of Model Description

The simulation game MABRICEJ is designed to attract an attention of policy makers to the challenges facing their countries makes it possible to evaluate how their decisions take into account the interaction between countries. The game goes step by step, starting from the situation of beginning year. Each step corresponds to country action on one year forward. For calculation of players' actions on each step we use a mathematical model of economic interaction between the countries.

This section of the paper is devoted to overview a mathematical model description on which the simulation game of interacting countries is based. Here we represent some elements of a mathematical

description of an open economy model used in describing the economy of each country. Open economy model is original. Production sector of a country is described by a vintage capital model (Olenev and al. 1986). Interaction of countries is described by dynamic balance normative model somewhat similar to (Olenev 2009a).

So this section consists of two subsections. One subsection described a production function based on vintage capital model. The production function of each country is based on the age distribution of production capacities which we can estimate by time series of gross fixed capital formation and capital intensity. Second subsection describes some elements of a normative balance model of economy.

Vintage Capital Model for Production Function

A vintage capital model is the base for description of economic system because it give us a production function that is built by distribution of production capacities by age (Olenev et al. 1986). The production function constructed on the base of a microdescription is better than an abstract function used for macrodescription because it gives natural limits for it use.

Construction of a production function based on the following description of the aging process of productive assets and dynamics of production capacity. For description a model we use putty-clay technology, and the number of workplaces on created production unit is fixed from the moment of creation of the unit until it dismantles. Aging of production assets is expressed by reduction of capacities at constant rate. This aging of production capacities is not accompanied by an equivalent reduction in workplaces. In process of aging the equipment works even more often with interruptions and the part of employments is occupied with repair, and other part has to be idle. So labor-intensity of production on unit of a product in process of aging of a production capacity increases with the same rate so that it depends on life time of the capacity.

Now we give a mathematically strict description of the provisions expressed in the previous paragraph. We consider the economy, which has the only homogeneous output - national income - and spent only a uniform resource - labor. Production is carried out by set of production units. The production technology is completely determined by labor input - norm of work use on output of unit of a product.

Hypothesis *A*: The number of workplaces on the production unit remains unchanged over time and output is reduced at a constant rate μ.

Production capacity m of production unit is defined as its maximal possible output. Labor-intensity λ is defined as norm of labor expenses on a unit of production output. To formally describe the hypothesis it is necessary specify creation time τ for each production unit, the initial (nominal) labor-intensity ν and initial production capacity *I*. By hypothesis *A* in time $t \geq \tau$ production capacity of the production unit is reduced to a value $m(t,\tau) = I\exp[-\mu(t-\tau)]$. The number of workplaces in the production unit is equal its initial value $r(t,\tau) = \nu I = \lambda(t,\tau)m(t,\tau)$. So, labor-intensity of production on unit of a product at time $t \geq \tau$ on the production unit is more than nominal. $\lambda(t,\tau) = \nu\exp[\mu(t-\tau)]$. In this description all production units constructed in the same time are indiscernible ones. We can consider them as one firm in the model. Such firms differ by the creation time τ and at each time t a different firm has a different age $t-\tau$.

On Fig. 1 you can see age distribution of production capacities for Russia in 2011 which I estimate by official statistical data on gross fixed capital formation and an implicit estimation of capital-intensity. In Fig. 1 the ordinate is the production capacity in billion rubles of 2005, the abscissa is the age of the capacities in years.

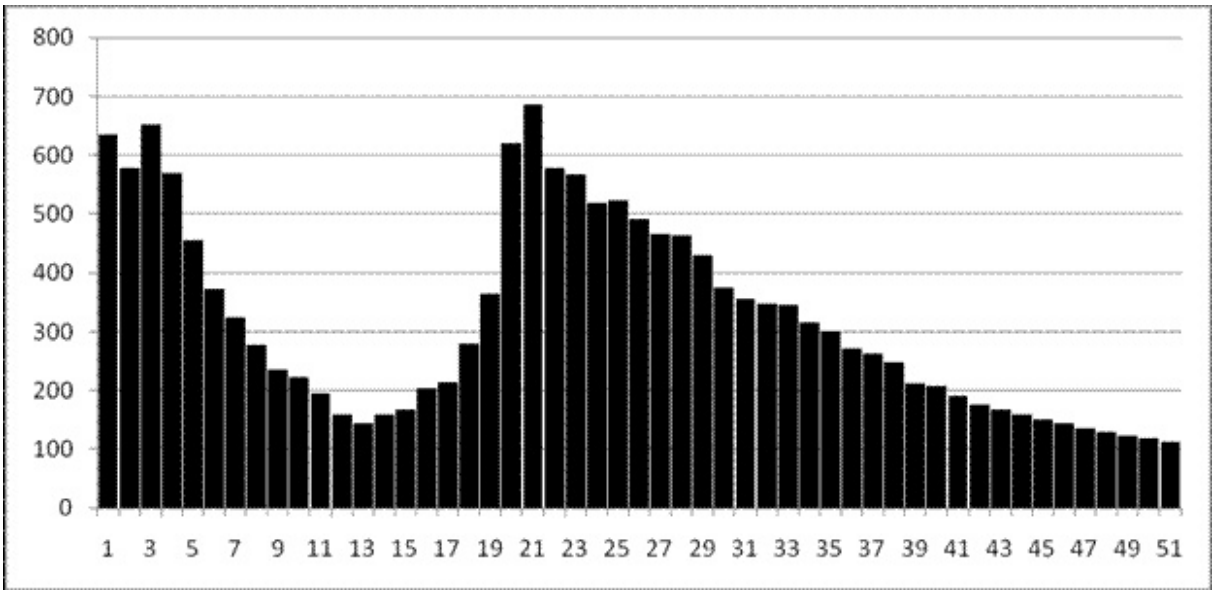

Figure 1 Age distribution of Russian production capacities in 2011

For macroeconomic description of industry or country it is important to know a total production capacity $M(t) = \int m(t,\tau)d\tau$ of the corresponding set of production units. By setting total capacity of the production units which labor-intensities belong to a given set we can construct a production function (Olenev et al. 1986). The production function $Y(t) = F(M(t), L(t))$ determines country's gross domestic product $Y(t)$ at given values for volumes of production factors - the total production capacity $M(t)$ and total employment $L(t)$.

Dynamic Balance Normative Model for Description of Countries' Interactions

Production outputs in countries are defined by their production functions of production factors. The factors have a long prehistory. The exchange of products between countries and the pricing equations describe the balance in a dynamic form which are similar to the description (Olenev 2009a).

Production sector delivers product on domestic market, and on foreign markets. Productive sector of each country is denoted the same letter as the country: *M, A, B, R, I, C, E, J*. It is considered that the prices are formed in each market of each product and change of the prices is in inverse proportion to change of stocks of corresponding products. Households *L* offer labour and consume final production. Trading intermediary *T* redistributes material and financial flows. Bank system *S* emits money resources, gives out credits to production sectors. The government *G* accumulates taxes from production sector (the profit tax n_1, the value-added tax n_2 and excises n_3, the uniform social tax n_4, the customs duties on export n_5) and households (the customs duties on import n_6, the surtax n_7) and adjusts charges of the budget.

Standard designations are used for simplicity. Macroindexes and parameters of the model are supplied by the top and bottom indexes, and the top indexes are used to point agents, and bottom to point the goods. Thus the same symbols can be used as top or bottom index or can be stayed at normal place but they designate the different things. In the given work parameters and intensive indexes will be designated by small letters, and extensive macroindexes and the called indexes by capital letters. It is considered that distribution of a stock of each good is made by norm: a_i^{nm} - a share of a stock of the good *i* going from economic agent *n* to economic agent *m* ($a_i^{nn} = a_i^n$). It is considered that distribution of money is made also under some norm: b_i^{mn} - a share of money stock going from agent *m* to agent *n* for a product *i* ($b_i^{nn} = b_i^n$). Capital intensities also are set by some norms: c_i^m - agent *m* norm of expenses on product *i* for creation of one unit of capital product. Parameters of production functions

are set by constants. For example, output $Y_M(t)$ of product country M produced by economic agent M (Iran, production sector of country M) is described by its production function of used production factors: labour L, capacity M.

$$Y_M(t) = F(M_M(t), L_M(t)). \tag{1}$$

Hereinafter, all macroindexes $Y_M(t)$, $M_M(t)$, $L_M(t)$ are considered as functions of time t, therefore this argument falls in formulas. Economic agent M produces product M. The stock of product $Q_M^M(t)$ increases due to production and decreases due to shipment to domestic agent L, foreign agents A, B, R, I, C, E, J, and for investments $I_M(t)$. It is considered that charges on investments from the own product coincide with incomes of them. There are fix shares a_M^{MO} of own product stock that goes on foreign market $O \in \{A, B, R, I, C, E, J\}$ that give flows X_M^{MO}.

$$\frac{dQ_M^M}{dt} = Y_M - (a_M^{ML} + a_M^{MA} + a_M^{MB} + a_M^{MR} + a_M^{MI} + a_M^{MC} + a_M^{ME} + a_M^{MJ})Q_M^M - c_M^M I_M, \tag{2}$$

where

$$I_M = \frac{b_K^M W^M}{p_M^M c_M^M + \sum_O p_O^M c_O^M}, \qquad X_M^{MO} = a_M^{MO} Q_M^M. \tag{3}$$

Change of labour and capital stocks is similarly described.

The stock of money $W_M(t)$ of economic agent M (production sector of country M) grows when agent M takes bank credits, sales the goods on foreign markets, sales the goods on domestic market, takes transfers from consolidated budget $T^{GX}(t)$. It decreases due to wages payments to households L, due to payments on credits and transfers of taxes to the consolidated budget.

$$\frac{dW^M}{dt} = \sum_O w_M^O p_M^O X_M^{MO} + C^{SM} + p_M^L a_M^{ML} Q_M^M - \left(b_L^{ML} + b_H^{XB} + \sum_O b_M^{MO}\right) W^M - T^{MG} + T^{GM}, \tag{4}$$

where $w_M^O(t)$ is M/O-currency exchange rate, $O \in \{A, B, R, I, C, E, J\}$, $T^{MG}(t)$ is transfer payments to the consolidated budget (equal the sum of taxes), $T^{GM}(t)$ is transfer from the budget to production sector (VAT returns plus grants and so on). Transfer $T^{MG}(t)$ of agent M to the consolidated budget develop from the profit tax $T_1^{MG}(t)$, the added value tax $T_2^{MG}(t)$, the excises $T_3^{MG}(t)$, the uniform social tax $T_4^{MG}(t)$, to customs duties on export $T_5^{MG}(t)$.

It is considered that agent M takes all the credit offered by country M bank system S, however the volume of given credit $C^{SM}(t)$ is limited by liquidating cost of production capital which is considered proportional the total production capacity: $C^{SM} = \sigma^M M_M(t)$, $\sigma^M > 0$. Debts $Z^M(t)$ of agent M to bank system S grows due to delivery of new credits $C^{SM}(t)$ and charges of current interest rate $r(t)$ on an available debts, and decreases due to repayment flow $H^{MS}(t)$.

$$\frac{dZ^M}{dt} = C^{SM} + rZ^M - H^{MS}, \quad H^{MS} = b_H^{MS} W^M. \tag{5}$$

Corresponding equations for countries $O \in \{A, B, R, I, C, E, J\}$ are easy write by analogy to equations (1) - (5) for country M.

Change of stock for final product M of intended to domestic agent L (households), $Q_M^L(t)$ defines change of a consumer price index p_M^L on product M.

$$\frac{dQ_M^L}{dt} = a_M^{ML} Q_M^M - \frac{b_M^{LM} W^L}{p_M^L}, \tag{6}$$

$$\frac{dp_M^L}{dt} = \alpha_M^L \left(\frac{b_M^{LM} W^L}{p_M^L} - a_M^{ML} Q_M^M \right). \tag{7}$$

Changes of stocks of all other products in all markets and change of the corresponding prices are similarly defined. Thus we assume, that the product of the same sectors acts in other quality in the different markets and has the other price, that it is, as a matter of fact, other product.

It is considered that increase of the wages can occur both at shortage of the labour, and due to increase of consumer prices on production of the sector. For example, the open wage at sector M is determined by equation

$$\frac{ds_L^M}{dt} = \left[\alpha_L^M \left(\frac{b_L^{ML} W^M}{s_L^M} - a_L^{LM} Q_L^{LM} \right) + \frac{\beta_L^M s_L^M}{p_M^L} \left(\frac{b_M^{LM} W^L}{p_M^L} - a_M^{ML} Q_M^M \right) \right]_+ . \tag{8}$$

Here the following designation is used: $A_+ = A$, if $A > 0$ and $A_+ = 0$, if $A \le 0$. It is supposed that the gain of wages at surplus of a manpower does not exceed a gain of the price, $\beta_L^M \le \alpha_M^L$.

The stock of money on the consolidated budget of country M accounts increases by tax revenues and decreases by transfers to domestic and foreign production sectors and households.

$$\frac{dW^G}{dt} = T^{MG} + T^{LG} + \sum_O P^{OG} - \left(b_M^{GM} + \sum_O b_O^{GO} \right) W^G . \tag{9}$$

The bank system of country is not closed, and the branches of the foreign banks from other countries play a role in investment decisions.

The description of the model terminates on it because of restrictions on volume.

Overview of Game Rules

Participation in the game does not require knowledge of the mathematical model of interacting economic systems on which the game is based. Even knowledge of mathematics does not require. On the contrary, it is necessary to imagine that your decisions will lead to such consequences that can occur in real life. If any of your decisions can not be processed by an existing model, it is not a problem for the country players. It is a problem for the team of intermediaries in the game that will have a lot of work on the rapid modification of the computational model, if this is necessary. In other words, "all's fair in love and the game." Team players are not restricted in their decisions within defined rules. And the rules are simple - players should formulate their actions on the next step in writing form and transfer this decision to intermediaries. The solution of a player may be in an open form and in a closed for other players form. And if you are agreed in something with the rival countries, this agreement each party should send to intermediaries, so they can take into account your agreement in calculation the consequences of this agreement.

Remind that the game participants consist of team of intermediaries and eight teams of country players. The team of intermediaries performs next tasks: (1) translates verbal decisions of players into

mathematical language used in model, (2) estimates results of the next step of players by model and declares these results, (3) in each step suggests paying attention to significant problems of the year, (4) modified the model. The team of country players performs next tasks: (1) defines the country problems; (2) offers solution of internal and external challenges; (3) negotiates with other countries and signs contracts; (4) writes decisions of current step in their topic of group at social network and sends message with secret decision to intermediary.

Overview of Game Realizations

Interaction of participants of each game was carried out by a group opened in social network. For today simulation games were carried out with students of the Russian universities in Russian. Total number of the carried-out games makes 8 while all of them were led to the networks vk, com. The first game took place in 2009 in Russian University of Peoples Friendship (Olenev 2009c), the report by its results was presented at the EKOMOD-2009 conference (Olenev 2009b).

It is shown (Olenev 2007) that by the end of 2008 Russia's economic growth by attracting older capacity will over and further development can be only due to other sources. The global financial crisis has exacerbated the problems facing the Russian economy (poor management, old production capacities, the demographic crisis). The long-term forecast of further development is impossible if it is not clear yet what strategy will be chosen. However mathematical modeling here is useful for analysis the interaction between countries and analysis of their possible strategies for recover the financial crisis.

One effective way to analyze possible strategies for economic development of interactive countries are simulation games (Pavlosky et al. 2005). Consider a simulation game of the major countries, which depend on the actions for recovery from the crisis. Business simulation game MABRICEJ was carried out in 2009 with students of chair of the nonlinear analysis and optimization of the People's Friendship University. In this game students were divided into eight teams representing eight countries of a planet MABRICEJ (see Fig. 2) which title is drawn of the first letters of the considered countries.

Figure 2 Geographical map of MABRIKEJ planet in form of a ring.

In this paper each country named by the name of original country or by the first letter but in the games held it was called by name of flower beginning with the same letter.

The goal of each team - at the time of recovery from the crisis which is not known in advance and depends on the actions of the players to put their country in a relatively better economic situation. Production, human and energy resources settle down on country cells non-uniformly. The output is determined by a production function constructed by production capacities distributed by age. In the game, each country produces goods in five different proportions: (1) fuel and energy raw materials, (2) gold, (3) the means of production, (4) consumer products, (5) weapons - and can share them with other countries in accordance with established international prices. Each country has its own currency, the rate at which relative to other currencies and gold is changing. The first step is choosing the country's strategy, which can later be changed. The game ends when the death of all inhabitants of the planet, as

well as in the case where one or more countries within a few periods are in a situation of normal life or prosperity.

In games held my estimations for total production capacities of eight selected countries were used. These estimations are derived from official sources of statistical data and from indirect estimates of capital-intensities for these countries. See Fig. 1 as an example.

Experience of the carried-out games showed that students make the best decisions if on each step they have known any purpose though not mandatory. So, starting with the first game the first step was devoted to analyze the situation at the start of the game (it coincides with a year of carrying out game) and a choice of strategy of development for the country. In order to show what decisions can players take we give almost completely the first step from the first realization of simulation game which was in 2009.

As an example how you can estimate country's problems and choice ways to solve them I presented to players my vision of the challenges of Russia in 2009 and possible decisions that could be offered by different political parties. The following challenges were in Russia in 2009 by my opinion.

- Ineffective control system.
- Aged production capacities.
- Demographic crisis.
- The need for defense of huge reserves of natural resources.
- Political and economic apathy of the people.
- Imbalance between the under-consumption of employed in primary production and over-consumption of the major consumers.
- Global financial crisis.

For example, political parties would be offered such possible development strategies for the Russian economy including the extreme ones.

- "New Economic Policy" (step back to a familiar state) State capitalism, State Planning reindustrialization, enthusiastic of such problems
- "Pinochet" (liberalism without limitation) the full order in everything, a ban on abortion, the development of the defense industrial complex, close the bankrupts
- "Lunokhod (Moon Rover)" (the strategy of small things) If you fall into a ravine, you should come back to a familiar situation, and thence forward, taking into account all the ravines
- «Administrative" (Limit the country by 30 provinces with appointed governors, friendship with the south neighbor, where more men than women)
- «Imitation» (we introduce all good that they has outside our country)
- «Innovation» (possible in defense industrial complex protected by laws on nondisclosure)
- «Inertial" dropping until the fall of accumulated resources, forced devaluation, and again at a crossroads.

And players of MABRICEJ-2009 at the first step (year 2009) selected the next strategies.

Country M (Iran) strategy from 2009 is transition from agrarian to industrial development. It consists from the next points:

- • Industrialization (machines and workers)
- • Attracting foreign workers
- • Development of infrastructure
- • Protectionism and gas industries
- • Nationalization of bankrupt
- • Organization of work for the needy (both in the U.S. during the Great Depression)
- • Construction of agro irrigation. Industry (chemical and mechanical engineering)
- • Increase in army, mainly engineering troops
- • To send an army to build domestic systems
- • "New Economic Policy" at low level
- • Strengthening the police

Emphasize the ideology; so that people mostly go for the idea, sacrificing personal interests (turn to religion)

Country A (USA) strategy from 2009

- Investments in Asia's largest companies;
- Increase the state's share in the domestic financial sector;
- Convergence in the political sphere with neighbors;
- Funding for European and Asian oil companies;
- Decline in domestic unemployment, inflation, reduction of immigration flows;
- A secret military funding for European

From online negotiations in social net vk.com: Country B (Brasilia) offers A (USA) collaboration on mutually on beneficial terms: in exchange for their high technology and skilled personnel, B is ready to provide A with resources and provide territory for the development of new fields.

Country B (Brasilia) strategy from 2009 was "Lunokhod" (Strategy of small things by trial and error)

- Purchase of weapons in R, cooperation with its military-industrial complex
- Purchase of technology in J and/or A)
- In time of world crisis is necessary to smooth variations in standards of living for strongly differentiated population B. It is necessary to prevent a reduction in wages of the poor to a level below subsistence. Help poor people will be provided in the form of provisions and food because it is lack of an adequate supply of government funds in times of crisis. Thus the country can fight with the growing threat of poverty and at the same time save money stock for industries and development of economic relations which should help country get out of the crisis in the long run.

Country R (Russia) strategy from 2009 is innovation development

- Development of the national education system to absorb the modern knowledge and technology. Become a base for expanding scientific research.
- Assist talented young people in scientific research to help them integrate successfully into the scientific and innovative environment.
- State stimulation business for investment in research and development, so they grew
- Large-scale modernization of production capacities in all sectors of economy. Development of new sectors of competitiveness, especially in high-tech industries (aerospace industry, shipbuilding, energy, information sphere)
- Construction and modernization of roads

Country I (India) strategy from 2009 is catching-up development.

- India is a poor country which is strongly connected to world credit relations and trade flows with other countries. We believe that their blocking in the crisis will not lead to a drop in the economy and the strong changes in the rate of annual growth which remain at around 5%. Our goal is to raise living standards through the introduction of technologies that are developed and used in the world for the last 50 years. To carry out the introduction of new technology for us by a way of contracting with businesses ruined in countries A and J.

Country C (China) strategy from 2009 is more open economy (economic liberalization).

- Reducing of unemployment by reducing subsidies and grants from the state budget for the unemployed. Providing labor (from unemployed) for country M.
- Increase exports to countries with low production processing (M, R, ...) up to 20% of GDP.
- Reducing the cost of investment subsidies, grants, expenses on defense and economy, social welfare by 10%.
- Raising taxes to 15% of GDP.
- Increase of Foreign Investment.

Country E (European Union) strategy from 2009. West Europe give the different policy than East Europe.

- Establish a regime in order to accelerate the implementation of the strategy.

- Support a free competitive market with social security.
- Development of domestic market. Freedom of movement of goods, services, capital and people.
- Common conditions for entrepreneurship.
- Freedom and variety of cultural and religious traditions.
- High individual entrepreneurship.
- Spread of education.
- Achieving a higher standard of living for all strata of society.
- Support and assistance to people with low incomes.
- Adapt the population to the situation.

Country J (Japan) strategy from 2009 is policy of administrative actions.

- Slightly reshaping of export-oriented high-tech sector of economy on import substitution.
- Supports the most successful companies in the sector to maintain leadership in innovation. Transfer some production to R and other countries.
- Reduction of pro-birth demographic programs but not more than for two years. Funds for the anti-crisis measures.
- Temporarily reducing of municipal expenses.
- Stimulation of recycling system - cheap raw materials.
- Open economy for other countries. Minimum tariffs for cheap raw materials.
- Measures to support the banking sector.
- For country R building oil and gas pipelines, activate trade, transition to a new level of cooperation, R gives us a special economic zone for building of a large high technology enterprise.

Within a week the team of intermediaries estimated all these solutions of the countries offered by students and transformed these solutions of the countries to corresponding changes of control variables in model. Results of calculations by the model on change of the main indicators were presented to participants of game. Here are some of results of the first step:
M (GDP -1 %, Export -10%, Import -5%),
A (GNP -2 %, Export -5 %, Import -10 %),
B (GDP +3 %, Export +2 %, Import -1 %),
R (GDP -6 %, Export -20 %, Import -2 %),
I (GDP -1 %, Export -10 %, Import -5 %),
C (GDP +6 %, Export -6 %, Import -3 %),
E (GDP -4 %, Export -15 %, Import -5 %),
J (GDP -1 %, Export -10 %, Import -1 %).

Some results of the second step (Year 2010). Strategy specification and coalition choice.
M (GDP +1 %, Export +2%, Import -3%),
A (GNP -1 %, Export -3 %, Import -5 %),
B (GDP +4 %, Export +2 %, Import -1 %),
R (GDP -3 %, Export -1 %, Import -5 %),
I (GDP +1 %, Export -5 %, Import -3 %),
C (GDP +7 %, Export -3 %, Import +3 %),
E (GDP -1 %, Export +1 %, Import -1 %),
J (GDP -1 %, Export -1 %, Import +1 %).
There was M+B+R+C coalition with own resources and products. Countries A, I, E, J officially did not have coalitions, they own finance – "League of democracies".

On the third step (2011) countries choice an order of problem solution.

Result of the first simulation game

The result of the game on economic performance was estimated by analogy with the Great Game of the XX century, when the economic center moved from England to the United States. The intrigue was

the fact that Germany claimed to replace senescent England, as now, China could replace the United States. But the center will not allow this. As a result, the center will shift to someone who is friends with the current center and the other players too. In this implementation, the game turned out that the Government of country B (Brasilia) has behaved as well.

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Conclusion

Simulation game of interacted countries MABRICEJ is based on action of players. Result of interactions is estimated by a mathematical model of interacting socio-economic systems. The article presents some of the implementation of the game held in the Russian Peoples' Friendship University. The main result of the game is that players are starting to realize that different countries have their own interests. Limiting the number of countries involved in the game led to the fact that not all possible variants of future was discussed.

A review of implementation of the shortest of the played games was presented here - the first one. In this game managed to make only three steps when semester and the game finished. It was as the game went along with program debugging which took much longer time than planned.

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