THE ESTIMATION OF TAX-BENEFIT AUTOMATIC STABILIZERS IN SERBIA: A COMBINED MICRO-MACRO APPROACH

**ABSTRACT:** The large volatility of GDP due to the economic crisis, particularly in transition economies, has brought the issue of automatic stabilizers back into the focus of economic policy. The vast majority of empirical literature in this field relates to the estimation of the size of automatic stabilizers in developed countries, usually based on macroeconomic data. On the other hand empirical literature on this topic based on micro data, particularly for transition economies, is limited. This paper provides an evaluation of the size of automatic stabilizers in one transition economy (Serbia), by combining tax-benefit simulation modelling based on micro data and econometric methods based on macroeconomic data. The results show that, in the case of shock, around 17% of fall in market income would be absorbed by automatic stabilizers. Although the stabilizing effects of the tax-benefit system in Serbia are lower than in other European countries, the total size of automatic stabilizers is close to the average value in these countries, due to the higher elasticity of demand to income. The results also show that progressivity-enhancing income tax reform would only slightly increase automatic stabilizers, due to the large informal economy and the large share of agriculture in total households’ income.

**KEY WORDS:** automatic stabilizers, income stabilization, consumption function, microsimulation, income tax reform

**JEL CLASSIFICATION:** D14, E63, H24
1. INTRODUCTION

In 2008-2009 and 2011-2012 Europe faced sharp declines in economic activity, after strong growth posted in the previous years. As a result, economic literature and policy is again focusing on the issue of built-in (automatic) stabilizers, which would reduce output volatility and thus prevent overheating or extreme shrinkage. This topic is particularly important for European transition economies, since many of them posted large GDP growth rates in 2002-2007, but also a sharp decline in GDP in 2008-2009 when the global economic crisis began (in Baltic countries the annual fall in GDP was double digit). The economic boom and following decline were much larger in these economies than in developed countries. Serbia was in a similar position to other transition economies, since its real GDP grew at an average annual rate of 5%-6% between 2001 and 2008, and slowed down considerably in 2009 (by 3.5%).

According to economic theory and the results of empirical studies, the size of automatic stabilizers depends on the size of the public sector, the structure of the tax system, and the design of the principal taxes, i.e., their progressivity (Baunsgaard and Symansky, 2009; Arnold, 2008). There are numerous empirical studies that evaluate the size of automatic stabilizers in developed countries, usually by applying econometric methods to macroeconomic data (Girouard and Andre, 2005). Some of the recent studies also evaluate the size of automatic stabilizers in developed countries by means of microsimulation models, based on micro data (Dolls, 2010). Although this topic has been frequently researched in developed countries there is little empirical literature on the estimation of automatic stabilizers in transition economies because of the limited availability of consistent and sufficiently long series of macroeconomic data (which would encompass several business cycles). On the other hand, to our knowledge there is almost no empirical literature on the empirical estimation of automatic stabilizers in transition economies based on micro data. Therefore the aim of this paper is to fill the gap in the empirical literature on the estimation of the size of automatic stabilizers in transition economies, by combining microsimulation methods based on micro data and econometric methods based on macro data, for Serbia. Personal income tax reform has been a burning topic in Serbia for almost a decade. One of the strong arguments for reform relates to
the weak built-in stabilizers stemming from the existing system. Therefore in this paper the potential effects of three hypothetical income tax reform scenarios in Serbia are also estimated and analyzed.

The results show that automatic stabilizers in Serbia equal 17%, which is close to the average estimated values in other studies (Veld, 2012). The considerable size of automatic stabilizers is driven by the high elasticity of consumption to income, not by the design of the tax-benefit system. Progressivity-enhancing tax reform would only slightly increase the size of automatic stabilizers in Serbia – the introduction of progressive taxation of labour income being more important in that respect than progressive taxation of capital income. The limited effects of tax reform on automatic stabilizers are the consequence of the large informal economy and large share of income from agriculture in the total households’ income.

The paper consists of six sections. Following the introduction, section two presents a theoretical framework for the analysis of automatic stabilizers. In section three the macro and micro approaches to empirical evaluation of the size of automatic stabilizers are analyzed. Section four deals with the impact of the tax system on the size of automatic stabilizers, while section five presents the results of the empirical analysis for Serbia. Section six concludes.

2. AUTOMATIC STABILIZERS – THE THEORETICAL FRAMEWORK

In the last few decades there have been numerous attempts in economic theory to explain the reasons for volatility in economic activity. According to these theories there are three groups of factors which generate business cycles: i) supply side factors – technological progress, change in import prices, inflow of capital from abroad, discovery of natural resources, etc., ii) demand-driven factors: change in the amount of investment and personal consumption, export demand, and iii) economic policy factors: interest rate policy, money supply, fiscal policy, exchange rate regime, etc. (Arsić et al, 2012). One of the prevailing theories in the last few decades has been the Real Business Cycles theory, which suggests that cyclical fluctuations in economic activity are the results of supply side shocks (primarily, technological innovation). Although this theory provides
a satisfactory explanation of the speed of economic growth, it fails to explain the factors of decline in GDP (recessions).

Success in reaching macroeconomic goals depends on the selection and application of economic policy instruments, but also on the structure of the economic system. The main drawback of discretionary measures of economic policy relates to the fact that they are enforced ex post, implying a considerable time lag between the moment a need for action is noted and the moment a policy measure gives results. The total time lag (the time between the moment the need for reaction arises and the moment when measures bring effects) depends on efficiency of economic analysis, efficiency of the decision-making process, and efficiency of enforcement and the time which is necessary for the applied measures to trigger certain effects. This time lag often makes the results of discretionary economic policy measures suboptimal.

In addition to the design of discretionary measures, the structure of the economic system may also have a significant impact on the movement in macroeconomic variables, since the transmission mechanism itself could trigger (de)stabilization of macroeconomic trends. This is frequently referred to as the “automatic stabilizing impact of economic policy”, which reduces fluctuations in the movement of macroeconomic variables without any direct government intervention. When Keynesian economic theory prevailed GDP fluctuations were considered to be caused by demand side shocks. This implied that automatic stabilizers are features of economic policy which stimulate aggregate demand in the case of recession (through increase in public expenditure and reduction in taxes) or which reduce aggregate demand in the case of expansion (through cuts in expenditure and increase in taxes). On the other hand, if variation in business activity is caused by supply side shocks, the effectiveness of automatic stabilizers is limited, sometimes eventually leading to acceleration of inflation.

The substantial advantage of automatic stabilizers relates to their countercyclical impact, while the time lag problem is almost non-existent; which is why they are regarded as superior to discretionary measures. Consequently, in order to improve the efficiency of the economic system, the design of economic
(particularly fiscal) policy measures is usually aimed at maximizing the potential size of automatic stabilizers. For example, under the Stability and Growth Pact (of the European Monetary Union), fiscal policy should be run so as to avoid a large structural imbalance, leaving considerable space for automatic stabilizers. Empirical studies suggest that fiscal policy in developing and transition countries is usually procyclical, leaving little space for fiscal expansion in case of economic recession. Therefore an increase in the size of automatic stabilizers would be particularly beneficial to the macroeconomic stability of these countries. However, this does not mean that automatic stabilizers are always sufficient to stabilize the economy (this depends on the causes of the shocks), which makes it necessary to apply discretionary measures.

Automatic stabilizers reduce the impact of shock in gross (market) income on effective demand. Their effectiveness in that respect depends on two factors. First, the design of the tax and benefit systems, which determines the extent to which the change in gross market income (before taxes, social contributions, and benefits) will be translated into change in net disposable income (after tax, contributions, and benefits). Second, on the household liquidity constraint, depending on which the change in disposable income will be reflected in change of consumption/demand. Assuming that people behave in a lifetime consumption-smoothing manner, it is likely that they will opt to borrow when their disposable income falls. In that case a reduction in disposable income will not be fully reflected in a decline in consumption, which means that automatic stabilizers do not play a big role, and it will be necessary to apply discretionary policy measures in order to boost demand. In this regard the concept of Ricardian equivalence seems important, since it implies that borrowing does not change the consumption of any generation, leading to the conclusion that fiscal policy is irrelevant. If households do own assets or a stable source of income, based on which they can borrow funds, they are considered to be facing a liquidity constraint. This means that a decline in their disposable income would lead to a decline in their consumption/demand. In that case automatic stabilizers could play a significant role in smoothing the variations in demand and economic activity. Assuming that government is not intending to change the liquidity constraint of households with its measures, the difference in the
size of the stabilizing effects of various public policy measures stems from their power to change the elasticity of disposable to market income.

If $W$ is employment income, $Q$ self-employment income, $I$ capital income, $P$ property income, and $O$ other income, then market income ($Y^M$) equals:

$$Y^M = W + Q + I + P + O$$  \hspace{1cm} (1)

Disposable income ($Y^D$) is computed by reducing the market income by the amount of income tax ($T$) and social contributions ($S$), and increasing it by the amount of benefits ($B$). The amount of benefits net of taxes and social contributions may be regarded as the change in personal income due to government intervention ($G$):

$$Y^D = Y^M - GI = Y^M - (T + S - B)$$  \hspace{1cm} (2)

This means that tax and benefit policy can make the change in disposable income smaller than the change (fall) in gross market income. The indication of the intensity of the absorption effects of the tax-benefit policy is called the coefficient of income stabilization ($\tau^I$). The value of $\tau^I$ is a function of market income and the amount of income tax, social contributions, and benefits:

$$\tau^I = 1 - \frac{\sum_i \Delta Y^D_i}{\sum_i \Delta Y^M_i} = \frac{\sum_i (\Delta Y^M_i - \Delta Y^D_i)}{\sum_i \Delta Y^M_i} = \frac{\sum_i \Delta GI_i}{\sum_i \Delta Y^M_i}$$  \hspace{1cm} (3)

The value of this coefficient shows which part of the change in market income is absorbed by government intervention, i.e., which part of the change in market income is not transmitted to the change in disposable income. Its value depends on the size of the public sector and on the structure of tax and benefit systems and the design of particular tax and benefit instruments. In order to capture the contribution of each particular tax/benefit instrument to the size of automatic

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1  Bourguignon and Spadaro, 2006
stabilizers, the global coefficient of stabilization ($\tau^I$) is disaggregated into partial coefficients ($\tau^I_T$, $\tau^I_S$, $\tau^I_B$) which depict the automatic stabilizing effects of income tax, social contributions, and social benefits, respectively:

$$\tau^I = \sum_i \tau^I_i = \tau^I_T + \tau^I_S + \tau^I_B = \frac{\sum_i \Delta T_i}{\sum_i \Delta Y_i^M} + \frac{\sum_i \Delta S_i}{\sum_i \Delta Y_i^M} + \frac{\sum_i \Delta B_i}{\sum_i \Delta Y_i^M}$$  \hspace{1cm} (4)

$$\Delta Y^D = (1 - \tau^I) \Delta Y^M$$  \hspace{1cm} (5)

Absorption of part of the shock in market income through public policy measures is necessary, but not sufficient, for stabilization of demand: a change in disposable income will trigger a change in demand, the size of this elasticity being dependent on liquidity constraint. Starting from the permanent income hypothesis, it can be concluded that households that are not facing a liquidity constraint (who can borrow) keep their consumption unchanged after the shock in their disposable income, or reduce it to a lesser extent than the change in disposable income. Households that are facing a liquidity constraint reduce their consumption by the full amount of change in their disposable income. Starting from this concept, the coefficient of demand stabilization ($\tau^C$) can be derived. It is defined as the indicator of elasticity of consumption/demand to market income. If ($\Delta C_{i,LQ}$) is the change in the demand of households which are facing a liquidity constraint, then the coefficient of demand stabilization can be calculated as follows:

$$\tau^C = 1 - \frac{\sum_i \Delta C_{i,LQ}}{\sum_i \Delta Y_i^M}$$  \hspace{1cm} (6)

The concept of liquidity constraint is rather broadly defined in economic theory, which is why there are different methods for its empirical estimation. The most frequently used criterion says that the household is regarded as

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2 Dolls et al, 2010, pp. 9
3 Dolls et al, 2010, pp. 10
liquidity constrained if its net financial assets ($NFA_i$) are lower than its two-months’ disposable income:¹

\[
LQ_i = \begin{cases} 
1 & \text{if} \quad NFA_i \leq \frac{2}{12}Y_i^D \\
0 & \text{otherwise}
\end{cases}
\]  

(7)

Results of empirical studies show that the average coefficient of income stabilization in EU member states equals 0.38, suggesting that a decline in market income by 1% would imply a decline in disposable income of 0.62% (Dolls, et al, 2010). According to the same research the demand stabilization coefficient in EU member states equals 0.22, while in the USA it is 0.174. This means that, ceteris paribus, a decline in market income by 1% would trigger a fall in consumption of 0.22%.

3. EVALUATION OF THE SIZE OF AUTOMATIC STABILIZERS – MACRO VS. MICRO APPROACH

Evaluation of the size of automatic stabilizers is usually performed by means of econometric methods applied to macroeconomic (time series or panel) data. In these models the total size of automatic stabilizers of fiscal policy equals the size of the public sector (share of public expenditure in GDP) multiplied by the output gap. However, for the purpose of fiscal policy design it is necessary to evaluate the automatic stabilizing effects of each type of tax and benefit. Therefore the measurement of automatic stabilizers in contemporary economic analysis is performed by means of two methods: the regression-based approach and the non-econometric elasticity-based approach.

The regression-based approach is a direct method, since it comprises an econometric estimation of the relationship between the change in economic activity (measured by output gap) and fiscal variables (primary fiscal balance or tax revenues). Although the regression-based approach provides precise estimates, the fact that the primary balance and the output gap may have mutual impact on each other is a significant drawback (Baunsgaard, 2009). On the other

¹ Dolls et al, 2010, pp. 10
hand, the non-econometric method relies on the estimation of elasticity based on tax legislation and data on tax base distribution and tax liability by percentiles.

Empirical evaluation of the size of automatic stabilizers is mostly performed by means of the regression-based approach, under which the elasticity of public revenue/expenditure to output gap is estimated. This procedure consists of two steps: estimation of elasticity of tax/expenditure to output gap, and estimation of sensitivity of budget balance to cyclical movements in economic activity.

Elasticity of tax revenues to output gap \( \varepsilon_{t,\text{gap}} \) is estimated by multiplying the elasticity of tax revenues to their tax base \( \varepsilon_{t,\text{t}} \) and elasticity of tax base to output gap \( \varepsilon_{\text{tbi},\text{gap}} \):

\[
\varepsilon_{t,\text{gap}} = \varepsilon_{t,\text{t}} \times \varepsilon_{\text{tbi},\text{gap}}
\]

(8)

It is then feasible to estimate the size of the automatic stabilizing effects of certain taxes. This effect is captured by the semi-elasticity \( \eta_T \), which equals the elasticity of tax revenue to output gap multiplied by the relative share of that tax revenue \( T \) to GDP (Baunsgard and Symansky, 2006, pp. 6):

\[
\eta_T = \varepsilon_{t,\text{gap}} \times \frac{T}{\text{GDP}}
\]

(9)

Empirical studies show that the average semi-elasticity in OECD countries amounts to 0.44, implying that an increase in output by 1% above the trend level leads to a 0.44% decline in fiscal deficit, provided the amount of expenditure remains unchanged (Girouard and Andre, 2005). These results suggest that automatic stabilizers play a significant role in smoothing macroeconomic flows in developed countries. However, since countries usually apply discretionary measures as well in the case of significant fluctuations in output, the effects of

\[\text{Output gap is the relative deviation of GDP from its potential level (GDP}_p\text{):}\]

\[Y_G = \frac{(\text{GDP} - \text{GDP}_p)}{\text{GDP}_p}\]
These measures cannot be easily separated from the effects of automatic stabilizers, which makes evaluation of the effects of automatic stabilizers more challenging.

A precise evaluation of the size of automatic stabilizers by means of econometric methods requires sufficiently long time series data, which encompass a period of several business cycles. Transition economies often face a lack of such a (consistent and sufficiently long) data set. Therefore estimation of the size of automatic stabilizers by using cross-section micro data could represent an appealing alternative for these countries. Estimation of automatic stabilizers based on micro data is performed by means of a tax-benefit microsimulation model. Starting from equations (3), (4), and (5), estimation of automatic stabilizers is performed by decreasing the amount of market income by a certain percentage (usually 1% or 5%), thus simulating the shock in output, which causes a decline in households’ market income (Dolls et al, 2010). Since in microsimulation models income, taxes, contributions, and benefits are interconnected by their respective functions, a change in market income triggers a change in disposable income, but taking into account the amount of shock absorbed by taxes, contributions, and benefits. The methodological approach based on the microsimulation model also allows separation of the effects of discretionary measures from the effects of automatic stabilizers. This is regarded as a significant advantage of the microsimulation approach in the evaluation of automatic stabilizers compared to the econometric approach. Although this is a good alternative for evaluating the size of automatic stabilizers, particularly in countries without a sufficiently long macro data set, it has not been extensively used in European transition economies. Therefore one of the aims of this paper is to provide evidence on the size of automatic stabilizers in one transition economy (Serbia), based on the microsimulation approach. However, since the microsimulation approach provides only an estimation of elasticity of disposable income to change in market income, in order to calculate automatic stabilizers it is also necessary to estimate the elasticity of demand (output gap) to change in disposable income, which is usually done by means of time series econometrics.
4. TAXATION AND AUTOMATIC STABILIZERS

The size of automatic stabilizers depends on the size of the public sector and the cyclical flexibility of public revenue and public expenditure. This could imply that increase in the size of automatic stabilizers can be achieved thorough expansion of the public sector - up to a certain level (some studies suggest that this limit approximates 40% of GDP). However, this could trigger other adverse effects, such as loss in economic efficiency due to increase in tax burden or crowding out of the corporate sector. Therefore the preferred option would be to increase automatic stabilizers without expanding the public sector. With regards to this, three common approaches have been identified: change in the structure of the tax system, change in public expenditure policy, and introduction of fiscal rules (Baunsgaard and Symansky, 2009).

The impact of the tax system on the size of automatic stabilizers depends on the structure of the tax system, the level of tax burden, and the level of progressivity of the main taxes. Empirical studies suggest that corporate income taxes are the most elastic to changes in output gap (approximately 1.3 in OECD countries), due to the direct link between output gap and the profitability of the corporate sector (Arnold, 2008). According to the same research, corporate income tax is followed by personal income tax (elasticity to output gap in OECD countries equals around 1). Consumption taxes are somewhat less elastic to output gap (approximately 0.9), while social contributions are the least elastic type of public revenue to output gap (in OECD approximately 0.8). This is due to the existence of the minimum and maximum base for calculation of social contributions in many countries, which means that, for low and high incomes, change in gross income does not trigger change in the amount of social contribution revenue. These results suggest that the tax system structure can influence the size of automatic stabilizers. However the potential to increase the size of automatic stabilizers through changes in the tax system structure is limited. According to empirical studies for the group of 20 developed countries, a change in tax revenue structure by 5% BDP (by increase in the share of personal income tax and decline in the share of consumption taxes) would only trigger an increase in automatic stabilizers of 0.05% of GDP (Arnold, 2008).
Since the possibility of increasing automatic stabilizers through changes in the structure of the tax system is limited, the question is whether they can be increased through parametric changes in the design of main taxes. The automatic stabilizing effects of personal income tax stem from its progressivity (van den Noord, 2000). In the case of economic growth, caused by demand shock, progressive taxes make the increase in demand slower than the rise in before-tax income, which hampers inflation and economic activity. In the case of recession the opposite mechanism is activated. An increase in income tax progressivity can have an impact on the volatility of macroeconomic variables via the supply side as well. When GDP and income before taxation fall, paying taxes at the lower marginal tax rate makes the decline in after-tax income lower (compared to the decline in before-tax income). Consequently, it is expected that in the case of recession individuals will be taxed at lower marginal tax rates, which would stimulate increase in their labour supply. If recession is caused by disturbances in the demand side of the labour market, this mechanism would reduce the decline in output. The size of the automatic stabilizing effects of personal income tax through impact on labour supply would be equal to wage elasticity of labour supply multiplied by the change in the marginal tax rate due to increase in income by one unit. One of the small number of empirical studies, focused solely on the stabilizing effects of income tax in the USA through impact on labour supply, shows that a 1% increase in taxpayers’ income leads to a change in labour supply (i.e., its monetary equivalent) of 0.02 to 0.08% of GDP (Auerbach, 2000). This means that the effects of income tax on increase in labour supply would reduce the output gap by 2% to 8%. When both the demand and supply side effects of income tax are taken into account, it is estimated that personal income tax in the USA diminishes fluctuations in output by around 8%, mostly due to the progressivity of the tax system. Although it is clear that automatic stabilizers can be enlarged by increasing the progressivity of the income tax system, the question is to what extent. According to empirical studies a 10% increase in elasticity of income tax to output gap (through a significant increase in progressivity) leads to an increase in the automatic stabilizing effects of income tax of 0.01% of GDP (van den Noord, 2000). This suggests that the potential increase in the size of automatic stabilizers through stronger tax progressivity is limited. This is also confirmed
by other studies, which imply that the automatic stabilizing effects of progressive income tax and property tax are lower than in the case of some other less distortive alternatives, such as proportional taxes on production (Wijkander and Roeger, 2002). At the same time, increase in progressivity is very costly, in terms of rise in deadweight loss.

The effects of the parametric reform of some taxes on their automatic stabilizing effects do not depend only on their progressivity, but also on the initial level of tax burden. When the initial tax burden is low an increase in taxes leads to a rise in the size of automatic stabilizers, while in the case of an already high tax burden its additional increase would not trigger a significant rise in automatic stabilizers. With regards to this, the fundamental question relates to the critical level of tax burden above which an additional increase in taxes does not trigger a rise in automatic stabilizers. The theory and empirical studies do not offer a unique answer, although several important conclusions can still be made (Buti et al, 2003). First, the less progressive the taxes are, the higher will be the critical level of tax burden. Second, the more flexible demand is to the automatic stabilizing effects of monetary and fiscal policy, the higher the critical level of tax burden. Third, the more open the economy, the higher the critical level of tax burden. This leads to the conclusion that in small open economies, with modest or relatively higher tax burden (which is the case in Serbia), the possibility of increasing automatic stabilizers through an increase in tax burden and tax progression is lower than in large or autarchic economies. Thus, it can be concluded that the critical level of total tax burden for countries like Serbia amounts to approximately 40% of GDP, which means that any significant increase in tax burden above that level would reduce the size of automatic stabilizers. Consequently the trade-off between efficiency and the automatic stabilizing effects of taxes is not universal, but rather depends on other economic circumstances.

Additionally, an increase in automatic stabilizing effects through increase in tax burden or tax progressivity would have a negative impact on long-term growth dynamics. Although it would reduce variations in output, the negative impact of high and highly progressive taxes on efficiency (supply and demand for production factors) could trigger a fall in GDP growth rate in the long run.
Although automatic stabilizing effects from the tax system are desirable, designing the tax system and particular taxes should not be focused on the maximization of the size of automatic stabilizers, since the efficiency losses would probably exceed the benefits from stabilization.

5. AUTOMATIC STABILIZERS IN SERBIA – EMPIRICAL RESULTS

The reform of personal income tax has been a burning topic in Serbia for several years, since this is the only tax that has not been fundamentally changed in the last decade. One of the arguments for income tax reform is the low progressivity of the existing system. It is widely believed that this is the cause of low automatic stabilizers in Serbia, which implies that automatic stabilizers could be enlarged through an increase in progressivity of income tax. In addition to providing evidence of the size of automatic stabilizers in Serbia by combining the micro and macro approaches, the aim of this paper is to provide empirical answer to the dilemma of whether an increase in tax progressivity could boost automatic stabilizers in Serbia.

5.1. Personal income tax – institutional framework and reform scenarios

The baseline scenario in this paper refers to the personal income tax system which was in force in Serbia in 2007 (since the data set is related to 2007). The Personal Income Tax Law stipulates different tax rules for incomes from different sources (see Table 1).
### Table 1. Personal income tax rates in Serbia

<table>
<thead>
<tr>
<th>Source of income</th>
<th>Statutory tax rate</th>
<th>Deductible costs/ non-taxable amounts</th>
<th>Effective tax rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income from self-employment</td>
<td>10%</td>
<td>-</td>
<td>10%</td>
</tr>
<tr>
<td>Salary/wage</td>
<td>12%</td>
<td>RSD 5,050</td>
<td>10.35%¹</td>
</tr>
<tr>
<td>Income from agriculture and forestry</td>
<td>14%</td>
<td>-</td>
<td>14%</td>
</tr>
<tr>
<td>Income from authorship rights, related rights,</td>
<td>20%</td>
<td>34%, 43%, 50%</td>
<td>10%, 11.4%, 13.2%</td>
</tr>
<tr>
<td>and intellectual property rights</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income from capital</td>
<td>20%</td>
<td>-</td>
<td>0%, 16%, 20%²</td>
</tr>
<tr>
<td>Income from immovable property</td>
<td>20%</td>
<td>20%</td>
<td>16%</td>
</tr>
<tr>
<td>Capital gains</td>
<td>20%</td>
<td>-</td>
<td>0%, 20%</td>
</tr>
<tr>
<td>Other income</td>
<td>20%</td>
<td>20%</td>
<td>16%</td>
</tr>
</tbody>
</table>

1) Effective tax rate on average monthly salary in Serbia paid in April 2007

2) Interest on dinar deposits are tax exempted. Dividends received by residents are taxed at the rate of 20%, on a tax base equal to 80% of gross dividend (i.e., effective tax rate is 16%).

**Source:** Personal Income Tax Law

For the majority of taxpayers, this represents their final tax liability. However, a taxpayer whose total annual income exceeds a certain threshold (three times the average annual salary in Serbia, six times the average salary if the taxpayer is a foreign citizen) were also obliged to pay annual income tax at progressive tax rates (10% and 15%). Since less than 1% of the total number of taxpayers actually pay annual income tax, the economic effects of annual income tax are very low.
Unlike indirect taxes, where the number of controversies with regards to tax design is small and the solutions applied in developed countries are relatively unified, the approaches to the design of direct taxes are highly differentiated across the developed countries. This is the situation in the European Union, where almost no harmonization of personal income taxation has been achieved so far. However, although income tax models vary across the EU countries, the solutions applied in EU countries can be clustered into three conceptual groups: flat tax, dual income tax, and comprehensive income tax. Therefore this paper will provide evidence of the change in automatic stabilizers in Serbia through: i) introduction of a single tax rate scheme (flat tax), ii) introduction of progressive taxation of labour income only (dual income tax), and iii) introduction of progressive taxation of both labour and capital income (comprehensive income tax). The design of tax reform scenarios is determined by two groups of parameters; each of the reform scenarios is aligned with the pure theoretical model of its kind, and all three reform scenarios are revenue-neutral in comparison to the baseline scenario. The revenue neutrality assumption is important, as the character and intensity of the economic effects of tax policy are affected by the level of taxes and their structure.
### Table 2. Income tax reform scenarios

<table>
<thead>
<tr>
<th>Elements</th>
<th>Flat tax</th>
<th>Comprehensive income tax</th>
<th>Dual income tax</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sum of income from all sources</td>
<td>Sum of income from all sources</td>
<td>Wages, 80% of self-employed income, and income from agriculture and forestry</td>
</tr>
<tr>
<td>Taxable income</td>
<td></td>
<td></td>
<td>Interest, dividends, capital gains, income from immovable property, 20% of</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>self-employed income</td>
</tr>
<tr>
<td>Tax base</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gross taxable income decreased by allowances</td>
<td>Gross taxable income</td>
<td>Gross taxable income decreased by allowances</td>
</tr>
<tr>
<td></td>
<td></td>
<td>decreased by allowances</td>
<td>Gross taxable income</td>
</tr>
<tr>
<td>Allowances¹ (in RSD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal allowance</td>
<td>9,000</td>
<td>9,000</td>
<td>9,000</td>
</tr>
<tr>
<td>Dependent children allowance</td>
<td>4,000</td>
<td>4,000</td>
<td>4,000</td>
</tr>
<tr>
<td>Health care expenditure allowance</td>
<td>0</td>
<td>full amount of expenditure</td>
<td>full amount of expenditure</td>
</tr>
<tr>
<td>Education expenditure allowance</td>
<td>0</td>
<td>4,000</td>
<td>4,000</td>
</tr>
<tr>
<td>Tax rates</td>
<td>15% (up to RSD 20,000)</td>
<td>10% (up to RSD 10,000)</td>
<td>10% (up to RSD 10,000)</td>
</tr>
<tr>
<td></td>
<td>20% (from RSD 20,000 to 45,000)</td>
<td>15% (from RSD 10,000 to 25,000)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25% (above RSD 45,000)</td>
<td>20% (above RSD 25,000)</td>
<td></td>
</tr>
</tbody>
</table>

1) Monthly amount of allowances are presented. It is assumed that allowances are first used by the member of the household with the highest income.

**Source:** Author’s calculations
5.2. Methodology and data

The estimation of automatic stabilizers in Serbia in this paper is performed by combining the microsimulation approach based on micro data and the econometric approach based on macro data. The microsimulation method is used to estimate the income stabilization coefficient, while the econometric method is used to estimate the coefficient of elasticity of the consumption function, in order to obtain the elasticity of demand to income.

The tax and benefit microsimulation model for Serbia (SRMOD) is used to calculate the coefficient of income stabilization. SRMOD is a static microsimulation model, in which personal income tax, social security contributions, and main benefits are simulated. It is developed on the EUROMOD platform. The SRMOD microsimulations are performed based on Living Standard Measurement Survey (LSMS) data from 2007. LSMS is the survey conducted by the Statistical Office of Serbia on a representative sample of 5,557 households (17,335 individuals). The simulation of taxes, contributions, and benefits is performed in a manner that provides their full interaction (e.g., an increase in taxes leads to a decline in disposable income, which might make the individual eligible for some benefit). This property of SRMOD enables estimation of the coefficient of income stabilization by decreasing the market income reported in the LSMS dataset by 5%, which simulates a shock to market income. By means of microsimulation, income tax, social contributions, and benefits are calculated before and after this shock, which enables estimation of the coefficient of income stabilization under the baseline scenario (existing income tax scheme). The three reform scenarios are then simulated in SRMOD, and the same procedure (artificial shock to market income) is repeated.

In order to evaluate the total size of automatic stabilizers it is necessary to estimate the elasticity of consumption/demand to change in income, which is actually the estimation of the consumption function. According to Friedman’s permanent income hypothesis, permanent consumption \( C_t^p \) is determined by permanent income \( Y_t^p \):

\[ C_t^p = \beta Y_t^p \]

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6 For further details on SRMOD see: Randjelovic and Zarkovic, 2013
\[ C_t^p = \alpha + \beta Y_t^p \]  

Since permanent income and permanent consumption are unobservable, partial adjustment and the adaptive expectations model are usually combined in order to transform unobservable components into their observable counterparts: annual or quarterly consumption and income. Thus the consumption function based on Friedman’s permanent income hypothesis is empirically tested, by assuming that consumption, \( C_t \), is a function of its lagged value, \( C_{t-1} \), and income, \( Y_t \), (Manitsaris, 2006):

\[ C_t = \alpha + \beta C_{t-1} + \gamma Y_t + \varepsilon_t \]  

The most frequently used proxy for demand in the estimation of automatic stabilizers in the literature is the real final consumption of the household sector, which corresponds to the common approach to the empirical estimation of the consumption function (Manitsaris, 2006). Therefore, quarterly data on real final consumption of the household sector (in constant prices 2005) for period Q1 2003 – Q4 2012 are used to estimate the elasticity of demand/consumption to income in Serbia. Since there is no quarterly data series on household disposable income available in Serbia, estimation of the consumption function will follow the approach common in the literature, which means that real GDP (in 2005) price data will be used as a proxy for income. This is also the common approach in the empirical literature on estimation of the consumption function.

5.3. Results

In order to estimate the size of automatic stabilizers (demand stabilization coefficient), it is necessary to calculate the value of the coefficient of income stabilization and the elasticity of consumption/demand to change in income.

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7 This implicitly means that the liquidity constraint is assumed in the empirical estimation of the demand stabilization coefficient, which is also assumed in the respective theoretical model (see: Dolls 2010).
The results of the microsimulation analysis show that the income stabilization effect in Serbia equals 0.183, which means that 18.3% of shock in market income is absorbed by tax contributions and benefits policies, so that a change in disposable income would equal 81.7% of the change in market income.

Estimation of the elasticity of demand to income is performed on seasonally adjusted, logged values of the real final consumption of the household sector and the seasonally adjusted, logged value of real GDP. Before estimating the elasticity, unit root tests (ADF, Philips Perron, and KPSS) have been used in order to test stationarity of the respective series. While the KPSS and PP tests suggest that both series are stationary (at a 5% significance level), the conclusions based on the ADF test are dependent on (non)inclusion of trend and/or intercept in testing for the unit roots. Since the two tests suggest stationarity of these variables, while estimation of the consumption function in the relevant literature is usually performed on the level of variables, the estimation of the consumption function in this paper is also performed on the level of variables:

$$\log(C_t) = \alpha + \beta \log(C_{t-1}) + \gamma \log(Y_t) + \varepsilon_t$$

(12)

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Independent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>log($C_t$)</td>
<td>const log($C_{t-1}$) log($Y_t$)</td>
</tr>
<tr>
<td>Estimate</td>
<td>-2.587*** -0.251** 0.935***</td>
</tr>
<tr>
<td>t-statistics</td>
<td>-3.061 2.325 6.303</td>
</tr>
<tr>
<td>Probability (p)</td>
<td>0.0042 0.0258 0.0000</td>
</tr>
<tr>
<td>Other statistical properties</td>
<td>F=244.459 (p=0.0000); R²=0.93; DW=1.84; JB=5.94 (p=0.051)</td>
</tr>
</tbody>
</table>

The statistical properties of the estimated model are satisfactory, since the equation explains approximately 93% of the total variation in consumption. Explanatory variables are statistically significant at 1% (except for the lagged consumption variable, which is significant at 5%). They are also highly significant jointly (according to the F test and respective p-value). There is no
autocorrelation in the model, which is confirmed by examining the correlogram of residuals, by the Breusch-Godfrey LM test, and by the value of the Durbin-Watson statistics (critical values are $d_L=1.43$, $d_U=1.54$). The Jarque-Berra test suggests that the residuals are normally distributed, although the value of this test is close to the critical value.

The result shows that short-run elasticity of demand of household sector real GDP in Serbia equals 0.94, suggesting a high marginal propensity to spend. Estimated elasticity in Serbia is higher than the EU average (0.53) due to faster growth in consumption than in GDP in most of the observed period. This is because a large portion of household consumption was financed through fast-rising bank loans, fast-rising public wages and pensions (due to high revenues from privatization), and significant inflow of remittances (although remittances constitute part of GNP). The estimated elasticity of consumption to income closely corresponds to the share of personal consumption in Serbian GDP in the respective period.

Table 3. Coefficient of income stabilization and coefficient of demand stabilization in Serbia

<table>
<thead>
<tr>
<th>Current PIT</th>
<th>Flat PIT</th>
<th>Dual PIT</th>
<th>Comprehensive PIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>...due to personal income tax</td>
<td>0.071</td>
<td>0.087</td>
<td>0.104</td>
</tr>
<tr>
<td>...due to social contributions</td>
<td>0.117</td>
<td>0.112</td>
<td>0.112</td>
</tr>
<tr>
<td>...due to benefits</td>
<td>-0.005</td>
<td>-0.006</td>
<td>-0.005</td>
</tr>
<tr>
<td>Coefficient of income stabilization</td>
<td>0.183</td>
<td>0.193</td>
<td>0.211</td>
</tr>
</tbody>
</table>

Elasticity of demand to income of households

| Coefficient of demand stabilization | 0.171 | 0.180 | 0.197 | 0.198 |

Source: Author’s calculations

The combined micro and macro estimation of income stabilization and demand stabilization effects suggest that automatic stabilizers in Serbia amount to
approximately 0.17 (or 17%), implying that the decrease in gross (market) income due to a 1% shock would lead to a 0.83% decline in demand. The results of empirical studies for EU member states suggest that personal income tax is the single largest automatic stabilizer, followed by social security contributions, while the stabilizing effects of benefits is small (Dolls et al, 2010). The results for Serbia are slightly different: the single largest automatic stabilizer is social security contributions, followed by personal income tax, while the stabilizing effects of benefits are close to zero (or even slightly negative).

**Figure 1. Income stabilization coefficient in Serbia, the EU, and the USA**

Estimated automatic stabilizers in developed countries range from 2% to 30%, depending on the period, sample of countries, and estimation method (Veld et al, 2012). The total coefficient of income stabilization in Serbia is considerably lower than the EU average. This is due to the considerably lower progressivity of income tax in Serbia compared to other EU member states, but also due to the lower amount of income tax, measured as share of GDP. The Musgrave-Thin progressivity index in Serbia equals 1.015, which is far below the EU average of
1.07 (Randjelovic and Zarkovic, 2011). At the same time, income tax revenues in Serbia are lower than the EU average by 3.4% of GDP. These are also the reasons why the income stabilization coefficient in Serbia is close to the values in some other Central and Eastern European countries (e.g., Estonia and Slovakia). These countries apply a flat tax scheme, while the income tax revenues are only slightly above the relative amount collected in Serbia. In addition, income stabilization related to benefits is smaller in Serbia than in EU member states. Unlike other EU countries where benefits contribute considerably to income stabilization, in Serbia (as in the USA) this contribution is even negative. This is because the total expenditure on benefit programs in Serbia is lower than the EU average. At the same time, the share of means-tested benefits, which are the only programs with a built-in stabilizing mechanism, in total benefits expenditure is considerably lower in Serbia compared to the EU 27, and also compared to other Central and Eastern European countries. On the other hand automatic stabilizers related to social contributions in Serbia are larger than the EU average, because the total social security contributions rate of 35.8% (in 2007) was one of the largest in Europe. In addition to this, the span between the minimum and maximum base for calculation of social contributions is relatively large (35% - 500% of the average wage in Serbia), which suggests that gross income shock also triggers change in social contributions for a large share of the population.

Since the income stabilization coefficient in Serbia is considerably below the EU average, while the elasticity of demand to income is higher than in EU member states, it can be concluded that the considerable level of automatic stabilizers in Serbia is mostly the consequence of high demand-income elasticity, while the stabilizing effects of tax and benefit policies is low. This leads to question of whether automatic stabilizers stemming from the design of the tax and benefit systems could be improved through their reform.

The results suggest that income tax reform would slightly increase automatic stabilizers in Serbia. In the case of flat tax reform, automatic stabilizers would rise to 0.180, while under dual and comprehensive income tax schemes it would rise to 0.197 and 0.198, respectively. An increase in the size of automatic stabilizers is consistent with changes in tax progressivity after each of these
reform scenarios. Flat tax reform implies an increase in indirect progressivity through a rise in the non-taxable threshold, which triggers an increase in automatic stabilizers by 0.9 pp. The results also suggest that progressivity in taxation of labour income does make a considerable difference to the size of automatic stabilizers, by 0.7 pp. (dual compared to flat tax), while introduction of progressive taxation of capital income makes almost no impact (0.1 pp.) on the size of automatic stabilizers (comprehensive compared to dual income tax). This is largely due to the relatively low share of capital income in total personal income in Serbia.

The results also suggest that even after the introduction of direct progressivity, the size of automatic stabilizers in Serbia would not rise substantially, due to several reasons: i) all reform scenarios are designed in a revenue-neutral manner, which means that there is no space for increasing automatic stabilizers through increasing the tax burden, ii) introduction of progressive marginal tax rates does not trigger a large increase in overall progressivity. Lower tax progressivity (compared to developed countries), even after the introduction of relatively high marginal tax rates, is the consequence of structural differences in income between Serbia and these other countries. The share of informal income, as well as income from agriculture (which is not taxed away) in Serbia is considerably above the EU average (Krstić et al, 2013), which represents a limitation of the potential increase in overall tax progressivity through an increase in marginal tax rates.

6. CONCLUSION

The discussion of equity efficiency trade-off has dominated the theory of optimal taxation and policy-oriented studies for decades. However the recent economic crisis and high volatility in output, particularly in European transition economies, has raised (again) the question of the importance of tax-benefit automatic stabilizers.

The values of the coefficient of income stabilization, which is regarded as an indicator of the stabilizing effects of tax-benefit policies, are very heterogeneous within the EU. Usually its value is higher in Western and North European
countries, which have larger public sectors but also higher and more progressive tax systems. This has triggered discussion in East and South European countries on the manner of increasing the size of automatic stabilizers through tax reform.

The results presented in this paper show that automatic stabilizers in Serbia equal 17%, which is close to the average value obtained for Western Europe and North America in other studies. The results also show that the automatic stabilizing effects of tax and benefit systems in Serbia are considerably smaller, while the elasticity of demand to income is higher than in other European countries. However, since the marginal propensity to spend in Serbia was unsustainably high in the previous decade, it could be expected that the elasticity of household demand to income would fall in the following years. In that case, the size of automatic stabilizers would also decline. This leads to the question of whether the size of the stabilizing effects of the tax and benefit system could be enlarged through tax reform. The results show that revenue-neutral progressivity-enhancing income tax reform would slightly increase the size of automatic stabilizers. In that respect, progressive taxation of labour income would bring larger effects than progressive taxation of capital income. However, the size of the stabilizing effects of the tax-benefit system would still be smaller than in other European countries. This is due to the lower income tax burden and the higher share of the informal economy and the agricultural sector in generating households’ income, which makes a significant increase in total tax progressivity unfeasible (without significant losses in efficiency). Since income tax is highly distortive (in terms of impact on economic growth), the design of a (more progressive) income tax system should balance the positive effects on automatic stabilizers and vertical equity and the negative effects on efficiency and economic growth.
REFERENCES:


THE ESTIMATION OF TAX-BENEFIT AUTOMATIC STABILIZERS IN SERBIA


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