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FISCAL CONSOLIDATION AND TOTAL FACTOR PRODUCTIVITY

Fiskalna konsolidacija i
ukupna faktorska produktivnost

Abstract

Fiscal consolidation is a necessary means to contain rising public debt, but it will not provide growth and employment over the mid-term and must be much harsher than usually expected. Rising total factor productivity should complement this policy. In a DSGE framework, by using our QUEST_SERBIA model, we illustrate how these two policies work and what effects they may have on maintaining Serbia's public debt at a sustainable level.

Improvements in total factor productivity were modeled by using an example of a labor-augmenting technological progress. The present labor market restructuring debate addresses wage and labor-to-employer rigidities. This will not contribute much to improving human capital and upgrading it to the standards of growth based on innovation and technological progress. We propose a complementary policy of closing highly skilled labor supply gaps. The role of government is crucial in triggering such a policy change, which is broadly in line with efforts to design the reindustrialization policy aiming at promoting development in Serbia. This policy does not call for billions of euros for investments, but for modernization of the public education system.

Key words: *fiscal consolidation, total factor productivity, DSGE, Serbian economy*

Sažetak

Fiskalna konsolidacija je nužna da bi se javni dug održao na podnošljivom nivou, ali ona neće sama po sebi pokrenuti rast i zaposlenost na srednji rok i moraće da bude mnogo oštija nego što se uobičajeno pretpostavlja. Povećanje ukupne faktorske produktivnosti bi moralo da dopuni ovu politiku. U okviru DSGE modela, odnosno našeg modela QUEST_SERBIA, pokazali smo kako ove dve ekonomske politike deluju i kako bi mogle da utiču na zadržavanje javnog duga na planiranom nivou.

Porast ukupne faktorske produktivnosti ilustrovan je preko radno intenzivnog tehnološkog progressa. Tekuća rasprava o restrukturiranju tržišta rada je fokusirana na rigidnost plata i regulacije zapošljavanja i otpuštanja radnika. Ne sporeći nužnost ovakvih promena, ta politika neće poboljšati ljudski kapital, što je neophodno da bi se zadovoljili standardi razvoja zasnovanog na inovacijama i tehnološkom progressu. Predložena je dopunska politika koja bi imala za cilj da eliminiše strukturne jazove u ponudi visokokvalifikovanog rada za šta je neophodna ozbiljna promena u visokoobrazovnom sistemu zemlje. Uloga države je ključna u promeni poslovnog ambijenta koji bi podržavao moderni razvoj. Takva politika bi mogla da se tumači kao značajan deo nove politike reindustrijalizacije zemlje koja ima za cilj ubrzanje privrednog razvoja u Srbiji. Ona ne bi zahtevala milijarde investicija, nego adaptaciju javnog obrazovnog sistema.

Ključne reči: *fiskalna konsolidacija, ukupna produktivnost faktora, DSGE model, srpska privreda*

JEL classification: E17, E63, F41

Introduction

There are always important and urgent issues, and the tendency to switch the order of priority between them in favor of current needs. In the Serbian economic context, the important issue is related to fiscal consolidation and the worrying level of public debt. The urgent issue is set in motion by proposals to cure the fiscal deficit by restructuring the labor market. More time has been spent discussing the labor law and its provisions on firing and hiring workers than on reversing the trend of the country's indebtedness. The two issues are interconnected and should be addressed jointly and with appropriate timing by a sound economic policy. Additionally, priorities in the labor market restructuring should be revised in order to support growth based on innovation and technological progress.

This paper is based on theory and praxis. The part corresponding to theory is represented by the QUEST_SERBIA model, which is a Dynamic Stochastic General Equilibrium (DSGE) model of the Serbian economy. It belongs to the family of QUEST models used by the European Commission to simulate various structural, fiscal and monetary policy issues.¹ The part relating to praxis is based on our experience in doing business consultancy in Serbia.² The Serbian economy needs to restructure the labor market, but in a different way from the one which currently attracts public attention and raises many controversies. Our principal position is the following:

1. Successful private companies drive GDP growth in Serbia. Promoting growth means supporting growth

1 This model is developed for the Ministry of Finance of the Republic of Serbia in order to improve its forecasting and policy simulation capacity. The work is financially supported by the World Bank office in Belgrade and the USAID program in Serbia. We thank Milica Labus, Jan i'nt Veld, Werner Roeger, Dušan Vujović, Dragan Djurićin, Ivan Vujalić, Srbojub Antić, Miladin Kovačević, Boris Begović and Siniša Milošević for their very valuable comments, suggestions and assistance. The paper represents the author's contribution to the research project "Development of the Serbian legal system and its harmonization with the EU law – legal, economic, political and sociological aspects 2013" at the University of Belgrade, Faculty of Law.

2 We mostly consult successful companies in Serbia, not loss-making firms or state-owned enterprises (SOEs), and this fact may frame our views. We work in part as macroeconomic adviser to the PricewaterhouseCoopers (PwC) office in Belgrade. The views in the paper are our views and do not necessarily reflect views of the PwC. See <http://www.pwc.rs/en/news/10-minutes.jhtml>.

leaders, not restructuring failed companies dropped out of privatization or loss-making SOEs.

2. The best way to support growth leaders is to lift obstacles to a sound business environment, which includes a well-functioning labor market.
3. The labor market rigidities in Serbia are a less severe problem than the labor market's structural imbalances. There is high unemployment, but successful private companies have problems in hiring top quality management and a highly skilled work force. Hiring and firing of workers, wage negotiation costs and minimum wage regulation are of secondary importance.
4. In order to contribute to improving the business climate, the government should survey the labor market, identify professional skills' bottlenecks, anticipate the future labor demand development (looking at the advanced market economies) and set forth curriculum changes in the public education system to meet development needs based on innovation and technological progress.
5. A more flexible labor market will not hurt the business environment, but by itself it will not promote innovation and the rise of total factor productivity.

The proposed policy measures address the supply side of the economy and will contribute to improving total factor productivity. The cost of public borrowing is not below 5 percent. There is a simple mathematical principle which states that the average GDP growth rate over the mid-term should also be at least 5 percent. Otherwise, the debt-to-GDP ratio will rise even with no net public borrowing. Such a high growth rate is beyond reach without a substantial rise of the total factor productivity. Future structural reforms should therefore not only reduce public spending, but also improve total factor productivity and GDP growth. The higher GDP growth, the lower debt-to-GDP ratio³. This is a missing link in current thinking about fiscal consolidation. We consider lifting of structural

3 Using panel VAR analysis and data on 20 developed economies for a very long period of time, *Lof and Malinen* [4] have found that there is: "...no statistically significant long-run effect of debt on economic growth, for any elevated level of debt... GDP growth, on the other hand, is found to have a statistically significant negative effect on sovereign debt. This implies that the negative long-run correlation between the sovereign debt and GDP growth is mainly driven by the negative effect of economic growth on sovereign debt".

imbalances in the labor market as a vital part of the broadly defined policy of reindustrialization in Serbia aiming at promotion future development.

We will proceed in this paper as follows. Part II underlines the basic characteristics of a DSGE model that originated in the QUEST family and indicates how the QUEST_SERBIA model is modified to capture fundamentals of Serbian macroeconomics. Part III defines the policy framework that will be used for policy simulations aiming at stabilizing public debt. Part IV reports results of the fiscal consolidation scenario, while part V reports similar results for the total factor productivity scenario. Part VI explains how the latter scenario may be implemented through a labor market restructuring. Part VII concludes, pointing out the role of government in promoting structural reforms in Serbia.

QUEST_SERBIA: Basics

We call our model the QUEST_SERBIA DSGE model of Serbia's economy. It is based on the European Commission's QUEST III model. QUEST III is a global macroeconomic model developed for macroeconomic policy analysis and research. As a member of the class of new-Keynesian DSGE models, QUEST has rigorous microeconomic foundations derived from utility and profit optimization and includes frictions in goods, labor and capital markets. *Ratto et al.* [5] provide a detailed exposition of the core version of the QUEST III model using the euro area data from Q1Y1978 to Q4Y2007 and Bayesian estimation techniques. We strongly suggest to the readers that they read this paper. Extensions are described in *Roeger and in't Veld* [6], *Roeger and in't Veld* [7], *in't Veld et al.* [1], and *Vogel* [9].

With empirically plausible estimation and calibration the Serbian model is able to fit the main features of the macroeconomic time series in Serbia in the period between Q1Y2003 and Q3Y2013. Figure 1 illustrates the basic structure of the model.⁴ The QUEST_SERBIA model does not distinguish between tradable and non-tradable production sectors due to the lack of appropriate data. The model adopts hypotheses that tradables and non-

tradables are treated as perfect substitutes in consumption and investment demand.

Output is produced by profit maximizing monopolistically competitive firms, using Cobb Douglas technology with private and government capital, corrected for the capacity utilization rate, and labor input augmented by technological progress. The production function is defined in terms of growth rates instead of the factors of production levels. Goods and labor markets are subject to nominal and real rigidities. Goods and capital markets are internationally integrated. Capital is perfectly mobile, so that uncovered interest parity (UIP) holds.

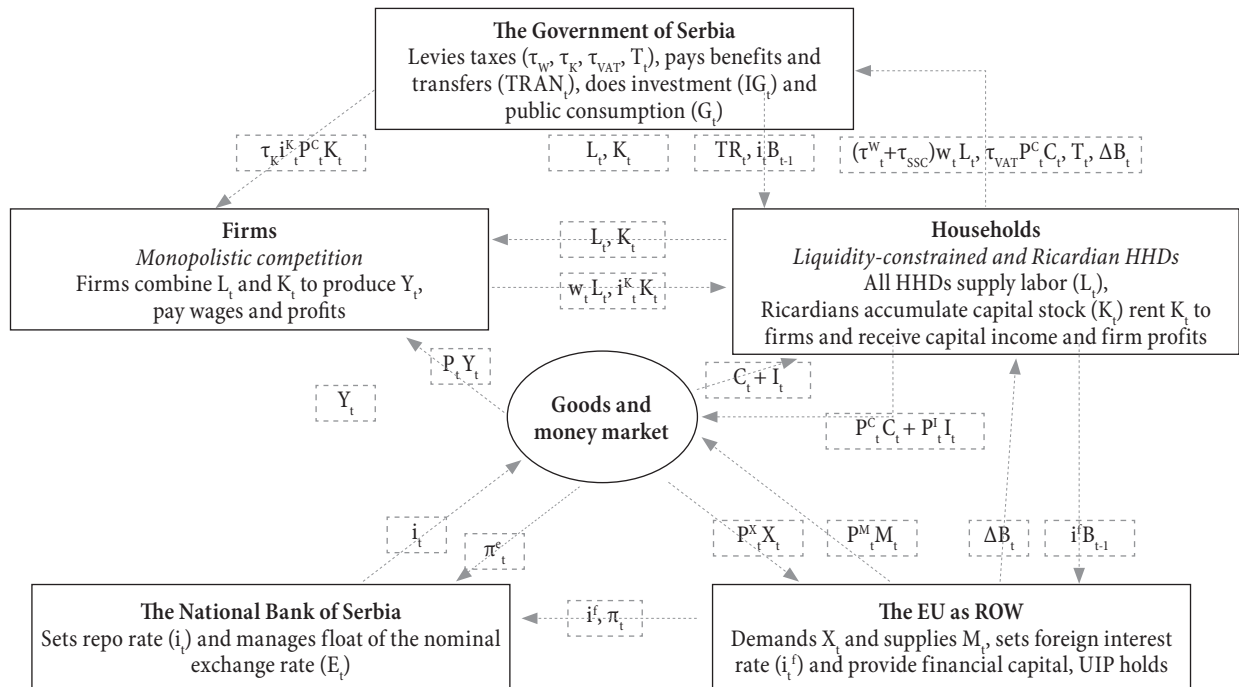
Households make savings, consumption, and labor supply decisions. There are two different types of households: financially unconstrained (Ricardian) households, which can optimize only facing an intertemporal budget constraint, and liquidity-constrained households, which do not have access to financial markets and in each period consume their entire disposable income. Ricardian households maximize expected utility over an infinite period of time subject to the budget constraint, which embraces consumption and investment expenditures, financial investments in real money balances, domestic and foreign bonds, labor and capital income, including labor and capital adjustment costs.

Within a process of collective bargaining the trade union acts as an agent of households and maximizes a joint utility function of the Ricardian and liquidity constrained households. The wage rule is set in a sophisticated way reflecting the marginal utility of leisure and the marginal utility of consumption (the ratio of which defines the reservation wage rate), the real wage of both types of households, wage adjustment costs, real wage rigidity and a mark-up over the marginal product of labor.

The government is subject to an intertemporal budget constraint. On the expenditure side the model distinguishes among government consumption, government investment and transfers (further disaggregated into unemployment benefits and pension transfers). On the revenue side, the model distinguishes taxes from consumption, labor and capital. Tax revenues are linked to their corresponding tax bases, via linear tax rates, and are sensitive to business cycle fluctuations. There is a debt rule which forces the

⁴ The figure is adapted for the Serbia's case from *Vogel* [9], p. 5).

Figure 1: Basic structure of the QUEST_SERBIA model



adjustment of taxes and expenditure such that a certain defined debt target is reached.

To summarize, households, firms and the government make decisions which are consistent with their intertemporal budget constraints and first-order conditions of their respective optimal positions.

QUEST_SERBIA follows the main lines of the QUEST III model's platform with some substantial differences. In our model there are two regions: domestic economy and foreign economy, where the euro zone is treated as the rest of the world. Differences are due to distinct properties of the Serbian economy from the EU economic area. The Serbian economy is a small open market economy, which is imperfectly integrated into the wider international market. Contrary to this, the EU economy is a large open economy with full mobility of capital, goods and financial assets. Differences in size and adjustment costs due to imperfect international integration must be taken into account in defining steady-state properties of the Serbian economy. We underline the following four fundamental specifics of the QUEST_SERBIA model:

1. There is no full mobility of financial capital across borders and households that save income and invest in domestic and foreign bonds face no pressure to adjust their intertemporal preferences. Therefore, the

real interest rate in Serbia is permanently above the EU real interest rate. Additionally, the real interest rate convergence cannot be detected over past ten years. This means that the rate of time preference in Serbia is permanently lower than in the EU. In terms of utility, domestic households value present income over future income much more than their counterparts in the EU. Quite differently, QUEST III assumes that steady state domestic and foreign rates of time preference are equal. We cannot do this. Hence, there is a permanent gap between domestic and foreign rates of time preference.

2. There is also no perfect mobility of goods across borders. Due to transaction costs, domestic inflation is permanently higher than foreign inflation. In the steady state these differences are destined to vanish if purchasing power parity holds. However, this does not hold in Serbia and QUEST_SERBIA had to respect this fact. Therefore, even in the steady state the rate of inflation in Serbia is higher than in the EU. QUEST III, on the other hand, assumes zero difference between these two rates.
3. QUEST III states the trade balance is zero in the long run. The Serbian case is quite the opposite; it is hard to assume that the Serbian economy will

balance exports and imports over next ten years. The steady state value of the trade balance will be negative. The only doubt is how negative it will be.

4. Finally, the Serbian economy is a small economy bound to grow much faster than large mature economies in the world, including the EU. There is no doubt that we need somehow to model the convergence process in which steady state GDP rate of growth in Serbia must be higher than the GDP steady state rate of growth of the euro zone.

These four fundamental distinct properties of the Serbian economy were taken into account by modifying original QUEST III model codes. The next two specifics are more technical than fundamental:

5. The data set underlying QUEST III model is much richer than our data set. The European Commission originally estimated the model using quarterly data for the period between Q1Y1978 and Q4Y2007, which uses 149 data points. In our case, we use only 42 data points and estimate the model from Q1Y2003 to Q2Y2013.
6. Parameters are modified to the macroeconomic framework of the Serbian economy. In some cases, we used the same initial values as in QUEST III. Since these parameters are overridden by the Bayesian estimation, a possible initial bias is substantially reduced if not completely eliminated. For instance, the parameter reflecting cost due to sluggish wage adjustment is set by QUEST III at the rather high level of 12.07. However, the estimated value for Serbia is 0.0049. This case illustrates the different behavior the two labor markets under the similar model set up.⁵

Policy modeling

We follow the QUEST III modeling approach that fiscal and monetary policy is partly rule-based and partly discretionary. Therefore, public expenditure and revenue partially depend on the policy targets and partially respond

to business cycle conditions. Transfer payments are indexed to wages and follow their cyclical fluctuations. However, there is a non-cyclical part of transfer payments that is set by the government and reflects its generosity in providing for non-employment benefits and the public pension fund. Fiscal revenue due to personal income tax is also divided into a fixed part and a cyclically adjusted part. Lump-sum taxes are a surrogate for public borrowing due to higher than expected public debt. If the model was opened for financial transactions, the government would borrow the difference between the target and actual debt. Otherwise, the balance should be restored by rising lump-sum taxes. Therefore, these taxes serve as a proxy for public borrowing.

Public debt (B^G) is a complex function which does not evolve over time in a simple way. It takes into account several factors: (i) the long-run target for the debt-to-GDP ratio, (ii) the fiscal policy that sets not only proportional tax rates, but also targets for long-run government consumption and investment, (iii) fluctuations of the output gap due to the corresponding stage of the business cycle, (iv) the transfer system which provides income for unemployed, retired and disabled people, acting as an automatic stabilizer, (v) the monetary policy that governs interest rates and effects expected inflation rate, (vi) relative prices of consumption and investment goods, (vii) the long-run natural rate of population growth, (viii) distribution of personal and corporate incomes into wages and profits, and finally (ix) the inherited level of the public debt accumulated up to the present time. Public debt evolves over time according to equation (1):

$$\begin{aligned} \frac{B_t^G}{P_t Y_t} = & (1 + r_t - g_t - g^{pop}) \cdot \frac{B_{t-1}^G}{P_{t-1} Y_{t-1}} + \frac{P_t^C \cdot G_t}{P_t Y_t} + \frac{P_t^I \cdot I_t^G}{P_t Y_t} + \text{TRAN}_t^W \\ & - \frac{W_t \cdot L_t}{P_t Y_t} - (\text{TAX}_t^W + \text{tax}^{SSC}) \cdot \frac{W_t \cdot L_t}{P_t Y_t} - \text{tax}^{pf} \cdot \left(1 - \frac{W_t \cdot L_t}{P_t Y_t}\right) - \\ & \text{tax}^{VAT} \cdot \frac{P_t^C \cdot C_t}{P_t Y_t} - \frac{\text{TAX}_t^{LS}}{P_t Y_t} \end{aligned} \quad (1)$$

where r_t stands for the real interest rate; g_t and g^{pop}_t for the GDP growth rate and natural growth rate of population; Y_t , G_t , I_t^G , and C_t are output level, government consumption, government investment and private consumption, respectively; W_t and L_t are the average wage rate and employment level; P_t , P_t^C and P_t^I are GDP, consumption and investment deflators; linear tax rates are tax^{SSC} , tax^{pf}

⁵ Data for Q3Y2013 were released in December 2013, but are not included in the model since they redefined all macroeconomic series due to a switch of the base year from 2005 to 2010.

and tax^{VAT} for social security contributions, corporate income tax and value-added tax; and $TRAN^w$, TAX^w and TAX^{LS} are transfers, personal income tax and lump-sum tax that evolve according to the business cycle.

We skip corresponding equations for endogenous variables called for by equation (1) and recommend the reader consult the original paper of *Ratto et al.* [5]. This time we only need to indicate that public consumption and public investment also have two parts. The first part is time invariant and represents fiscal policy priorities set by long-run targets on the government consumption share in GDP and the government investment share in GDP. The second part reflects the state of the business cycle and is subject to cyclical fluctuations. We assume that the government sets fiscal targets and adapts all related fiscal instruments, not explicitly declared in the model, to achieve these policy goals. Therefore, the government has a great degree of influence over fiscal matters, but does not control them entirely. The consequence is that public debt may not correspond completely to the path set by the fiscal policy. This discrepancy appears as a result of many other market factors that contribute to forming general equilibrium in the economy or restoring it after some exogenous shocks.

Let us reiterate that fiscal matters are not under full control of the fiscal authority. On top of that is monetary policy pursued by the National Bank of Serbia (NBS). This policy may be, or may not be, in full accord with the fiscal policy. The reason for this ambiguity is simple. By law, the only goal of the NBS is to stabilize prices at any costs. High inflationary expectations trigger an even higher increase in the repo interest rate. According to Fisher's equation (2) on the real interest rate, this will raise r_t in equation (1) and push up the public debt. If purchasing power parity does not hold, as it is the case in Serbia, and the real exchange rate appreciates, the public debt in foreign exchange terms will rise as well. Therefore, the monetary policy might have the unintended effect of worsening the public debt problem.

$$r_t = i_t + \pi_{t+1} \quad (2)$$

There is, however, another unintended effect that might go from fiscal to monetary policy and fire back to public debt. Let us start with a Taylor-based rule of the

monetary policy, where i_t is the nominal interest rate (equal to the repo interest rate); $(1/\beta - 1)$ is the real interest rate that depends on the rate of time preference β , π^{target} is the target inflation rate and $\zeta^{\pi^{target}}$ the target inflation rate that evolves under uncertain conditions (since central banks tend to change inflation targets); π_{t+1}^C is expected inflation; \check{y}_t and $g_t^{\check{y}}$ are the output gap and its rate of change; g_t^{BG} is the rate of change of public debt; ζ_t^i is the monetary shock that evolves according to a first-order autoregressive process; i_{lag} is the smoothness parameter which reflects monetary policy's aversion to dramatically changing interest rates; φ_{π} is the inflation aversion parameter; and $\varphi_{\check{y}}$ and $\varphi_{g^{\check{y}}}$ are output stabilization parameters:

$$i_t = i_{lag} \cdot i_{t-1} + (1 - i_{lag}) \cdot \left[\left(\frac{1}{\beta} - 1 \right) + \pi^{target} + \varphi_{\pi} \cdot (\pi_{t+1}^C - \zeta^{\pi^{target}}) + \varphi_{\check{y}} \cdot \ln(\check{y}_{t-1}) + \varphi_{g^{\check{y}}} \cdot g_t^{\check{y}} \right] + \varphi_{BG} \cdot g_t^{BG} + \zeta_t^i \quad (3)$$

We modified the QUEST III monetary rule and added the term $\varphi_{BG} \cdot g_t^{BG}$, where g_t^{BG} is the rate of public debt change. Public borrowing crowds out financial funds from the private sector, but additionally it drives up demand for loans and pushes up the interest rate. Public borrowing has an "autoimmunity" defect. It increases the cost of borrowing in order to meet the higher demand for public financing and, in turn, further increases the public debt, not recognizing negative feedback effect. It raises the interest rate and triggers the national bank to upwardly revise its repo interest rate. In the next release of QUEST_SERBIA, we will include financial flows in the model and separate financial assets into the dinar denominated part and the euro denominated part, with corresponding interest rates. In this case, the Taylor rule will only reflect interest rate dynamics in the dinar terms.

The NBS does not set target inflation as a stochastic process and does not recognize output gap as a part of the Taylor rule. Of course, the feedback effect of public borrowing on the interest rate is also ignored. On the top of that, the exchange rate policy is left completely ambiguous.

The QUEST III model does not include a feedback effect of the public debt on the interest rate, as we already indicated, but it recognizes the effect of net foreign assets (NFA) change on the nominal exchange rate dynamics through a modified version of a standard UIP condition.

We kept this setting and changed the reaction parameter to reflect Serbian macroeconomics. However, for the time being, we did not fully adjust this equation to Serbian circumstances, since this needs a broader data base and a new set of variables and equations to encompass NFA components, most notably net factor income from abroad and net capital inflows. Without this adjustment, the model-based NFA time series is negative almost all the time.

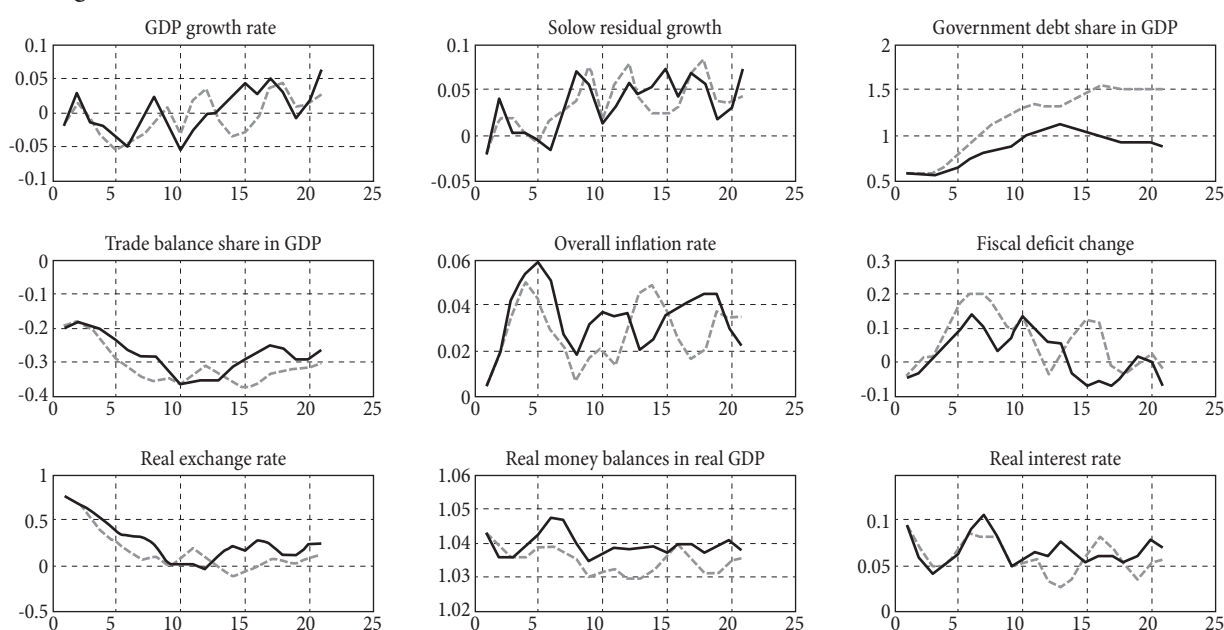
Fiscal consolidation

The government of Serbia tried to consolidate fiscal deficit last year and contain the rising public debt, which was approaching 60 percent of GDP. Personal income tax was reduced, but compensated with an increase in social security contributions. These measures are aiming at lowering transfer payments to the pension fund and limiting the rise of local government revenues and expenditures. Value added tax was also upwardly adjusted. Some subsidies were cut and public salaries were additionally taxed. NBS, on the other hand, slightly reduced the repo interest rate to 9.5 percent even though inflation substantially declined to 2.5% in December 2013. A further cut in the repo rate is not envisaged, as explained, due to relatively high inflationary expectations.

We model this policy as it goes, i.e. we set steady state fiscal parameters of the model at the level reached at the end of the historic period of empirical macroeconomic time series (Q2Y2013). We call this scenario the baseline or unchanged policy scenario and forecast macroeconomic series for the next 20 quarters without any change of the fiscal parameters. Results of the simulation are reported in Figure 2 as dotted lines⁶. The fiscal adjustment is scheduled on the both the revenue and expenditure sides of the public debt. On the revenue side, VAT tax rate is increased by 10 percentage points. The share of VAT revenue in GDP is increased from 0.1249 to 0.1375. On the expenditure side, public consumption and transfer payments are also reduced by 10 percentage points. The share of public consumption in GDP is decreased from 0.2067 to 0.1860, while the ratio of transfer payments to the wage bill is reduced from 0.2384 to 0.2146. In Figure

⁶ Vogel [9, pp. 21-23] simulated fiscal consolidation for the euro area-wide economy. He presented two separate scenarios: one for 5 percentage-point expenditure-based reduction of public debt to GDP and one for 5 percentage-point revenue-based reduction of public debt to GDP. His reported results show a more smooth adjustment of the main macroeconomic variables than our results. We suspect that he has averaged out shocks taking into account only the uncertainty about parameters. Our figures, however, represent both the uncertainty about parameters and shocks. Since shocks show a high cyclical pattern, there must be more volatility in our figures than in Vogel's figures.

Figure 2: Fiscal consolidation – Baseline scenario (dotted lines) and alternative scenario (solid lines)



2 only joint effects of the policy measures are reported. Of course, the individual effects are different. Generally speaking, a tax increase has a smaller impact on the public debt reduction than expenditure cuts.

The period's average debt-to-GDP ratio is 120 percent and the quarterly GDP growth rate is negative -0.6 percent. It is obvious that such fiscal policy is not sustainable. The debt-to-GDP ratio is permanently increasing and has reached the point of saturation in the 15th quarter at the enormous 150 percent level. The corresponding GDP growth rates are declining with two incidental peaks in the 12th and 17th quarters. The trade balance is worsening with further appreciation of the real exchange rate. The fiscal deficit is increasing for the first three years and somehow stabilizes afterwards. The overall inflation rate fluctuates around 2.9 percent. The real interest rate continues to stay high at an average of 6.5 per cent, which depresses growth prospects.

We can hardly expect that this hands-off fiscal and monetary policy will prevail for a long. Financing public debt at a level over 80 per cent of GDP would be not realistic even if some easy loans were finalized this year. Also, the monetary policy will not be expected to change substantially, since the inflation rate is broadly within the target zone. Hence, public borrowing will be limited much sooner than expected. There are low chances for the baseline scenario to go unchanged over the entire period of the forecast.

Results of the alternative fiscal consolidation scenario are reported in Figure 2 as solid lines. GDP will modestly rise at 0.4 percent and the public debt will peak to 100 percent of GDP after 12 quarters. It will slightly go down afterwards. The rate of change of the fiscal deficit will be increasing in the first half of the period and decreasing in the second one. Inflation will still be broadly in line with the targets with the average rate of 3.5 percent. Real money balances will improve compared to the baseline scenario indicating slight recovery in the aggregate demand. The trade balance will also be less negative with lower appreciation of the real exchange rate.

Let us summarize results of the model's simulations. The consolidation scenario is superior to the unchanged fiscal policy scenario, but it is not good enough. The level

of public debt is still unsustainable and much stronger fiscal consolidation is needed, compared to what we assumed, in order to stabilize public debt at the level suitable for regular financing. Broadly speaking, the fiscal consolidation policy is a doable option if the right size of fiscal measures is adopted. Inside such a policy, expenditure-reduction measures should be preferred to revenue-increasing measures.

Total factor productivity improvements

Fiscal consolidation alone will not secure high and stable growth and is costly in terms of forgone output and employment, not to mention rising social and political tensions, if the right size of adjustments is adopted. From a macroeconomic point of view, fiscal consolidation works through income and demand channels of the economy. Reduction of aggregate demand always has a negative growth effect, at least in the initial stage of policy implementation. The increasing tax burden destroys incentives to work and decouple real personal income from productivity gain. There is no doubt that fiscal consolidation is a must for the Serbian economy in years to come. The question is whether this policy can be supported by measures from the supply side of the economy. The supply side policy is reflected in the policy of structural and institutional reforms aiming at improving the business climate, reducing costs and increasing the ease of doing business.

There are many different ways to raise competitiveness and improve the supply side of the economy. One is to increase total factor productivity. We model this by using the Cobb-Douglas production function defined in terms of growth rates instead of level in factors of production. This is reported in equation (4):

$$g_t = (1 - \alpha) \cdot (g_t^K + g_t^{UK}) + \alpha \cdot [g_t^{LFP} + g_t^L \cdot (1 + \ln h_t)] + (1 - \alpha_K) \cdot g_t^{KG} \quad (4)$$

Capital is divided into two parts: private capital and capital accumulated by government, with corresponding growth rates g_t^K and g_t^{KG} , where α_K is the share of the private capital stock in the total capital stock. Use of private capital is subject to capital utilization rates, which are the model's consistent estimates depending on data and the model's specification of related equations. Labor demand is derived

from the first-order condition of households' maximization problems and depends on their intertemporal decisions on whether to spend today on consumption or save and accumulate capital for tomorrow's investments. This optimal decision sets the labor growth rate g_t^L . The labor growth rate also depends on the average labor participation rate, which is low in Serbia compared to similar economies. We set this participation rate at 70 percent even if it has recently drifted below that percentage. On the other hand, the labor overhead participation rate ($\ln h_t$) has a tendency to rise and additionally worsen labor market conditions. This is also taken into account in order to represent the overall impact of labor on output, where there is both a productive part and an unproductive part of the labor force.

Total factor productivity is an effect on output that is assigned neither to physical capital input nor to labor input. It is also called the Solow residual. In our case, it is captured by a change in capacity utilization rate (g_t^{UK}), and complemented by labor-augmenting technological progress (g_t^{LFP}), as defined in equation (5):

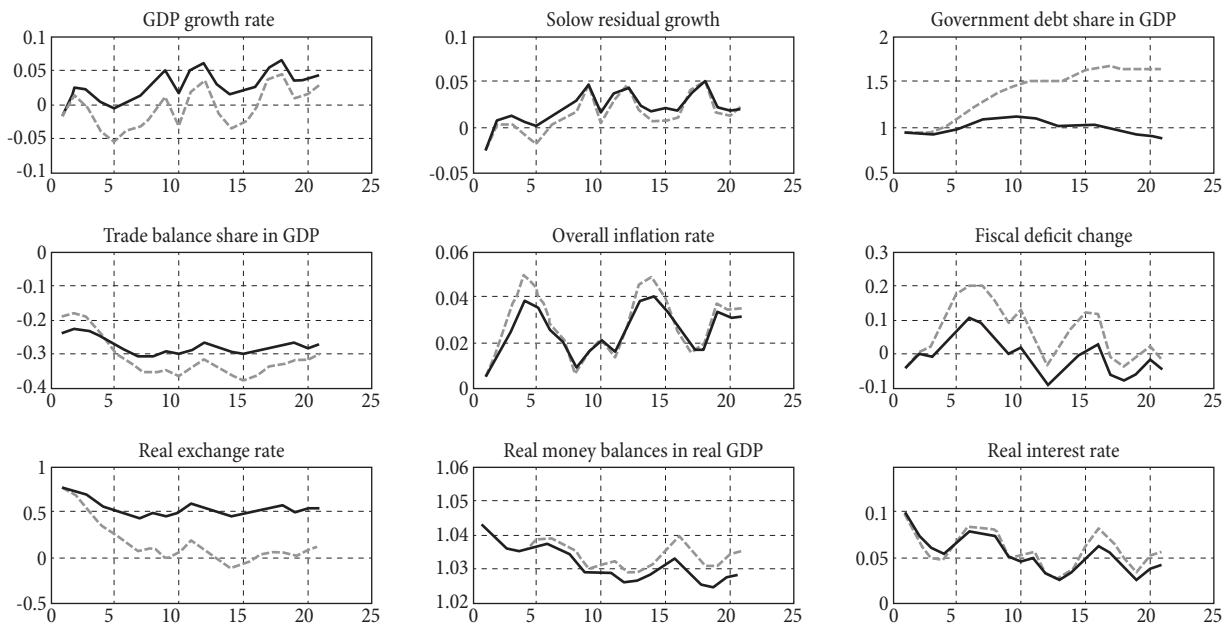
$$\text{Solow residual} = (1 - \alpha) \cdot g_t^{UK} + \alpha \cdot g_t^{LFP} \quad (5)$$

Since the capital utilization and its growth rate are solutions of the model, we rely on policy simulation only on the labor channel in equation (5) to model the impact of the total factor productivity on public debt. It will be

subsequently explained how changes in human or knowledge capital may practically improve total factor productivity in Serbia. Before that, let us focus on the model. Time series g_t^{LFP} is a stochastic process, independent from other macroeconomic variables and subject to stochastic shocks. It is modeled as a random walk with a drift. The drift is not equal to zero and depends on the initial conditions of some other steady state variables and parameters. Its steady state value is derived from equation (4) under the assumption that the other growth rates $\bar{g}_t, \bar{g}_t^K, \bar{g}_t^L$ and \bar{g}_t^{KG} would be in the steady state, combined with the related parameters α and α_K . We changed its value for 0.02 in order to get the steady state increase in the total factor productivity growth of 1 percent. Results are reported in Figure 3.

Compared to the fiscal consolidation scenario, the total factor productivity scenario predicts higher growth rates, lower trade deficit, less real exchange rate appreciation, slightly lower inflation and real interest rate and, most importantly, lower fiscal deficit and the public debt-to-GDP ratio. The period's average GDP growth rate is positive and high (2.9 percent), while the corresponding the public debt-to-GDP ratio is 65 percent. All these make it superior to the alternative scenario. The point, however, is not that improving total factor productivity may have

Figure 3: Total factor productivity improvements – Baseline scenario (dotted lines) and alternative scenario (solid lines)



better macroeconomic results than the fiscal consolidation scenario. The point is that supply-side policy measures may be equally as or more effective than demand-reduction measures to contain disturbing public debt even with less severe external consequences.

Public attention is overwhelmingly focused on the demand side of the public debt problem. We propose a more balanced approach and consider total factor productivity growth as a part of the solution. Caution is, of course, needed. Increase in the total productivity growth should not be treated as a *Deus ex machina* solution that can be substituted for more painful fiscal consolidation. In our view, it is a mid-term complement to immediate fiscal consolidations. Fiscal measures can be implemented overnight, while changes in human capital are only effective after some time. Total factor productivity effects have considerable lags. This is evident if one considers the paths of GDP growth rates and public debt in Figure 3. It takes at least four quarters for these measures to start generating positive outcomes.

Human capital improvements

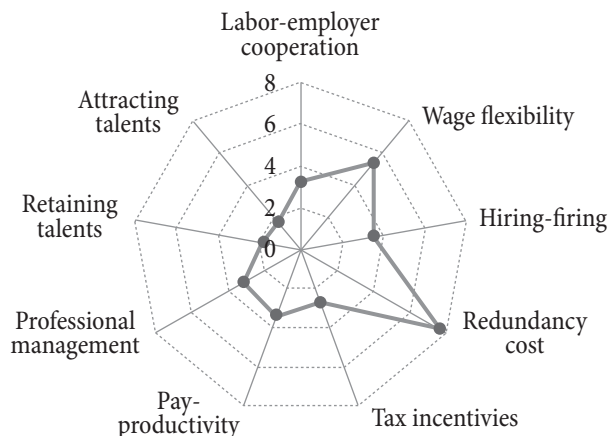
Serbia’s economy is hampered by a highly rigid and protected labor market, as reported by an IMF mission sent to Belgrade to conduct Article IV consultation with the local fiscal and monetary authorities [2], [3]. Therefore, reforms of the labor market were strongly recommended. These reforms were intended to foster job creation in the private sector and redirect the growth model to export and investments. Priorities were given to delinking severance

payments from lifetime employment, decentralizing wage bargaining, simplifying dismissal procedures, improving incentives for hiring, and ensuring that minimum wage increases should not outpace productivity gains. These recommendations were officially accepted, legally converted to amendments on related provisions of the Labor Law and sent to the Parliament for adoption. However, the amendments are still pending due to trade unions’ objections and ongoing public controversy.

Reforms of the labor market are at the heart of the total factor productivity improvements. They illustrate what kind of structural and institutional reforms should be made in order to boost total factor productivity. However, the recommended structural reforms only partly address labor rigidities and overemphasize the firing-hiring problem. The World Economic Forum (WEF) in Davos provided a more productive scanning of Serbia’s labor market deficiencies [8]. We reproduce in Figure 4 detailed findings on the 7th pillar of the Global Competitiveness Index relating to labor market efficiency in Serbia. According to this assessment the hiring-cum-firing deficiency is severe, but wage flexibility and redundancy compensations are not strong obstacles to labor market efficiency. We have a particular reason to believe such findings.

Our model QUEST_SERBIA has a particular parameter that reflects costs due to sluggish wage adjustment. It is set by the QUEST III model for the EU at the rather high level of 12.07. However, the estimated value for Serbia is 0.0049. This estimate is broadly in line with the WEF findings that the Serbian labor market is more flexible than what was reported by other studies.

Figure 4: Global competitiveness index – Labor market efficiency in Serbia



Tax disincentives and poor labor-employer cooperation have low marks and reveal even greater cause for concern than hiring-firing rigidity. There are similarly poor scores for the next two efficiency factors: the inadequate pay-to-productivity relationship and unavailability of highly qualified local professionals. The most worrying finding, however, is that the Serbian labor market does not attract talents or retain them. This is alarming if we recall that the WEF classifies world economic development into three stages – factor-driven, efficiency-driven, and innovation-driven stages – where the most developed economies have already advanced from the first to the third stage of development. Serbia is still in the second stage of development and is lagging behind the group’s average. Innovation-based development relies on talented people and highly professional managers. That is something which Serbia needs if intends to go beyond the present stage of development.

Conclusions

In a DSGE framework, by using our QUEST_SERBIA model, we illustrate how two alternative policies work and what effects they may have on managing Serbia’s public debt at a sustainable level. Figure 5 has combined their simulated effects on the real GDP level and debt-to-GDP ratio separately as presented in Figures 2 and 3. Our conclusion is that fiscal consolidation is a necessary means to contain rising public debt, but it will not provide growth and employment over the mid-term. It is even more worrying that fiscal consolidation policy, both

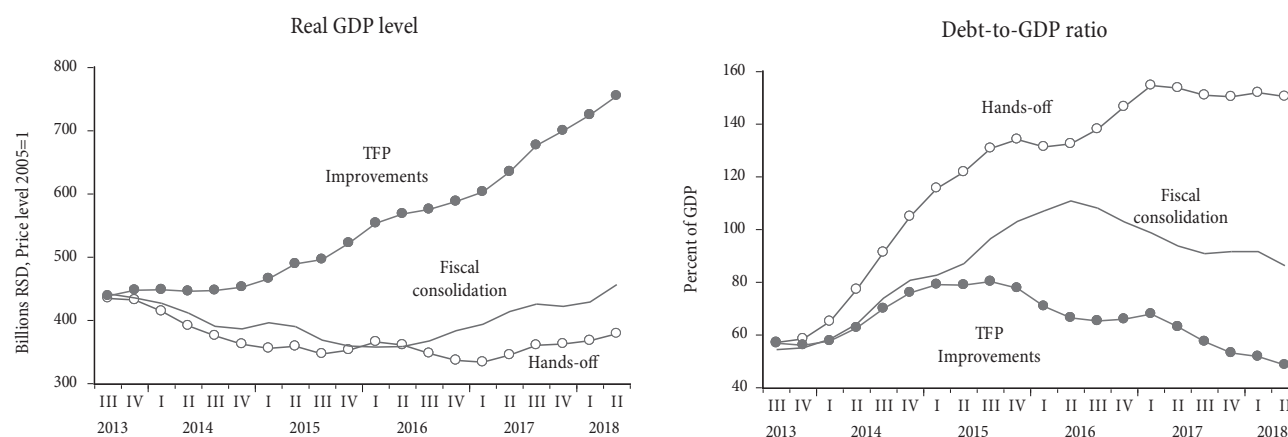
public expenditure-reducing policy and fiscal revenue-increasing policy, must be much harsher than what we assumed in our simulations. Otherwise, a rising public debt might go out of control.

For us there is no doubt that rising total factor productivity policy should complement fiscal consolidation policy. Improvements in total factor productivity were modeled by using labor-augmenting technological progress. This progress can be achieved in practice by restructuring the labor market. As far as restructuring is concerned, the present fiscal policy addresses wage and labor-to-employer rigidities. This does not go far enough and will not contribute much to improving human capital. We propose a complementary total factor productivity policy aiming at lifting high quality labor supply bottlenecks or obstacles to innovation development. The role of government is crucial in triggering such a policy change. There is no time to waste, since improvements in labor efficiency work with lags. From Figure 5 it is visible that effective reversal of negative trends comes after six to eight quarters.

To make our model-based conclusions both more practical and realistic, we propose to the government to adopt a comprehensive program of restructuring the labor market along these lines:

1. Survey the labor market to identify professionals’ gaps or highly skilled workers’ bottlenecks,
2. Anticipate the future development of labor demand, taking the advanced market economies as a benchmark case,
3. Set forth curriculum changes in the public education system necessary to meet the future labor demand

Figure 5: GDP and debt-to-GDP ratio – Alternative policy scenarios



based on innovation and technological progress development, and

4. Stimulate (not depress by the public wage policy) the public education system to generate labor profiles instrumental to future sustainable growth.

This policy is broadly in line with efforts to design the reindustrialization policy in Serbia.

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