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The Impact of Public Debt on Economic Growth in Ukraine

Abstract

Theoretical background: The growth in government borrowing, carried out in connection with the banks' capitalisation, significantly increased the state budget expenditures aimed at servicing the capitalisation domestic public debt, which reinforces the general tendency regarding the exacerbation of the budget risk in the debt sphere in Ukraine. A weighty debt-creating factor was the budget deficit, which was covered by borrowing. Proceeding ahead of the rate of increase in debt volumes in comparison with gross domestic product (GDP) growth rates under the influence of internal and external destabilising factors contributed to the excess of the debt levels security indicators and increased the insolvency risk of the state. The increase of the obligations share denominated in foreign currency or linked to the exchange rate in the overall debt structure as an important indicator of the financial system's vulnerability to exchange rate fluctuations creates additional threats to debt sustainability regarding the increasing currency risk and the national currency devaluation.

Purpose of the article: The article is focused on studying the dynamics and structure of Ukraine's public debt, its ratio to GDP, and an empirical analysis of the relationship between public debt (external and domestic) and economic growth in Ukraine.

Research methods: To empirically test the relationship between public debt and economic growth in Ukraine over the 1992 to 2018 period, multiple regression models were conducted. A real GDP per capita was used as an indicator for economic growth and the debt-to-GDP ratio was used as an index of public debt. Research hypotheses were the following: H1: The public external debt-to-GDP ratio and GDP per capita have a strong negative and statistically relevant correlation; H2: The public domestic debt-to-GDP ratio and GDP per capita have a strong negative and statistically relevant correlation.

Main findings: Examining the dynamics and structure of Ukraine's public debt by borrowing market (external and domestic), it is concluded that there is no strong negative or positive statistically relevant correlation between the public debt-to-GDP ratio and GDP per capita for Ukraine. The impact of this factor is so insignificant that it encourages further research to verify that low GDP growth rate causes the increase in Ukraine's public debt.

Introduction

In recent years, the financial system of Ukraine suffered substantial losses as a result of which fiscal imbalances have increased, the banking system crisis has strengthened, public debt has significantly risen, leading to a decrease in the country's solvency. The loss of a part of the state territories, the continuation of military actions caused a decrease in gross domestic product (GDP) growth, a decline in the export of goods and services and a balance of payments deterioration, an increase of debts guaranteed by the state for commercial enterprises, which are situated in occupied territories, etc. A significant threat for the financial sustainability of the state is to permanently exceed the limits of debt indicators envisaged in the current Ukrainian legislation (Art. 18 of the Budget Code of Ukraine stipulates the ratio between the general state debt indicator and the debt guaranteed by the state for the end of the fiscal period at the level up to 60% of annual nominal GDP).

The reasons for this were as follows: an excess of public debt and the loans under the state guarantees over the amount of public debt repayments and debts guaranteed by the state; devaluation of the hryvnia to foreign currencies in which the debt is nominated; underperformances in funding the budget from public property privatisation; a negative influence of the systemic banking crisis of 2014–2016 and

an increase in total state expenditures to overcome its consequences, which were at the level of 14% of GDP annually (according to the National Bank of Ukraine – NBU). The growth in government borrowing, carried out in connection with the banks' capitalisation, significantly increased the state budget expenditures aimed at servicing the capitalisation domestic public debt, which reinforces the general tendency regarding the exacerbation of the budget risk in the debt sphere. A weighty debt-creating factor became the budget deficit, which was covered by borrowing.

Despite the growth of public and state-guaranteed debt in absolute terms, its ratio to GDP decreased from 81% in 2016 to 62.7% in 2018 (according to NBU). Such a positive dynamic was not the result of a prudent fiscal policy of the Ukrainian government, but an outcome of a rapid increase in nominal GDP in the dollar equivalent under the conditions of macroeconomic stabilisation.

Simultaneously, the safe (cut-off) level of debt has still not been reached, which enables the state to fulfil its debt obligations independently (without the assistance of international financial organisations or other entities), timely and in full, without resorting to the restructuration of these obligations or default announcing, and realise state borrowings at capital markets at affordable interest rates. The increase of the obligations' share denominated in foreign currency or linked to the exchange rate in the overall debt structure as an important indicator of the financial system's vulnerability to exchange rate fluctuations creates additional threats to debt sustainability regarding the increasing currency risk and the national currency devaluation. Therefore, an empirical study of the relationship between public debt (external and domestic) and economic growth in Ukraine is relevant.

Literature review

There is a consensus within a significant part of academic society that the most serious consequence of large public debt is a capital displacing effect. When distracting the limited capital of society from a private production sector to the unproductive public debt, this is a factor of growth inhibition. Thus, the economic growth is weakening, and the future living standards are decreasing. To conclude with Samuelson and Nordhaus: "A large government debt tends to reduce a nation's growth in potential output because it displaces private capital, increases the inefficiency from taxation, and forces a nation to service the external portion of the debt" (Samuelson & Nordhaus, 2010). Therefore, the economy grows much faster without public debt than with it.

It is a controversial issue related to the level of debt burden, which is considered to be critical for the debt persistence of the state. The Maastricht convergence criteria (*The Maastricht Treaty…*), which determines the state appropriateness to the conditions of European Union (EU) accession, provides that the public deficit-to-GDP ratio should not exceed 3% and the public debt-to-GDP ratio should not exceed 60%.

The Reinhart–Rogoff (2009) findings on the relationship between debt and growth are: 1) the relationship between government debt and real GDP growth is weak for debt/GDP ratios below a threshold of 90% of GDP. Above 90%, median growth rates fall by 1%, and average growth falls considerably more. The threshold for public debt is similar in advanced and emerging economies; 2) emerging markets face lower thresholds for external debt (public and private) – which is usually denominated in a foreign currency. When external debt reaches 60% of GDP, annual growth declines by approximately 2%; for higher levels, growth rates are roughly cut in half.

The Bilan–Ihnatov (2015) analysis confirmed the existence of a "U inverted" relationship between public debt and economic growth, with a maximum debt threshold of approximately 94% of GDP for the whole group. After this threshold, public debt is expected to negatively affect the economic growth rate, due to higher interest rates, fear of public debt unsustainability and severe budgetary consolidation measures. A maximum public debt threshold of approximately 40–50% of GDP was suggested for developing EU countries and approximately 70–80% of GDP – for the developed ones.

The economic growth, as measured by GDP per capita, shows a negative association with the public debt in Malaysia. Government consumption does not stimulate economic growth. Malaysia might need to try always spending within the country's means (Lee & Ng, 2015).

External borrowing can increase a country's access to resources, but domestic borrowing only transfers resources within the country. External debt generates a "transfer" problem. Since central banks in developing countries cannot print the hard currency necessary to repay external debt, external borrowing is usually associated with vulnerabilities that may lead to debt crises. Public debt denominated in a foreign currency can create serious problems for the government. When a government borrows in foreign currency, even low levels of indebtedness can be unsustainable since the government is not able to issue that foreign currency to meet its debt obligations. As countries need to earn foreign exchange from exports, a sudden reversal in export conditions can render the country unable to meet its foreign debt obligations. When households or firms take on debts denominated in foreign currency, this creates a fragile situation and the drying up of the sources of foreign exchange can cause widespread debt defaults, possibly leading to a financial crisis. For this reason, governments should never issue debt instruments denominated in foreign currency; prudent private market participants probably should not, either; however, if they do, their government should refuse to take over the foreign currency debt. If the government issues debt in its own currency, it does not matter who holds the debt – foreigners or citizens. Debt payments can always be made just like any other payment by crediting bank accounts, technically issuing new money. Nevertheless, if the government takes on private debt in foreign currency, then it suddenly opens itself to solvency risk (Nersisyan & Wray, 2010).

Abbas and Christensen (2010) study the relationship between domestic public debt and economic growth and find a positive and non-linear relationship between these two variables. The benefits of domestic borrowing dominate its costs.

Panizza (2008) points out that in the current environment of increasing financial integration and open capital accounts, the traditional distinction between external and domestic debt may make less sense. Countries that are switching from external to domestic debt could be trading a currency mismatch for a maturity mismatch. The switch to domestic borrowing could lead to pressure on institutional investors and banks to absorb "too much" government debt and this may have a negative effect on financial stability. Domestic debt is much more difficult to restructure than external debt and several countries which successfully managed to reduce their external debt obligations (sometimes through debt relief) are still burdened by high levels of domestic debt. The new structure of debt could also lead to new vulnerabilities. Safer debt instruments can help in reducing vulnerabilities. That is why developing countries should not deceive themselves into thinking that by changing the structure of sovereign debt, they will become like Japan (able to sustain enormous levels of public debt while maintaining high credit ratings and paying low interest rates).

Ukrainian scientist Bohdan (2016) supports the opinion that a large amount of external debt is dangerous for the state economy because of slowing down economic growth as a consequence of the increase in the economic uncertainty level and a decrease in private investments.

Research methods

Public debt refers to gross central government debt and includes debts carrying a government guarantee. Domestic public debt is government debt issued under a domestic legal jurisdiction. External public debt includes the external debts of government and private debt that is issued by domestic private entities under a foreign jurisdiction. In 2018, domestic public debt amounted to 35.6% of public debt and external public debt – 64.4%, i.e. external prevailed over domestic 1.8 times.

Furthermore, the rate of increase in debt volumes in comparison with GDP growth rates under the influence of internal and external destabilising factors contributed to the excess of the debt levels security indicators and increased the insolvency risk of the state. Since 2007, the growth of public debt outpaced the growth rate of GDP in Ukraine (Figure 1).

To empirically test the relationship between public debt and economic growth in Ukraine over the 1992 to 2018 period, multiple regression models were conducted. A real GDP per capita (*GDP*) was used as an indicator for economic growth. The public external debt-to-GDP ratio (% of GDP) (*ED*) was used as an index of public external debt, public domestic debt-to-GDP ratio (% of GDP) (*DD*) was used as an index of public domestic debt. This data was obtained from the NBU. Other variables
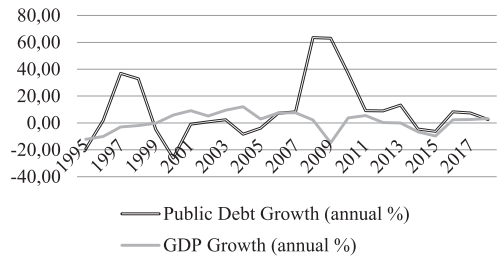
Figure 1. GDP Growth (annual %) and Public Debt Growth (annual %) in Ukraine over 1995–2018

Source: Authors' own study according to http://data.worldbank.org; https://bank.gov.ua

that influence real GDP per capita (*GDP*) are: the domestic credit to private sector (*DC*) (% of GDP) as an index of financial depth of economy (Kondrat & Kots, 2018) and inflation (*INFL*), GDP deflator (annual %). This data is obtained from the World Development Indicators released by the World Bank and NBU. The time series data cover the period from 1992 to 2018 (Table 1). This is a relatively limited period, yet it was all of the data that was available. Accordingly, 27 observations were conducted. The sample is representative.

Table 1. Descriptive statistics of dependent and independent variables

	Mean	Max	Min	Std. Dev.
GDP per capita (USD)	1603.679	3986.283	635.713	1108.010
Public external debt-to-GDP ratio (% of GDP)	21.993	49.714	0.541	13.117
Public domestic debt-to-GDP ratio (% of GDP)	10.967	27.165	0.541	8.231
Domestic credit to private sector (% of GDP)	30.100	90.573	1.385	29.954
Inflation, GDP deflator (annual %)	6.262	22.096	1.895	4.348

Source: Authors' own study.

The research hypotheses are set as follows:

H1: GDP per capita and the public external debt-to-GDP ratio have a strong negative and statistically relevant correlation.

H2: GDP per capita and the public domestic debt-to-GDP ratio have a strong negative and statistically relevant correlation.

To evaluate the relationship between economic growth and public debt, the following models are proposed:

$$GDP = a_0 + a_1 DC + a_2 ED + a_3 INFL + \varepsilon \qquad (1)$$
$$GDP = b_0 + b_1 DC + b_2 DD + b_3 INFL + \varepsilon \qquad (2)$$

where:
a, b – regression parameters,
GDP – real GDP per capita,

ED – public external debt-to-GDP ratio,
DD – public domestic debt-to-GDP ratio,
DC – domestic credit to private sector,
INFL – inflation,
ε – error.

Results

The regression model of the relationship between the indices of the economic growth and public external debt in Ukraine is:

$$GDP = 664.08 + 34.51DC - 3.44ED + 22.32INFL \tag{3}$$

The regression model of the relationship between the indices of the economic growth and public domestic debt in Ukraine is:

$$GDP = 239.16 + 34.92DC + 14.96ED + 45.50INFL \tag{4}$$

The results of the regression statistics of the relationship between economic growth and the public debt in Ukraine indices calculated using the Microsoft Excel software package are presented in Table 2.

Table 2. Results of regression statistics for models 3 and 4

Indices	Value for model 3	Value for model 4
Multiple R	0.892	0.896
R Square	0.796	0.803
Adjusted R Square	0.769	0.777
Standard Error	22.680	25.280
F-stat	29.844	31.254
F-stat (necessary tabular value) (3;23)	3.050	3.050
Observations	27.000	27.000

Source: Authors' own study.

The first index for model 3, which is the most important when analysing regression, is a Multiple R that shows the dependence of the dependent variable on the explanatory variable. In this case, the value is 0.892; thus, it can be stated that there is a direct linear relationship between economic growth and explanatory variables. The value of R Square is 0.796; therefore, it can be stated that a reliability of the resulting regression model (79.6% of cases are described through the proposed regression model) exists. Adjusted R Square is 0.769. This means that new variables, which are introduced into the model, will not cause a significant impact on this model. F-stat,

which indicates the importance and reliability of the model in this case is 28.844, and its necessary tabular value is 3.05. Thus, the actual value of the index is larger than the tabular one that shows the importance of the model and the reliability of the hypotheses about the existence of the relationship between the economic growth and explanatory variables.

To detect impact forces of different model parameters on resulting indices, we calculated the correlation indices of dependent and explanatory variables of regression model 3 (Table 3).

Table 3. Correlation matrix for model 3

	GDP	DC	ED	INFL
GDP	1.00	0.87	-0.05	-0.41
DC	0.87	1.00	0.04	-0.56
ED	-0.05	0.04	1.00	-0.54
INFL	-0.41	-0.56	-0.54	1.00

Source: Authors' own study.

Because the matrix does not consist of a pair of correlation coefficients, the values of which exceed 0.7, the regression model lacks multicollinearity. According to the results of the correlations of dependent and explanatory variables, it can be concluded that all model parameters have an impact on the resulting index. A positive impact on real GDP growth per capita in Ukraine causes the domestic credit to the private sector. Meanwhile, a negative impact on real GDP per capita in Ukraine causes inflation and the public external debt-to-GDP ratio.

According to the correlation matrix, the public external debt-to-GDP ratio causes an impact on real GDP per capita by -0.05. This means that, in the case of the public external debt-to-GDP ratio rising, the value of real GDP per capita with a probability of 5% will decrease. Consequently, the impact is insignificant.

The first index for model 4, which is the most important when analysing regression, is a Multiple R. In this case, its value is 0.896, which means there is a direct linear relationship between the dependent and explanatory variables. The value of R Square is 0.803; thus, it can be stated that a reliability of the resulting regression model (80.3% of cases are described through the proposed regression model) exists. Adjusted R Square is 0.777. This means that new variables, which are introduced into the model, will not cause a significant impact. F-stat, which indicates the importance and reliability of the model in this case is 31.254, and its necessary tabular value is 3.05. Thus, the actual value of the index is larger than the tabular one that shows the importance of the model and the reliability of the hypothesis about the existence of the relationship between the economic growth and explanatory variables.

To detect the impact forces of different model parameters on the resulting indices, we calculate the correlation indices of the dependent and explanatory variables of regression model 4 (Table 4).

Table 4. Correlation matrix for model 4

	GDP	DC	DD	INFL
GDP	1.00	0.87	0.34	-0.41
DD	0.87	1.00	0.34	-0.56
ED	0.34	0.34	1.00	-0.57
INFL	-0.41	-0.56	-0.57	1.00

Source: Authors' own study.

Because the matrix does not consist of a pair of correlation coefficients, whose values exceed 0.7, the regression model lacks multicollinearity. According to the results of the correlations of dependent and explanatory variables, all model parameters have an impact on the resulting index. A positive impact on real GDP growth per capita in Ukraine causes the domestic credit to the private sector and the public domestic debt-to-GDP ratio. Meanwhile, a negative impact on real GDP per capita in Ukraine causes inflation.

According to the correlation matrix, the public domestic debt-to-GDP ratio causes an impact on real GDP per capita by 0.34. This means that, in the case of the public domestic debt-to-GDP ratio rising, the value of real GDP per capita with a probability of 34% will also increase.

All the models are created with the reliability of 95%.

Discussions

Panizza and Presbitero (2014) do not find any evidence that high public debt levels hurt future growth in advanced economies. A level of debt which is unsustainable (for instance, when the interest bill becomes greater than GDP) and a debt-to-GDP ratio at which debt overhangs, with all its distortionary effects, kicks in. A fully solvent government with a high level of debt may decide to put restrictive fiscal policies in place aimed at reducing the probability that a change in investors' sentiments would push the country towards a bad equilibrium. These policies, in turn, may reduce growth, especially if implemented during a recession (such policies may even be self-defeating and increase the debt-to-GDP ratio). In this case, it would be true that debt reduces growth, but only because high debt leads to panic and contractionary policies.

Empirical literature shows that there is a negative correlation between public debt and economic growth, and finds that this correlation becomes particularly strong when public debt approaches 100% of GDP. However, the link between debt and growth could be driven by the actuality that low economic growth leads to high levels of public debt (Krugman, 2010).

Conclusions

According to the results of modelling the relationship between real GDP per capita and public external debt-to-GDP ratio for Ukraine, it can be concluded that the rising public external debt-to-GDP ratio can harm economic growth. However, the impact is slightly negative. The growth of public domestic debt-to-GDP ratio positively influences GDP growth, but it is also insignificant. Therefore, further researches are necessary to identify the inverse influence: weak growth in GDP causes a high public debt level, forcing a government to take out loans.

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