

Dynamic model of fiscal solvency with capital tax shifting

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Financial crisis results in difficult government financing due to an increase in debt servicing costs and the inability of the new debt issue in some extreme situations, such as in the case of Greece. Regardless of a financial crisis tax revenues and the issuance of debt are interdependent. The bonds issuance can to some degree substitute for tax revenues but as it has been demonstrated by Krogstrup (2002) the costs of debt servicing can crowd out other expenses. Therefore high-debt countries exhibit lower public spending despite higher overall tax burden. During a crisis governments are also more susceptible to an increase in debt servicing costs due to concerns about their fiscal solvency. This concept was strongly signalized by Mendoza and Tesar (2005). They emphasized that countries may adjust taxation of capital, labor and consumption in order to ensure long-term solvency and hamper harmful capital tax competition. Despite a high degree of flexibility in the tax-mix and the level of taxation adjustment it should be stressed that various types of taxes are to different degrees prone to such adaptation. On the one hand, harmonization of consumption taxes in the European Union constrains their use as a source of budgetary-needs-financing and forces the changes of tax burden on labor and capital. In practice, however, a significant reduction in capital taxation is not possible without significant increase in labor taxation. The latter requires a low elasticity of labor income and is unpopular for social and political reasons. As the result, taxes are lowered mainly in countries with relatively high taxation of capital income where an increase in labor taxation is easier to force. On the other hand, omitting the harmonization aspect, consumption taxes are simple to adjust and to a lesser extent affect the structure and the use of production factors. Taxation of consumption is also less apparent to taxpayers, usually because taxes are included in prices of goods and their use is motivated by non-tax factors (e.g. higher taxation of energy is justified by environmental protection or higher cigarette taxation - by the concern for public health). Neither the capital taxation inducing the capital outflow nor the labor taxation distorting the labor market has these advantages.

In this paper we analyze the problem of determining the relationship between the capital, labor and consumption tax-mix with the possibility of public debt issuance. We strive to determine the long run equilibrium, using dynamic optimization model with continuous time. Our approach differs from previous literature because, instead of utility (or welfare) maximization, we assume that government maximizes the revenues from the three taxes and bond issuance. This corresponds to the behavior of the Leviathan-type government. The objective function does not require the determination of the specific utility form and it better match the governmental behavior during financial distress when constraints on borrowing become binding. The dynamic optimization allows for testing the impact of parameter changes on tax rates and the bond issuance in the equilibrium and the value of state variables (capital, labor and consumption). Especially, the most important are the parameters referring to bond issuance and capital-income-shifting. In the proposed model all state variables are tax-driven but taxation of labor and consumption mostly depends on the values of external parameters.

Moreover, we propose three additional extensions to a typical multi-tax dynamic model. Firstly, the bond issuance is positive in the steady state but its level is limited by the relation of tax revenues to the proxy of the production measured as the product of labor and capital. Fulfillment of such a relation ensures fiscal solvency of the country. Therefore the bonds are not transitory phenomenon of budgetary financing and they are at a positive level in the equilibrium simply because they provide less distortion to the economy than taxes. However, there is an upper limit on the tax burden and debt financing which does not violate the fiscal solvency postulate. Secondly, the taxation of the capital income can be partially avoided by shifting the capital income abroad. The shifting possibility is exogenous because it depends on the existing “tax shifting technology” and the level of foreign ownership of capital. Thirdly, consumption taxation can be raised but there are external factors

constraining its maximum level. The factors affecting consumption partially reflect the consumption tax avoidance. They are not directly modeled but stay linked with legislative or competitive reasons, like for example possibility of cross-border purchases or the possibility of shadow economy expansion.

There is only one internal (non-boundary) equilibrium with positive tax rates and bond issuance. There are some interesting numerical results referring to the equilibrium. Firstly, the higher the explicit part of consumption (the taxed consumption) the higher the taxation of capital and consumption and - because of higher tax revenues - higher level of debt financing. However the adjustment is not linear. for small values of explicit consumption the taxation of capital dynamics is decreasing and the bond issuance dynamics is slowing down. So there are some preferences for higher indebtedness than taxation of capital if consumption tax is not efficient in generation of revenues. Secondly, the taxation of labor income is unaffected by the changes of explicit consumption. The consumption achieves the maximum value for some level of explicit consumption and for higher values of explicit consumption it decreases. Thirdly, the higher capital income tax shifting parameter induces the decrease of capital income and encourages the capital outflow, finally lowering the consumption.

The article is structured as follows. Firstly, a dynamic model of government revenue maximization in continuous time is described. The government revenues stem from the taxation of: capital, labor and consumption and the issuance of debt. In the next step, we present the sketch of dynamic optimization procedure involving the description of differential equations of control variables. This allows to carry out numerical analyses curbed to cases with control variables (tax rates) bounded in range 0-1. The analysis concentrates on the impact of parameters affecting: the bond issuance, capital income shifting, taxation of consumption and the intertemporal preferences. Then conclusions and final remarks follow.