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The Upper Limit of Public debt for the Crisis and Subsequent Conditions

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Abstract: This article examines public debt. The study developed two econometric models to determine the relationship between economic growth in Uzbekistan and the country's debt. While one of them is based only on the dynamics of the share of public debt in GDP, the second model takes into account other factors that have a positive and negative impact on economic growth.

Key words: public debt, domestic and foreign debt, debt limits, economic growth, crisis.

1. Introduction

Due to the coronavirus pandemic, the world economy is facing a new economic crisis. Unfortunately, neither this pandemic nor the resulting global crisis has limited Uzbekistan. While the difficult economic situation, which initially began in major trading partners, began to have a negative impact on our national economy, then domestic economic activity declined due to the implementation of quarantine measures within the country. However, from the outset, on the instructions of the President of the Republic of Uzbekistan, the Government and all agencies in the economic block have prepared and are actively implementing measures to overcome the potential crisis and mitigate its risks (Decree, 2020).

At present, the main goal of economic policy is to stabilize the economy. Stabilization measures are being implemented through the use of monetary and fiscal policy instruments. We are well aware that the end results of the application of this policy by both stakeholders will often be conflicting.

According to the data, between 2010 and 2018, about 5-10 percent of the world's central banks were subject to fiscal intervention each year, while 39 percent of countries experienced this phenomenon at least once. And in 2019, 14 percent of the world's central banks will face the dominance of fiscal agencies in their home countries. Intervention has almost always been done to ease monetary policy (Binder, 2019). This has led to an increase in the price level on a global scale. In the context of the global crisis and its aftermath, this risk is likely to increase at a high rate.

Therefore, the need for a coordination mechanism between the monetary and fiscal policy bodies is important for achieving any ultimate goal of economic policy. Achieving this, especially in times of crisis, will pave the way for post-crisis conditions to become more stable.

Due to the crisis, budget revenues are falling sharply and expenditures are rising, in which case it is natural for the state budget deficit to widen. However, proper financing of the budget deficit will determine the next priorities of economic policy. In Uzbekistan, the introduction of external debt as a tool in this process is the most appropriate way as a coordination mechanism between monetary and fiscal policy agencies. The key issue now is to set a ceiling on public debt that will not have a negative impact on future economic growth.



Debt is, by nature, a two-way street. On the one hand, it helps to increase consumption in the current period, on the other hand, it forces us to limit consumption for the next period. That is, depending on which side you look at, there are pros and cons to debt. This means that the amount of debt has a positive effect to a certain extent, and a negative effect above this level. Finding the optimal boundary between the positive and negative effects of debt is an important task to get the most out of debt.

Public debt, in turn, is the total amount of loans and payments received to cover the excess of government expenditures over revenues. Each state borrows to improve the living standards of its population, to ensure the smooth running of the economy. Typically, economists argue that an excessive increase in these debt levels will limit the country's economic growth rate. However, there are some economists who believe that the effect of public debt is greater than its losses. These debates have been going on for a long time.

2. Literature review

Given that the debate in the scientific literature about the impact of public debt on economic growth is one of the hot topics for economists, it is understandable that the scope of scientific research on this topic is large.

While [Scherjon \(2017\)](#) tries to find the optimal level of public debt in his article, he takes into account the factors that positively and negatively affect the growth rate of nominal GDP in addition to the debt / GDP ratio. He describes the relationship between debt and GDP growth rate as a secondary function. The author finds the optimal amount of debt level by calculating the relationship between public debt and GDP growth rate of 28 industrialized countries.

[Omosho and Bawa \(2016\)](#) finds the optimal point for the amount of public debt, external and internal debt for Nigeria. In conclusion, it is noted that it is normal for Nigeria to have a public debt of 73.7% of GDP. [Akram \(2011\)](#) examines the effects of public debt on economic growth and investment in Pakistan. The study found a strong negative correlation between government external debt and per capita income growth and investment, confirming the country's over-indebtedness.

A study by [Kraay and Nehru \(2006\)](#) showed that the risk of a debt problem depends on small factors: debt size, policies, institutions, and shocks. According to the study, there is a significant difference between debt obligations and policy: countries with better policies can bear much greater burdens than countries with worse policies and institutions without increasing the risk of raising debt problems. According to their calculations for low-income countries, moderate growth and poor policies can make the country 100 percent tolerant of the current value of debt before exports. However, a well-policied debt can withstand up to three times as much debt.

[Cordella et al. \(2010\)](#) provided evidence of debt change when the net present value of debt in countries with good policies and institutions exceeds 20-25 percent of GDP. At the same time, the debt will remain insignificant in the range of 70-80 percent - the impact of debt on growth rates will cease to be negative. In countries with poor policies and institutions, the surplus and insignificance rates are significantly lower (10-15 and 15-35 percent of GDP). Their results show that the growth of debt reduction depends on both the quality of policies and institutions and the level of indebtedness of countries.



Pattillo et al. (2003) found that the effects of low and high levels of debt on debt growth were very different. At high levels of debt, a doubling of debt from any starting level or higher reduces per capita income growth by about 1 percent. At low levels, however, the effect was generally positive, but often insignificant. At the same time, the negative impact on the growth of high debt affected both the accumulation of physical capital and the increase in the efficiency of total factors. Thus, reducing the amount of debt will help at the expense of capital accumulation and production growth. In view of the above, the issue of public debt and the establishment of its upper limit has been covered in many foreign scientific studies. Their scientific findings can be applied to Uzbekistan's public debt policy as well.

3. Research methodology

We use two methods to find the optimal amount of public debt for the economy of Uzbekistan. The first model proposes a multivariate secondary regression equation by the author. The second model is based on the model used by Omotosho and Bawa (2016), Sani (2016).

1. Construction of a multivariate secondary regression equation (model recommended by the author)

This method stems from the idea that public debt has a positive effect on economic growth to a certain extent, and then have a negative one. That is, the secondary equation is formed:

$$GDP_{growth} = a_0 + a_1 \cdot td + a_2 \cdot td^2 + w + \varepsilon \quad (1)$$

Where, GDP_{growth} - nominal GDP growth rate, td - the ratio of public debt to GDP, w - other factors, a_i - parameters, ε - error.

In this model, to maximize the rate of economic growth, we take the product of the function and set it to zero. Selecting the optimal loan limit by setting different values.

The second model differs from the first model proposed by the author (Omotosho, 2016):

$$GDP_{growth} = b_0 + b_1 d(td - td^*) + b_2(1-d)(td - td^*) + \varepsilon \quad (2)$$

Бунда, GDP_{growth} - nominal GDP growth rate, td - the ratio of public debt to GDP, td^* - the optimal point of the debt level, b_i - parameters, ε - error.

d - is a special coefficient, which we calculate by the following formula:

$$d = \begin{cases} 1, & td > td^* \\ 0, & td \leq td^* \end{cases} \quad (3)$$

To calculate the optimal debt level, we put different coefficients on td^* and select the value that records the smallest square error. That is,

$$(y - f(x)) \rightarrow \min$$

The point where the square error is the smallest is recorded as the optimal point of public debt.



4. Analysis and discussion of results

The first model provides the following results:

The official statistics for 2000-2018 were taken into account in the formation of the model. In this case, we use indicators such as *GDP_{growth}*, *td* (public debt), *ed* (external debt), *inv* (investment), *tr_{open}* (trade openness), *inf* (inflation).

All indicators are calculated as a percentage. As a result of these indicators, the optimal level of public debt was calculated.

Since the indicator we are interested in in the model is the level of public debt, we only create a model using public debt. Another reason to omit other factors is that the model looks like this when using the following indicators when obtaining the first-order product on the debt level to find the maximum point of the regression equation:

$$GDP_{growth} = 3.1452 + 2.81td - 0.37td^2 \tag{4}$$

To find the maximum point from the equation, i.e. the level of debt at which the GDP growth rate is maximal, we calculate the first-order product and equal it to 0.

$$\frac{d}{d(td)}GDP_{growth} = 2.81 - 0.74td = 0 \tag{5}$$

Result: *td* = 45%. Thus, according to the model, the point at which the growth rate of GDP of Uzbekistan will be maximized - its share in GDP will not exceed 45%.

The results of a model constructed by putting different values.

Table 1. The value of coefficients for debt levels of different sizes¹

Optimal debt rate	b0	b1	b2	R ²	F-statistics	F-table	Standard error
10%	8.742305	-0.11183	0	0.618293	29.88189	11.392	1.092409
20%	7.866258	-0.12054	0	0.609532	26.5375		1.13359
30%	5.92411	-0.07043	0.175867	0.661618	15.64195		1.087756
35%	5.322	-0.0481	-0.16019	0.678102	16.85256		1.060932
38%	4.999643	-0.03719	-0.15084	0.670016	16.24358		1.074174
40%	4.884966	-0.04075	0.140446	0.65743	15.35292		1.094466
50%	4.065738	0.006809	0.119379	0.640822	14.27308		1.120683
60%	3.150957	0	0.111827	0.642637	14.38622		1.117848
70%	2.032687	0	0.111827	0.637387	14.28939		1.092409

¹Formed by the author

Given the coefficients of the regression equation at different sizes of debt levels (Table 1), the equations at all debt level values meet the Fisher criterion. It can be seen that the value of the highest determination coefficient (R - squared) and the lowest standard error rate are recorded in the optimal debt ratio in the range of 35-38%. This means that the optimal debt level can also be in the same range. To test the estimate, we calculate the square error rate.

When calculating the optimal debt level by setting the values at different levels, the square error rate looked as follows:

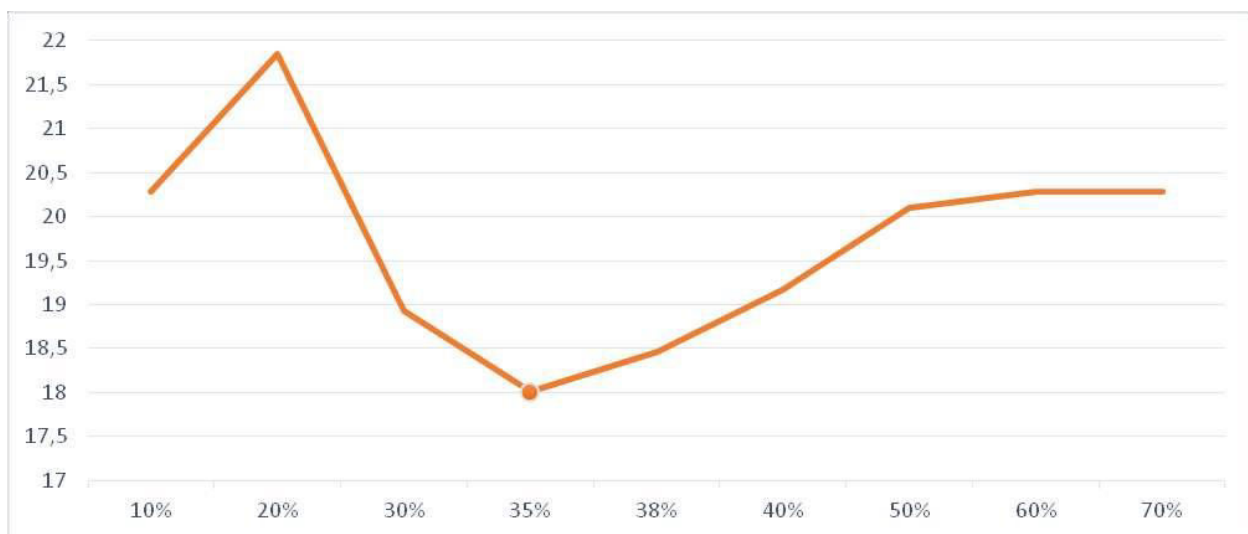


Fig. 1. Error variation at different optimal debt levels²

Analyzing the square errors of the regression equation at different values of the debt / GDP level (Fig. 1), it is known that the lowest error rate is recorded when this ratio is 35%. The first model builds a secondary sunken linear function based on the existence of a nonlinear link between public debt and economic growth.

According to the results of this model, based on the empirical analysis of the countries economy, the upper debt limit should be set at 45% of GDP. Although the results of the model are slightly lower than the recommendations of the International Monetary Fund, it may be advisable to set a relatively low level of public debt, given that our country is in transition. The average level of borrowing is critical to boosting capital accumulation and ensuring economic growth. However, excessive borrowing can also cause some problems for the growth economy. A number of arguments have been put forward about the negative impact of excess public debt on future growth and its various ways, including excessive debt fluctuations. In the second model, we apply the annual data to Khan and Senhadji's (2001) model. Our goal was to identify a point that contributes to economic growth and also hinders debt growth, commonly referred to as the optimal debt level. This was due to the need to reconsider Uzbekistan's debt situation, especially the economy after the reform period. The regression results confirmed the existence of a nonlinear (inverse U-shape) relationship. For public debt (the amount of external and internal debt) ratio to GDP (in percent) was found to be the highest at 35 percent. This excess of public debt over the estimated value could have a negative impact

²Formed by the author



on economic growth in Uzbekistan. An analysis of the country's debt dynamics showed that this figure had risen to pre-2005 levels.

In general, the two econometric models developed to determine the optimal limit of public debt have shown different results. While our proposed model showed that the level of public debt at 45% of GDP was the upper limit, the second model set the figure at 35%.

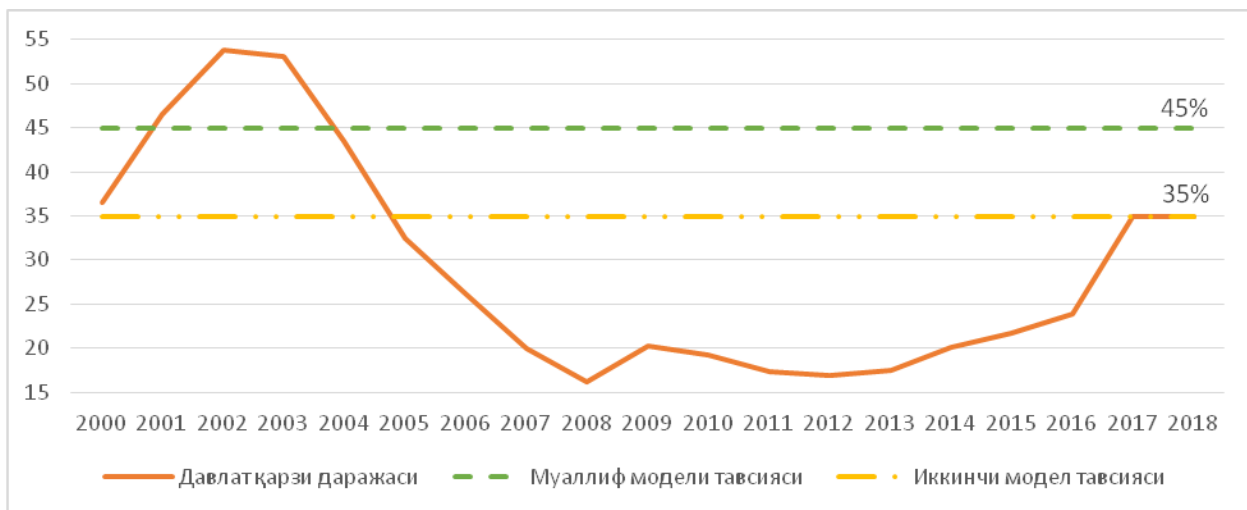


Fig.2. The optimal loan rate offered by the model³

The main reason for the difference between the two models is that our model is based on other indicators that have a positive and negative impact on economic growth, while the second model is based solely on the dynamics of public debt.

In conclusion, other factors affecting economic growth in Uzbekistan may offset the various risks posed by rising public debt.

5. Conclusion

The International Monetary Fund, the World Bank, and the European Union have been making recommendations on setting public debt limits. In particular, while one of the main conditions for joining the EU is that the ratio of public debt to GDP should not exceed 60%, the International Monetary Fund warns that public debt exceeding 55% of GDP could have negative consequences for the national economy (Chohan, 2016).

It should be noted that the optimal level of public debt for developing countries will be lower than for developed countries.

Uzbekistan is also developing clear mechanisms to limit public debt. In particular, according to the calculations of the Ministry of Finance, to ensure macroeconomic stability in the Republic of Uzbekistan, the maximum level of public debt should not exceed 50% of GDP. However, in our opinion, in the context of the global crisis and its possible negative consequences, it is advisable to set a lower limit for public debt. This is because, creating conditions

³Constructed by the author



for a sharp increase in public debt growth in the event of a slowdown in economic growth could have a negative impact on future economic activity.

According to the analysis, it is good for Uzbekistan that the share of public debt in GDP does not exceed 45%. An increase of the debt level by 1 percentage point from this figure will lead to a decrease in economic growth by 3.95 percentage points (provided that other factors do not change)⁴.

At the same time, the limited volume of new foreign debt agreements to be signed on behalf of the Government of the Republic of Uzbekistan or under the guarantee of the Republic of Uzbekistan in 2020 is \$ 4 billion, and the limited disbursement of external debt from the state budget is \$ 1.5 billion. 2019). Given the possibility of short-term (urgent) need for external sources of financing to mitigate the negative effects of the current global crisis, it is advisable to temporarily suspend these restrictions.

In order to ensure high growth rates of the economy of the Republic of Uzbekistan, the following proposals have been developed to optimize public debt and its structure:

1. Increase the share of public debt in the national currency, including the issuance of domestic government bonds to cover the budget deficit and consider their sale to residents of the country. Research on this topic shows that the presence of public debt in the national currency allows the state to be more resilient to external influences;
2. Given that the country is experiencing a transition period of development, it is advisable to set the share of public debt in GDP below the IMF recommendation (55%). It is recommended by the author to set this figure at 45%;
3. Record the upper limit of public debt in the Budget Code of the Republic of Uzbekistan or the Law "On Public Debt", which is expected to be adopted, and ensure that the level of debt does not exceed this figure, establish appropriate liabilities and liability measures, including setting strict limits on such indicators as variable interest rates, public debt growth rates;
4. In addition to increasing gold exports in the country, it is advisable to attract credit lines from major foreign banks by mortgaging a certain amount of gold. This is important in diversifying the structure of external debt and increasing the security of external debt;
5. Ensuring a suitable and stable combination of national and foreign currency liabilities in the loan portfolio, issuing debt instruments with different characteristics such as variable interest rates and coupon yield bonds;
6. Carrying out operations on active management of public debt in order to extend the average repayment period of government securities and ensure a single schedule of public debt repayment, reduce the burden on the budget and stimulate demand for government securities;
7. Establish a separate independent structure for public debt management using best international practices and further improve the institutional mechanism for public debt management policy through its activities.
8. These recommendations, proposed by the author, serve to regulate the amount of public debt in Uzbekistan and to achieve macroeconomic stability and improve living standards.

⁴Author's calculations



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