SPOTLIGHT ON:

Long-term consequences of the collapse of the Serbian economy during the 90s: the dynamics of potential GDP in the period between 1989 and 2015

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1. Introduction

After more than two and a half decades of transition Serbia is in a small group of countries of Central and Eastern Europe (CEE) which have not yet reached the level of development from the pre-transition period. Serbia's GDP in 2015 was 25% lower than in 1989, while the CEE countries in the same period increased their GDP by almost 60% in average. As a result of divergent developments in that period CEE countries are in 2015 more developed, in average, than Serbia by 85%, while in 1989 Serbia was at the average level of development of this group of countries[2]. The lower level of development implies a lower living standard of citizens, while the decline in GDP directly influenced the increase in unemployment.

Therefore, the following questions are imposed as relevant: why Serbia hasn't yet reached the pre-transition level of development, which factors crucially influenced the absolute and relative decline in the level of development of Serbia, which policies can initiate growth of the Serbian economy so it could catch up with the CEE countries and after that with the developed countries of Western Europe?

In this Spotlight on we will try to prove that the main reason for the low level of development of Serbia is the collapse of its economy in the 90's of the last century when GDP fell by over 50%. The fall of GDP of Serbia during the 90s is far beyond the transitional recession in other European countries, in which GDP typically dropped by about 20%. Transitional recession usually lasted 3-4 years, after which the economies of the CEE began to rise, and the majority of CEE countries in 2000 had GDP higher than in 1989. On the other hand, the collapse of the Serbian economy lasted from 1989 to 2000, i.e. 12 years, after which Serbia's GDP in 2000 was lower by 50% than in 1989. The fall of GDP in Serbia in comparison to other countries is a result of the fact that during the 90s Serbia was exposed to nearly a decade of international sanctions, hyperinflation and NATO bombing, while other countries from the mid-90s took the path of a rapid growth.

Long-term effect of the collapse of the economy in the 90's on the level of development of Serbia is a result of the fact that in that period not only that the GDP fell by 50%, but the economic potential of the country was reduced by about 40%. The dynamics of the reduction of the economic potential of Serbia is assessed based on the movement of potential GDP in the period between 1989 and 2015, which represents a measure of the maximum sustainable GDP. Reduction of the economic potential of the country for about 40% during the 90s is a result of the long lasting international sanctions during which high percentage of capital present in the economy of Serbia devalued or became unproductive in terms of the open market economy. Capital and capacities were physically preserved, but economically devalued. The movement of potential GDP implies that the collapse of the economy during the 90s is the most important reason why Serbia has not yet reached the pre-transition GDP and why it is lagging behind the countries with which it used to be at a similar level of development.

So the current low level of development and the low level of the standard of living are not predominantly the result of economic policies and reforms (privatization, liberalization, etc.) which were carried out in Serbia after 2000, but the result of the collapse of the Serbian economy during the 90's. Indirect evidence that these factors have not decisively influenced the present level of development and the standard of living in Serbia is that similar policies and reforms

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2 Because of the comparability, we analyze Serbia throughout the whole period in comparison with five countries (Poland, Czechoslovakia, Hungary, Romania and Bulgaria), where after the breakup of Czechoslovakia we use the data for the Czech Republic and Slovakia. According to Broadberry, S. and A. Klein (2011), average GDP per capita measured in equal purchasing power parity dollars in five CEE countries in 1990 was 5% higher than in Yugoslavia. Having in mind that Serbia was at the average level of development as the SFRY we can estimate that Serbia in 1990 was approximately at the level of development of five analyzed CEE countries.

(privatization, liberalization, etc.) have been implemented in all the countries of the CEE, and they are now at a much higher level of development than before the start of the transition and are much more developed than Serbia. Of course this does not mean that there were no mistakes in economic policy and reforms after 2000, but that the impact of these mistakes on the state of the economy is much smaller than the impact of the collapse of the economy during the 90's. Overall, economic policies and reforms since 2000 have been responsible for the growth of the economy during this period and they could be held responsible for the unbalanced growth in the period 2005-2008 and the stagnation of the economy during the period 2009-2015.

The analysis that follows will show us that the actual and potential GDP are roughly the same since the middle of the previous decade, which indicates that the growth of the Serbian economy after this period could not have been achieved by the increase of the current consumption of the citizens and the state, i.e. by expansionary fiscal and monetary policies. Indirect evidence for the preceding paragraph is the enormous growth of the foreign trade deficit in the period between 2005 and 2008, which can be directly attributed to the expansionary fiscal policy during this period[3]. When the actual and potential GDP are roughly the same then the growth of the economy can only be achieved by new investments to increase the production potential of the country.

2. Methods for estimating potential GDP

The long-term level of GDP directly[4] depends on the available factors of production (human and physical capital) and technology, and it is conventionally referred to as a potential or "natural" level of GDP, and the growth rate that it corresponds to as potential or "natural" growth rate. Potential GDP represents a kind of long-term line around which the real GDP fluctuates under the influence of other factors such as the changes in domestic and foreign demand, changes in the terms of trade and others. Potential GDP shows the maximum long-term sustainable level of economic activity in a country, without an increase in inflation, foreign deficit and other macroeconomic imbalances. Potential GDP increases when the level of production factors increases and when new technology is introduced, and reduces with a reduction of the level of production factors or as a result of technological regression.

Box 1. Potential GDP and historical maximum of GDP

In Serbia, potential GDP and a historical maximum of GDP are sometimes being misunderstood, which is why there are assessments that the potential GDP of Serbia in 2015 is for 30% or 40% higher than the real GDP. On this basis it is concluded that it is possible to significantly increase the real GDP with expansionary fiscal and monetary policy, which would increase the current private and government consumption.

However, a historical maximum of GDP, which is often approximated by the GDP from 1989, cannot be interpreted as an indicator of potential GDP. The reason for this is that the economic value of the factors of production (primarily capital), because of their devaluation during the 90's, is now significantly lower than the value which was at our disposal in 1989. Potential GDP in Serbia will reach a value from 1989 only when the investments compensate for the lost capital during the '90s plus the growth of capital per employee in the world economy over the last two and a half decades.

Second empirically convincing evidence that potential GDP is not greater than the actual GDP is the reaction of the economy to the growth of current consumption of citizens and the state in the period between 2004 and 2015. In the pre-crisis period the high growth in current consumption has generated economic growth of around 5% per year, but with the simultaneous enormous growth of the foreign trade deficit, which occasionally exceeded 20% of GDP, and relatively high inflation of around 10% per year. If the potential GDP was greater than the actual, the economy would react to the growth of domestic demand with even higher growth of GDP, while the external deficit and inflation would not record a significant growth. Moreover, the high growth of the external deficit and inflation in the period between 2005 and 2008 suggest that the Serbian economy in that period was "overheated", and that during this period real GDP was higher than the potential (see Chart 4). The Serbian economy in the period between 2009 and 2015 was in stagnation despite the high fiscal deficits which were realized in this period, which indirectly indicates that the potential GDP in Serbia does not differ significantly from the actually achieved GDP.

3 In addition to the expansive fiscal policy the increase of the current account deficit was also affected by a high inflow of foreign capital, which at that time was present in all CEE countries.

4 The level of employment, capital and technology, which are the immediate determinants of economic growth depends on many factors such as the quality of institutions, fiscal and monetary policy, development of financial markets, exchange rate policy, the quality of education and others.

The movement of real GDP depends not only on long-term factors, but also on the temporary, cyclical, seasonal and random factors. The movement of real GDP in Serbia over the past two and half decades is characterized by several distinctly different phases. The first phase represents the collapse of the economy in the period between 1989 and 1993 when GDP fell by about 60%. The greatest impact on the decline of GDP in this period had the international sanctions, which were imposed in May 1992 and halved the GDP of Serbia in the period of just a few months, but some other factors also had a certain impact on the decline such as the transitional recession, the collapse of Yugoslavia and the hyperinflation. The second phase covers the period between 1994 and 2000 during which the GDP grew by 12.5%.

This phase began with Avramovic's economic program of stabilization, continued with partial lifting of sanctions in the late 1995, and ended with the conflict in Kosovo, NATO bombing and the reconstruction of the country in 2000. At the end of this phase, in 2000, Serbia's GDP was 53% lower than in 1989. The third phase began in 2001 with lifting the sanctions and launching economic reforms and ended with the global economic crisis that hit Serbia in late 2008. This phase, which lasted eight years, is the only period of significant growth of the Serbian economy during the last two and a half decades, during which GDP grew by 58%. The fourth phase began in late 2008 and runs until the end of 2015, and it includes a seven-year period during which the Serbian economy did not achieve a growth.

The relationship between the actual and potential GDP is important from the standpoint of the possibility of influence of fiscal and monetary policies on the real GDP. When the real GDP is lower than the potential GDP, this means that there are unused productive capacities; it is then possible to cause an increase in real GDP with measures of economic policy, fiscal and/or monetary. However, when the real GDP is at the level of potential GDP then the available factors of production are fully utilized, and for the economic growth it is necessary to increase the amount of capital, number of employees or introduce new technology. In this case, measures of economic policy cannot have a direct impact on growth, and if this is attempted the result will be a rise in inflation, foreign deficit and other imbalances. When the actual and potential GDP are roughly equal, economic policy and reforms can affect growth only indirectly by creating stimulating conditions for investment and employment, i.e.to increase potential GDP.

Potential GDP is estimated using different methods that can be classified into two main groups. The first group consists of statistical methods which estimate the potential GDP by excluding cyclical, seasonal and random components from the real time series of GDP. GDP estimated in this way can be equated with long-term i.e. trend component of GDP. Within the statistical methods for estimating potential GDP usually the ones used are: deterministic estimates of trends, Hodrik- Prescott filter, Kalman filter and others. Although statistical techniques are often used to assess the potential GDP, there are arguments[5] that this estimated potential GDP represents only a trend in the movement of the real GDP, but not long-term sustainable level of production. Normally the potential GDP estimated using statistical methods is not significantly different than the potential GDP assessed using additional information about the factors of production, capacity utilization, etc., which is one of the reasons for the frequent application of these methods. However, methods that rely only on the time series of real GDP do not provide a meaningful economic assessment of potential GDP in extraordinary circumstances, such as sanctions against Serbia during the 90s of the last century. During this period, the real GDP has dropped sharply after the introduction of sanctions and the potential GDP gradually declined throughout the decade, due to the economic depreciation of factors of production and technology.

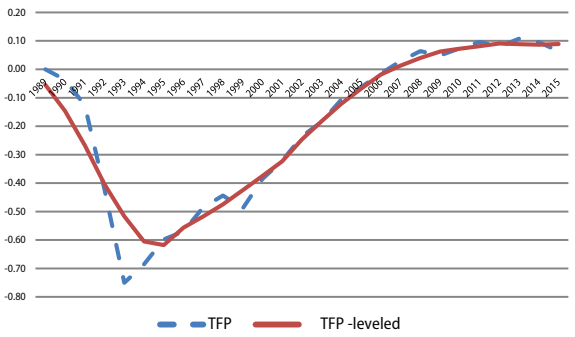
The second group of methods used to estimate the potential GDP uses additional information for the evaluation of potential GDP such as the movement of factors of production, technology, degree of capacity utilization, inflation and others. These methods are often based on Cobb – Douglas production function according to which the potential GDP is a function of the real capital, the natural level of employment and the level of technical progress. Potential GDP in this paper is evaluated by using a simplified version of the production function, in which the potential GDP is estimated based on the movement of capital and formal and productive employment. Application of simplified method is intended to cover the key determinant of potential GDP in Serbia in that period, and those are changes in equity and employment.

The first modification of the standard approach consists in the treatment of technical progress. Technical progress as a factor of economic growth is introduced into economic models in order to include the faster growth of economic activity than the growth of production factors - employment and capital. The faster growth of production than the growth of factors of production is the result of the introduction of new technologies, new forms of organization and others. Given that the introduction of new technologies is achieved through new investments, it is difficult to

5 Congressional Budget Office (2004)

imagine the existence of technical progress, in periods when the rate of investment is much lower than the level needed to replace depreciated capital. When replacing the depreciated capital, in modern economies, more productive capital is usually introduced, and so the technical progress, and therefore a certain growth of the economy, is also possible even when the investments are at the level of depreciation[6]. However, this effect is not significant, if it even exists, when the rate of investment is for one third lower than the rate of depreciation, as was the case with Serbia during the 90s. Therefore, while estimating potential GDP in Serbia we included technical progress only in periods when the rate of investment was higher, or approximately equal, to the rate of replacement of the depreciated capital, and in the case of Serbia this was the case in the period between 2007 and 2015. Standard assessment of technical progress using Solow residuals implies that a technical progress in Serbia was continuously negative during '90s and early years of this century (see Graph 1). Negative technical progress in that period is a resulting of afaster drop in GDP than the decreased of the economic value of factors of production. Faster reduction of the volume of production than the reduction of factors of production was a result of the imposition of international sanctions, hyperinflation, NATO bombing, etc.,and not a result of the transfer to the usage of the inferior technology i.e. the negative technical progress.[7]

Graph 1. Total factor productivity (Solow residuals) as measure of technical progress



The second modifications of the standard approach is that instead of the natural rate of employment in the model, we use formal or real (productive) employment. Formal employment includes workers who have at some point been employed, regardless of whether they were really engaged in a company or not. The real (productive) employment is the estimation of the required number of workers to achieve a certain level of production, and is estimated based on the assumption of constant productivity or constant ratio of capital per worker. It is estimated that in the case of Serbia during the past two and a half decades adequate determinant of the potential GDP is formal or actual level of employment, rather than the natural rate of employment. The concept of natural rate of (un)employment is generally debatable[8], and especially inadequate in the case of a country with high unemployment rates in the long period of time, as is the case with Serbia. Also, use of the natural rate of (un)employment would not significantly change the results of the analysis, as it is calculated as a levelled time series of formal or actual employment.

Having in mind that the trend of GDP over the past two and half decades was strongly influenced by factors such as the international sanctions, the disintegration of Yugoslavia, NATO bombing and others, the question is whether it is necessary to include variables that would include their impact while estimating the potential[9] GDP. The general answer is that this is not necessary because the effect of other factors on the potential GDP is covered indirectly through their impact on the movement of capital and employment. Namely, these factors affected the movement of the real GDP strongly and almost instantaneously, while their impact on the movement of potential GDP was gradual and realized through the reduction of factors of production and technological lagging of the economy.

Data on capital per year are estimated by applying perpetual method based on the initial level of capital, investment rate per year and the average rate of depreciation. The initial level of capital in 1989 was estimated by multiplying GDP in that year with capital coefficient[10] k=2. In accounting capital, output ratio in 1989 was probably 2.5-3, but

6 Horvat, B (1987)

7 History recognizes a number of periods of technological regression, usually after the collapse of a country, natural disasters and others. One such example is the technological decline of Europe and the Mediterranean after the fall of the Roman Empire. However, in Serbia during the 90s, this was not the case, but we can talk about the relative lagging, which occurred due to the strong technological progress of the world and the stagnation of Serbia.

8 See for example Akerlof, G.A. and Shiller, R.J (2010)

9 Of course if the goal was to explain the movement of the real GDP we would then the inclusion of the above mentioned factors in the model would be necessary.

10 According to official data Zizmond, E. (1992) capital ratio in 1988 in Yugoslavia was 3.23, while a decade earlier it was 2.5. It's pretty improbable that the capital-output ratio increased during the 80s of the last century, a decade characterized by low investments. It is possible that the growth of capital coefficient result of underestimated depreciation or inadequate valuation of fixed capital in the conditions of high inflation. The paper Weyerstrass, K., and D. Grozea-Helmenstein uses with a capital ratio of k = 1.6, while the estimates by the EU for the countries of Central and Eastern Europe usually assume that capital-output ratio in the initial year of transition is k = 2 . Therefore, in this paper, we presume that at the beginning of the transition capital coefficient in Serbia was probably in the range of 2.5-3, but that a significant part of the capital was inefficient in terms of the open market economy. Therefore, it is estimated that the initial capital-output ratio in 1989 wask = 2.

based on the research for other countries it can be estimated that between 1/4 and 1/3 of the capital at that moment was worthless in terms of the open market economy[11]. A large percent of companies in Serbia before 1990 was selling products in the markets that were, with high tariff and non-tariff barriers, protected from competition in developed countries, such as the former Yugoslavia market, the market of Central and Eastern Europe (COMECON), the Middle East and North Africa markets, etc. High tariff and non-tariff barriers have enabled companies from the socialist countries, including Serbia, to sell lower quality products in these markets at relatively high prices. With the disintegration of the former Yugoslavia and COMECON, these markets opened to competition from developed countries which lead to the suppression of non-competitive companies, including companies from Serbia. As a result, a large percent of the companies and its capital, in all of the countries of Central and Eastern Europe, at the beginning of transition has become economically unproductive, which led to a transition recession in which GDP declined by an average of about 20% in Central and Eastern Europe.

Data on investments, expressed in% of GDP for the period 1995-2014 were taken from the database of the World Bank, while for the period 1990-1994 they were downloaded from the database of the United Nations. The rate of investment in 2015 is estimated based on the preliminary data of the Statistical Office of Serbia on the increase of investments and GDP in that year. The dynamics of capital depreciation is estimated using the average rate of depreciation of the total capital, of 7% per year[12], as well as the depreciation rate of 10% for equipment and 2.5% for buildings.

Starting from the initial level of capital in 1989 we estimated the annual time series of capital for the period 1990-2015 with the application of a perpetual method[13]. Within the perpetual method capital in the year ***t*** is estimated by the level of capital in the year ***t-1*** increased for investment in the year ***t***, and then reduced by the depreciation in the year t:

$$Kt = Kt\text{-}1 + It - \delta Kt\text{-}1,$$

where K is the designated capital, I investment, and δ the depreciation rate of capital. For easier view of comparative dynamics the series are shown on the graphs in the form of an index with the base in 1989.

3. Assessment of the dynamics of capital and employment

The first step in evaluating the potential GDP is the construction of time series of capital and employment for the period between 1989 and 2015. By applying the perpetual method we calculate that the total capital of the Serbian economy in the period between 1989 and 2000 of the last century has declined by about 40%. The main reason for such a drastic fall in the value of capital is that the investments, for more than a decade, were significantly below the level of depreciation. In the period between 1989 and 2000 investments on average amounted to only 12.5% of GDP, which was far less than the level that was necessary to preserve the real value of capital, which is why a large part of economic capacities in Serbia economically devaluated. Average annual depreciation of capital during the 90's was 4.5%. The cumulative decline in economic value of capital in the period between 1989 and 1993 amounted to 15.8%, while in the period between 1994 and 2005 capital value decreased by 29%. From the above mentioned it can be concluded that the economic value of capital during the 90s decreased relatively evenly, i.e. that there is no significant difference between the period in which GDP has dropped drastically (1989-1993), and the period in which real GDP grew (1994-2000). Relatively steady decline of the capital value is the result of the fact that the rate of investment was low and at a relatively steady level of 12-14% of GDP over the entire period.

The rate of investment that is necessary to preserve the value of capital at a constant level in normal circumstances (aggregate depreciation rate of 7% and a capital ratio of 2) amounts to 17-18% of GDP[14]. However, during the period between 1989 and 1993 real GDP declined by 60%, while the value of capital in the same period decreased by about 20%. Therefore, to preserve still high levels of capital at that time it was necessary to invest as much as 30% of the reduced GDP[15], while actual investments amounted to 12-14% of GDP. There is no doubt that in the period, when

11 For Hungary, it is estimated that approximately 35% of capital that existed at the beginning of the transition had no economic value in an open market economy Földvári P. and B. V Leeuwen (2013).
12 The most common depreciation rates in the countries in transition is in the range of 4-8%. The paper Weyerstrass, K., and D. Grozea-Helmenstein used depreciation rate of 5%, while the research within the EU for the countries of Central and Eastern Europe most commonly used depreciation rate of 7%.
13 There are no data on capital per year for other countries also, so the perpetual method for evaluation of capital is also mainly used for them.
14 In the old EU member states, depreciation of fixed assets is about 18% of GDP, Görzig, B (2007).
15 Because of the significantly greater decrease of GDP than the fall of the capital, in the first half of the 90's capital-output ratio s temporarily jumped to as much as 5, and later, with the devaluation of capital, due to the low investment, it fell at a typical level of between 2 and 3.

GDP fell by 60%, it was not socially and politically feasible to increase the share of investment to 30% of GDP, because that would imply that the current personal and government consumption should drop considerably more than 60%[16]. Such huge growth in investment was not technically possible because most of the equipment in the Serbian economy was imported, and during most of the 90s, the import was disabled by sanctions.

Because of the low level of investment during the 90's, the components of capital which depreciate relatively quickly were in particularly affected, as it was the case with the equipment. Assuming that the equipment depreciates at a rate of 10% per year, and that the equipment accounts for 65% of total capital[17], as well as that 65% of the total investmentsis directed to the equipment, we get that the real economic value of the equipment in the 90's was reduced by about 45%. Observed by sectors, low investments had especially strong impact on the industry - sector in which capital equipment has a high share, and where the technological progress during the 90s was strong. With the devaluation of equipment for over 45% during the 90's Serbia practically deindustrialized.

Reduction of the economic value of capital and technological lagging of the Serbian economy started already in the 80's of the last century, although it was considerably smaller than in the 90's, as a result of obligations to return old loans, the inability to obtain new, and a low domestic savings rate, rate of investment already in the 80s dropped below the level required to cover the depreciation. A lengthy and intensive process of de-capitalization of the Serbian economy is indirectly revealed based on the data on the average age of the equipment in privatized companies in Serbia which was nearly 30. The average age of the equipment in developed countries such as Germany and Denmark is 13[18], which is more than half the age of the equipment in companies in Serbia at the time of their privatization.

The low level of investment in the period of a decade had less impact on the economic value of the buildings, which depreciate considerably slower. Based on the assumption that the average annual depreciation of buildings is 2.5% and that they accounted for 35% of total investments, the result is that the economic value of buildings in Serbia during the 90's even increased. Maintaining the value of buildings is further facilitated by the fact that investments in construction were dominantly implemented using domestic inputs and therefore they were not significantly affected by the sanctions.

The previous approximate calculations indicate an imbalance in the structure of capital, which was formed during the 90's - the economy at the end of the decade had a number of buildings and economically almost entirely devaluated equipment at its disposal. As economic activity requires a certain proportion between the equipment and buildings, it could be estimated that the decline in potential GDP is roughly equal to the reduction in the economic value of the factor of production that recorded a greater fall[19]. Given that during the 90's, the economic value of the equipment has fallen by around 45% it could be argued that the potential GDP of the economy recorded a similar decline.

The economic value of the capital has continued to decline also in the period between 2001 and 2003, but at a much slower pace. Total decrease in the value of the capital in the period 2001-2004 amounted to about 4%, or about 1% a year, which is considerably less than the rate of depreciation of 4.5% per year during the 90's. The reduction, and then restraining of the decline of capital value was the result of the increase of the investment rate, which in the period between 2001 and 2004 averaged 17%, with the rate of investment growing from one year to the next one so that in 2004 it reached a level of 21%. We estimate that in the period between 2004 and 2008 the total capital in Serbian economy increased by about 15%, which is also the only period in the last 2.5 decades in which the value of capital in Serbia grew. The growth of the value of capital is the result of increased investment in fixed capital, which in this period averaged 23%, reaching in some years even 25% of GDP. The high rate of investment in that period was largely financed by foreign capital, in the form of foreign direct investments and foreign loans, while domestic savings were low.

It is estimated that the dominant reliance on foreign capital in first years of transition was justified, because in the short time it was impossible to significantly increase domestic savings[20] in order to finance the growth of investment

16 Investments in the 90's were funded almost exclusively from domestic savings because there were no foreign loans or direct investments as a consequence of the international sanctions.

17 It is possible that the investments in equipment during the 90's participated significantly less in total investments because companies have not been able to import equipment, while domestic production of equipment fallen sharply due to a high import dependence. In this case the decline of the economic value of the equipment was greater than the estimated 45%, but there are no reliable data on which to assess how much was invested in equipment in the 90's.

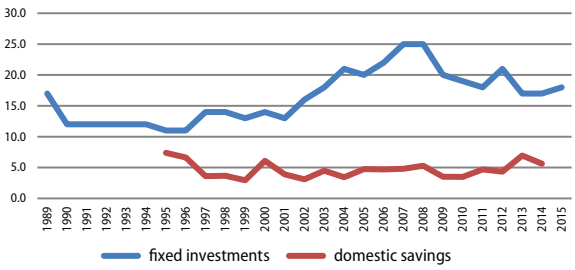
18 Görzig, B (2007).

19 Due to the existence of proportionality between the elements of capital and limited possibilities of substitution, effective limit of the potential output is determined by the factor that has recorded a greater decline.

20 Under the (gross) domestic savings we consider all domestic resources to finance investments, which include the funds of enterprises, citizens and the state. Domestic saving include depreciation and the profit of companies and savings of citizens of the state. In other words domestic savings includes a share of GDP which is not used for current consumption of citizens and the state.

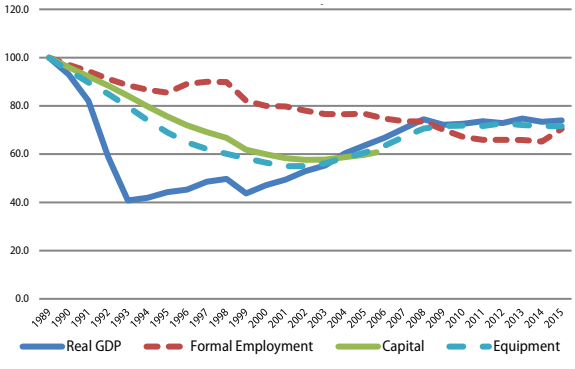
and the economy. In addition, foreign capital has enabled the introduction of new technologies, company organization and access to foreign markets. However, after 3 to 5 years from the start of transition there was a need for a considerable reliance on domestic resources to finance investment i.e. domestic savings. Considerable growth of domestic funds for investments was economically justified, but politically difficult to implement, because such policy requires a slower growth of domestic consumption. Reliance on foreign capital in the long run is not sustainable, because credit growth and foreign ownership in Serbia after a certain period of time generates a large outflow of capital in the form of interest and dividends. Besides, the inflow of foreign capital depends on the situation in the world market, and so in the case of major disturbances sudden stop of inflow or even withdrawal of capital is possible, as it happened after 2008.

Graph 2. Investments in fixed capital and domestic savings, % of GDP



Source: The World Bank, and investments in the period 1989-1994 United Nations

Graph 3. GDP trends and the factors of production (1989 = 100)



Since the beginning of the economic crisis in 2009 until 2015, the value of capital in the Serbian economy stagnated as a result of the reduction in the investment rate to a level of about 18%, which is approximate the amount of depreciation. The decline of the investment rate after 2009 was a result of a sharp decrease in the inflow of foreign capital, after the start of the world economic crisis, but also a result of the problems in Serbian companies which have accumulated during the period of high growth, which are manifested in high indebtedness and high percentage of non-performing loans. For long-term sustainable economic growth it is essential that investments are mainly financed by domestic savings, i.e. savings of the economy, citizens and the state.

In the 90's, in Serbia, there was also a decline in the economic value of the other factor of production - human capital. The movement of human capital is measured on the basis of data on the total number of employees that includes both formal and informal employment, as well as the movement of knowledge and skills possessed by the employees. In the case of Serbia a series of movements of formal employment was used as an indicator of human capital because there are no annual data on the movement of informal employment for the period before the introduction of the Labour Force Survey. Using data on formal employment is consistent with the data on GDP, which in the most part of the period under review does not include the results of the activities in the informal economy. Besides, data on the movement of informal employment, which are included in the Labour Force Survey after 2008, pose a dilemma in terms of their reliability.[21] The omission of the data on informal employment, especially during the 90's, when a large number of citizens provided their existence working in the informal economy, underestimates the total employment, but also the overall GDP.

Human capital also depends on the knowledge and skills of employees, which is usually approximated by the average number of years of education of employees, while sometimes the calculation includes the quality of education. During the 90's engineering, managerial, etc. knowledge was certainly outdated, as the dominant part of the economy was not working and contacts with the world were disabled as a consequence of international sanctions. In the world, the 90's were a period of strong expansion of the economy and a rapid technological progress, which influenced fast obsolescence of knowledge and skills of employees. Serbia made further loss of human capital with emigration from the country of a large number of skilled workers, engineers and managers. Given that the work in the gray economy partially erases the obsolescence of knowledge and skills and the departure of workers abroad, we estimate that the movement of formal employment is an acceptable approximation of the movement of human capital.

The number of formally employed in the 90's fell by over 500,000, or from 2.6 to 2.1 million employees. Observed by the selected periods, the most intense decline in employment occurred in the period between 1989 and 1993

21 See previous issues of *QM*.

when the number of formally employees decreased by 300,000[22], and in the period from 1994 to 2000 the number of formally employed decreased by a further 200,000.

Given that the decline in the number of formally employed was much smaller than the decline in production and the fall of the value of capital, a significant imbalance in the economy was created - there was a large number of workers who were formally employed, but their jobs were unproductive[23]. Retention of employees in enterprises though their jobs became unproductive is part of the tradition of state owned enterprises. But even more important reason for the retention of a large number of employees in enterprises was the Government Decree, which prohibited dismissals during the period of international sanctions[24]. Productivity in the 90's declined by about 40%, from which we could estimate that the minimum[25] excess of employees accounted for about 40% of the total number of employees in the year 2000 (2.1 million), and that the excess of employees was around 830,000. A much smaller decline in the number of employees in relation to the reduction in the value of capital created an imbalance between the factors of production, which was manifested in a large surplus of employees in relation to the capital at the disposal. If it is assumed that at the beginning of the period under review there was a balance between labour and capital the result of changes in the 90's would be a surplus of employees in the year 2000 in the amount of about 30% of the total number of employees, which is about 600,000 employees[26].

The fall of formal employment continues even after 2000, while in the period between 2000 and 2015 the total number of formally employed decreased by about 270,000, or 12%. In the pre-crisis period the number of formally employed decreased by about 180,000 while in the period between 2009 and 2015 the number of formally employed fell by about 80,000[27].

It is obvious that the estimates of potential GDP based on formal employment in the period when there is a large percentage of employees who were not productively employed or are only occasionally productively engaged overestimates the potential GDP. Therefore, it would be more appropriate to estimate the potential GDP based on the estimated actual employment[28]. One of the estimates of potential GDP is presented in Chart 4 and is based on the time series of actual employment, with the actual employment estimated based on the assumption of constant productivity.

4. Estimation of potential GDP and the analysis of its dynamics

Since the economic value of the factors of production in Serbia in the 90's was significantly reduced it follows that in the same period the potential GDP was also significantly reduced. Assessment of the fall of the potential GDP can be performed in several ways. It can be reasonably assumed that the potential GDP fell in proportion to the decline of the economic value of capital in the period 1989-2000, and it is about 40%. This estimate is based on the fact that for production a certain proportion between the production factors is necessary, so if one factor falls more than the other then potential GDP declines for about the same as that factors of production, which means that there is an excess of other factors that cannot be productively used (in the case of Serbia, there was a surplus of employees). Alternatively, it could be estimated that the decline of potential GDP is roughly equal to the decline in the real value of equipment, which was around 45%. A third possibility is that the decline in potential GDP is estimated based on the weighted average of the fall of formal (or actual) employment and capital, in which case the weights used will be the elasticity of capital and employment in relation to the GDP in the Cobb-Douglas production function[29]. When using the formal employment we get that the potential GDP of Serbia during the 90's fell by about 30%. If we use

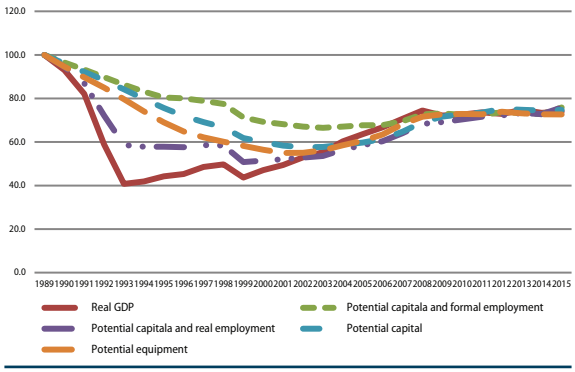
22 During this period, the practice of early retirement was widespread, which decreased the surplus of employees in enterprises but created long-term problems in the pension fund.
23 Arsić (2013).
24 In many cases workers were not going to work for years, while receiving minimum wage, often without payment of social security contributions.
25 The actual surplus of employees in 2000 was likely higher because the relative productivity of the Serbian economy in relation to the world deteriorated by more than 40%, as the productivity in the world during the 90's had grown significantly.
26 Alternatively, redundancy is assessed by comparing the level of capital per employee in 2000 with the same data in 1989. The estimated surplus of employment in relation to capital is also a lower limit because the amount of capital per employee in the world, during the 90's increased. In addition, as in the case of the number of employees quite unrealistic assumption was used that in 1989 in Serbia the number of employees in relation to the capital was optimal. Most probably in 1989, due to the nature of at the time dominant self-managed enterprises, there was a significant surplus of employees in relation to production and capital.
27 Excluding the unusually large increase in registered employment in 2015 of about 150,000 we get that the total reduction in formal employment in the period 2000-2014 was about 420,000, of which in the period 2009-2014the number of employees decreased by about 240,000.
28 See more detailed assessment of the actual employment in Arsic 2013.
29 The coefficients of elasticity of labor and capital in relation to GDP in Serbia, according to the latest research which can be found found in unpublished doctoral dissertation of Mirjana Gligoric,areboth 0.5 - similar results were obtained for other CEE countries.

some other measure of actual productive employment in production function rather than formal employment, it is then assessed that the potential GDP fell by about 40-45%. In the next part of this article it will be assumed that the fall in potential GDP was around 40% i.e. that it was approximately around the decline of economic value of the capital or the weighted average of the fall of the capital value and the real employment. It could be concluded that this is a conservative estimate of the fall of the potential GDP because it does not include the relative technological lagging of the economy of Serbia in relation to the world during the 90's.

The decline in potential GDP during the 90's was relatively steady, whether it is measured on the basis of the movement of the total capital, equipment or on the basis of Cobb-Douglas production function. Approximately constant and low level of investment and a relatively uniform decrease in employment influenced a relatively uniform decline of the potential GDP in the 90's. Unlike the real GDP, which was halved in a short period after the introduction of sanctions in 1992, potential GDP declined much more slowly, hence its high cumulative decline was largely the result of long lasting international sanctions.

The decline of the potential GDP is the result of almost ten years of extremely low investments resulting in economical devaluation of a significant portion of the capital of the Serbian economy. Although physical capital was mostly preserved[30], its use could not produce products that would be accepted by domestic or foreign markets.

Graph 4. The movement of the actual and potential GDP of Serbia



Potential GDP of the Serbian economy in 2000 was greater than the actual by 20% based on the economic value of the equipment, while based on the value of the total capital the potential GDP was by 27% higher than the actual. Based on the weighted average of the total capital and formal employment we get that the potential GDP was 47% higher than the actual, while on the basis of productive employment it was about 25% higher than the actual. Assuming that the organization of production requires a certain proportion between labour and capital, as well as that the possibility of economically efficient substitution of capital and work is small, it follows that the relevant measures are those which are based on the movement of the total capital or equipment or measures that rely on productive employment.

In the period between 2001 and 2003 the decline of potential GDP slowed down, and began its growth in the period between 2004 and 2008. It is relevant that these tendencies are present regardless of whether the potential GDP is measured on the basis of the production function, total capital or equipment[31]. Period between 2004 and 2008 is the only period within the last two and half decades during which the potential GDP achieved growth. This growth was the result of relatively high investments in fixed funds, which were in this period on average 23% of GDP. However it is necessary to bear in mind that the achieved level of investments was not sustainable in the long run because it was predominantly financed by borrowing of the companies and the state abroad, foreign direct investments and privatization revenues. Domestic savings were in this period low and averaged below 5% of GDP. Low domestic savings in this period can be directly linked to the rapid growth of personal consumption in this period. In the pre-crisis period 2001-2008, despite the rapid growth of the real GDP, formal employment declines as a result of lifting the ban on layoffs[32].

Potential GDP estimated based on the movement of capital and equipment was higher than the real GDP in the period 2005-2008 (Graph 4). This assessment is supported by the fact that in this period the Serbian economy, with relatively high growth rate of GDP, also achieved enormous growth of foreign trade deficit of over 20% of GDP, and that inflation was relatively high. On this basis, it could be reasonably argued that the Serbian economy in the period 2005-2008 was "overheated", and that domestic demand was too high, which was pushing GDP growth but also inflation and external deficit. A similar result is obtained on the basis of the production function that uses productive employment, while the use of formal employment gets the opposite result - according to which in this period the potential GDP was higher than the actual.

30 It is estimated that 3-5% of the capital was physically destroyed during the NATO bombing.
31 The increase in the real value of the equipment began as early as 2002.
32 See Arsić (2013).

In the period between 2009 and 2015 the potential GDP stagnateed as a result of low investments which, on average, were slightly above the necessary level to cover depreciation and the decrease in employment. As discussed in the previous section, with the beginning of the economic crisis there was a sharp reduction of foreign capital inflows, while domestic savings remained low at around 5% of GDP (see Graph 2). The result was a decline in the average investment rate of around 23% in the period between 2004 and 2008 to 18.5% in the period between 2009 and 2015. Stagnation of the potential GDP was accompanied by a stagnation of the real GDP which in this, almost decade-long period, has not achieved growth. Poorer results of Serbia than the results of other countries of Central and Eastern Europe after 2008 are the result of the fact that Serbia entered the crisis with unfinished reforms, low domestic savings and because Serbia was significantly behind schedule in the implementation of the fiscal consolidation.

Potential and actual GDP, according to all methods, have been about the same since 2008. When the actual and potential GDP are roughly equal it is not possible to achieve rapid economic growth by increasing current spending, with relatively modest investments. Once the actual and potential GDP are roughly equal for the growth of the economy it is necessary to increase the value of capital and employment, and this is conditioned by relatively high investments. When the potential and actual GDP are roughly equal there is no possibility that the increase in domestic demand and the use of expansionary fiscal and monetary policy will increase the GDP. This was confirmed in the case of Serbia in the period of expansion from 2005 to 2008 when growth in domestic demand led to an increase in the external deficit and inflation, as well as in the period from 2009 to 2015 when despite the high fiscal deficit GDP did not grow.

Conclusions

Potential GDP, as a measure of production possibilities of the Serbian economy, during the last two and a half decades went through several stages. In the period from 1989 to 2000 potential GDP was continuously decreasing, so that in 2000 it was some 40% lower than at the beginning of the period. In the first several years of transition the fall of the potential GDP was continuously slowing down year by year, so that in the period between 2004 and 2008 the potential GDP grew, and since the economic crisis of 2009 up until to 2015, potential GDP was stagnating. Assessment of the movement of the potential GDP is relevant because the real GDP fluctuates around the potential GDP, so the deviation of actual GDP from potential GDP can be limited both in time and in the scale. Therefore, the potential GDP basically determines the level of the development of the country, and thus the standard of living.

Movement of the potential GDP over the last two and a half decades indicates that the low level of development, employment and standards of living is mainly the result of economic collapse in the 90's of the last century. It can be argued that the negative impact of the economic collapse of the Serbian economy during the 90's on the level of development and standard of living will last as long as Serbia does not catch up with the countries of Central and Eastern Europe, with which it was at a similar level of development in the 80's of the last century. It is estimated that it would take several decades for this to happen, because the countries of Central and Eastern Europe achieve rapid growth until their level of development is not closer to Western Europe countries. The economic collapse led to devaluation of the factors of production, thus permanently reducing production capabilities of the Serbian economy, which means that the effects of the collapse are not extinct after the lifting of international sanctions. During the 90's other fundamental factors of economic growth which affect the physical and human capital have been also deteriorated, which is why after 2000 it was hard to rapidly increase the potential and the actual GDP. During the 90's institutions also deteriorated, the infrastructure was worn out, the results of the education system worsened, business ties with the world were broken and others.

Durability of the international sanctions during the 90's was a major cause of devaluation of the capital and the reduction of GDP. There is no significant difference between the period of very severe sanctions 1992-1995 and the period in which there was an outer wall of sanctions from 1996 to 2000, as the outer wall of sanctions prevented the inflow of foreign capital in the form of loans and direct investments. Absence of larger foreign investments, even after removing of sanctions on trade, in conditions of low domestic savings, resulted in a low rate of investment and further continuation of devaluation of the capital.

Given that the total value of the capital in the 90's was reduced by over 40%, after removing of sanctions the GDP could not be rapidly increased. Relatively rapid economic recovery from sanctions was hypothetically possible, if the sanctions lasted just few months because during that time there would be no significant drop in the value of the capital. However, the sanctions, in different modalities, lasted nearly eight years, which is long enough for capital to lose over 40% of its value and to almost adapt to a reduced GDP.

Movement of the potential GDP convincingly refutes the popular explanations according to which privatization, opening of the economy and other liberal reforms are the main causes for the low level of development, employment and living standard. Other countries of Central and Eastern Europe have carried out similar reforms and similar economic policies, and now their GDP is around 60% higher than in 1989, while in Serbia it is still 25% lower than in 2005. The main reason is the decline of the production potential of Serbia during the 90's, production potential was only in the period between 2004 and 2008 restored with problematic structure of financing and problematic sector structure of GDP growth. After 2008 the actual and potential GDP are equal, but the growth is possible only on the basis of new investments, but in this period investments were about the same as the depreciation of the capital. The reason for this is that the influx of foreign capital has declined while domestic savings have not increased.

Faster growth than the one achieved after 2000 was possible only under the condition that domestic savings were at a significantly higher level. However, the condition for a faster growth of domestic savings was slower growth in private and state consumption. In the context of political economy this was difficult to be achieved because the citizens after 2000 require high growth of current consumptions, as some kind of award for support of the political changes that were achieved during the 2000. The broad coalition governments that existed in the period 2001-2012 generally wasn't able to counter such requests, except in periods when there were external constraints in the form of an agreement with the IMF. Moreover, within the ruling coalition there were political parties which claimed that savings are not necessary, but that the domestic economy can start growing under the influence of the domestic demand and foreign capital inflows. However, at a time when there were no competitive unused production capacities the growth of domestic demand led to a growth in imports and the enormous increase of the external deficits, rather than an increase in actual and potential GDP. The result is that the Serbian economy in the period between 2005 and 2008 was "overheated", which means that the high growth of domestic demand had more influence on the growth of foreign deficit and inflation than on the GDP growth.

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