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Sovereign Debt: Implications for Growth Case Study for Armenia

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Abstract

Reviewing the existing literature and the recent changes in public debt economics, this research aimed to answer two important questions for the Armenian economy. The first challenge was to find the level of external debt to GDP ratio after which borrowing has negative effect on the GDP per capita growth and according to the estimations the debt overhang level appears at the debt to GDP ratio level of 34.5%. At second, this work reveals the efficient ways of using the government borrowings. Succeeding in the second task as well the estimations suggest that the most effective investments are in the reforms in educational and health systems. Relying on the findings, corresponding suggestions are made for managing the public debt.

Keywords: Debt, Economy, GDP per Capita, GDP Ratio, Growth
JEL: F34

Introduction

Generally, debt is an amount of money (or other type of obligation) that is borrowed from another person. Although during many centuries lending was immoral and prohibited in different regions of the world, the recent living standards and current economic progress would not be achieved without the properties of debt. The debt, in a macro level, is taken to increase the wealth of the economy, to stimulate the economy and to have higher growth rates. As the theory of debt overhang suggests the relationship between debt and economic growth is estimated to be positive at first. At some point, when the efficiency of one more unit of debt starts to decline the impact on growth becomes negative. The question is what that level is. Theory and estimations suggest different levels for debt overhang. For developing countries the threshold was estimated to be 60% of debt over GDP ratio (Reinhart & Rogoff, 2010). Although Herndon et al. have found mistakes in the data which Reinhart and Rogoff (R&R) were using in their estimations, the final estimations do not vary from the R&R's results and there exists debt overhang level, but not at 90%.

The aim of this work is to estimate threshold for Armenian economy where debt starts to have a negative impact on growth at first and at second to reveal the effective ways of using the debt. After Soviet Union collapse there was a huge uncertainness about the external debt to GDP ratio. There was a huge decline in output levels, which was also distorting. However, in the first years of development for Armenia and other transitional countries the control of external debt was one of the highly important questions as there were requirements for CIS (Commonwealth of Independent States) membership. Now after the recentc hanges in public debt economics, related policies must be reviewed.

Theoretical Background

Djankov, Hart, McLiesh, and Shleifer (2006) state that: "Debt is one of the most useful contracts in every economy, since it enables firms to finance investment and individuals to smooth consumption".

Reinhart, Rogoff, and Savastano (2003) studies the tolerance of public as well as external debts. It uses data collected from over 100 countries from 1820's till 2000's. The main finding is that there is a huge standard deviation in the threshold levels of defaulted countries. In most cases the emerging countries defaulted with a very low debt to GDP ratio. The observed threshold was 20%. After 1970 the trend went up and all the studied cases had a default of less than 60%. Already for the 2000's the estimated threshold is at around 150% Reinhart et al. suggest the idea of serial defaults.

"A country's record at meeting its debt obligations and managing its macroeconomy in the past is relevant to forecasting its ability to sustain moderate to high levels of indebtedness, both domestic and external, for many years into the future" (Reinhart et al., 2003).

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Thus, if the statement is true a country which once had a debt crisis will face it again. The interest rates at which countries borrow differ according to the history of the country. Therefore, defaults are counted in the interest rates and the "bad history" will make it more likely to have a default. The case of Greece is extremely relevant for this topic as Greek debt crisis is one of the recent defaults. In 2012 the debt-GDP ratio was 160%. Could the default be expected? According to Reinhart et al. (2003) it could. Only in 19th century Greek economy had four debt defaults (1826, 1843, 1860 and 1893). The history accumulates its "negative and positive memory" and causes a collapse sooner or later. Consequently, the chances of independent country, which has 20 years of economic history decrease (Reinhart et al., 2003).

Pattillo, Poirson and Ricci (2002) studied the non-linear impact of the external debt on the economic growth. The data used for the estimations is a panel data of annual reports for 93 developing countries starting from 1969 till 1998. Pattillo et al. (2002) ran different types of regressions trying to find the best method of capturing relationship between growth and external debt. First linear relationship is defined as follows:

$$y_{it} = \alpha_{i,t} + \beta \cdot X_{i,t} + \gamma \cdot D_{i,t} + \varepsilon_{i,t}$$

Where y is the per capita GDP growth, X's are the control variables (openness, schooling, population, foreign direct investment, import, export and their logarithmic interpretation, as well as the same variables as share of GDP), D is the debt indicator variable. However, the economic theory says that the relationship of debt and growth must represent inverted U-shape graph. Therefore, the square of the debt variable must be included in the following equation;

$$y_{it} = \alpha_{i,t} + \beta \cdot X_{i,t} + \gamma \cdot D_{i,t} + \delta \cdot D_{i,t}^{\ 2} + \varepsilon_{i,t}$$

The intuition behind this type of equation is that the relationship between growth rate and debt is quadratic, which means that at some point the impact of debt on the growth starts to decline, and here the question is: "What is that level?"

Pattillo et al. (2002) also uses the ratio of external debt over exports as a debt indicator, as well as net present values of the both variables. However, the findings of the paper suggest that the impact of debt becomes negative when external debt over exports is 160-170% and external debt over GDP is 35-40%. They claim that doubling the debt at these levels of indebtedness will decrease the growth by 1-1.5% (Pattillo et al., 2002).

Irons and Bivens (2010) take as given the results obtained by the Reinhart and Rogoff (2010), who discovered that external debt-GDP ratio starts to have a negative impact on the growth at 60%. The paper discusses the case of the United States using 216 observations. One of the few papers which includes post-soviet union countries in the study is Geithner (2002). It also includes Armenia. Geithner (2002) analyzes general financial sustainability of different countries and also estimates the external debt threshold level where the growth and debt are negatively correlated. For the external debt sustainability studies a data set of 15 post-soviet union countries was used starting from 1995 to 2001. The estimated threshold of external debt over GDP ratio is 44.7% which is very low noting that most of the Former Soviet Union countries had a higher level of indebtedness. However, Geithner indicates that the estimated probability that a country, which has more than 40% debt to GDP ratio, will not have a crisis is 80% (Geithner, 2002). Clements, Bhattacharya and Nguyen (2005) in their paper estimate the consequences of debt release by the International Monetary Fund (IMF). They are discussing the cases of 28 heavily indebted poor-countries (HIPCs) and cases of their debt reliefs. According to this policy when a part of the debt is forgiven, the country will at least be able to function and return rest of the debt. The conclusions that the paper found was that indeed the relationship between external debt and per capita GDP growth is non-linear, and there exists a threshold of 50% (on average) after which the relationship becomes negative.

Methodology and Data

This work is estimating the relationship of economic growth and external debt on the quarterly database starting from 1999 till the year of 2015. All the analyses are done for Armenian economy. The sources of collected data for the research are the Socio-economic situation of RA published by the National Statistical Service of Armenia (NSSA, 1999-2014), annual reports of the ministry of finance of RA (The Ministry of Finance of RA, 2006-2014), World Bank data catalog and the database of the Central Bank of Armenia. The methodology of this work includes the regressions of the Pattillo et al. (2002). First, linear relationship is estimated, where the dependent variable is the per capita GDP growth. The independent variables are debt indicators and control variables. In debt indicators external debt/GDP ratio and real debt have been used. As for control variables, the volume of trade (the sum of exports and imports), foreign direct investments and population size are taken. Second type of equations is quadratic equation where the square of the debt/GDP variable is included in the model. The purpose is to find inverted U-shape relationship between debt and growth.

The next groups of estimations use loans as a proxy to debt. As there are 5 groups of loans, it means that for each quarter there are 5 observations. The first thing to be tested is that loans affect the growth with similar pattern as debts. Then, the relationship between each type of the loan and the per capita growth of GDP is estimated. The estimations are going to be:

$$y_{it} = \alpha_{i,t} + \beta \cdot X_{i,t} + \gamma \cdot L_{i,t} + \varphi \cdot L_{i,t} \cdot l + \delta \cdot l + \varepsilon_{i,t}$$

Where y is per capita growth, X's are control variables, L is the amount of loan taken in that particular period, and l is the type of the loan.

Results

In order to find the level of debt at which the GDP growth becomes negative, the quadratic relationship is tested and the significant results prove that there is an inverted U-shape relationship between the variables of our interest. For this purpose, a variable which is the square of debt/GDP ratio, is generated and the quadratic type of regressions are run. The output in Table 1 shows that the coefficient of the debt/GDP ratio is positive, and the coefficient of the square of that ratio is negative. Accordingly, there is indeed inverted U-shape relationship between the debt/GDP ratio and the growth variable. In order to find the level where the debt overhangs, one needs to calculate the first derivative of the quadratic equation and equalize it to 0. The threshold level therefore is: $\hat{D} = -\frac{\beta_1}{2\beta_2}$, where $\hat{D}$ is the threshold level, β_1 and β_2 are the debt variable coefficients.

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According to the estimations and the aforementioned equation the level of debt overhang is 34.5%. The goal of this work is to find the threshold of debt overhang and to aware Armenian policy makers to stop borrowing or borrow more wisely. As Armenia has already reached and overcome the level of the debt overhang, which means that Armenia is in the downward sloping part of the relationship, the reasonable implication for Armenia is to stop borrowing or to optimize time management over debt repayment years. It is important to point out that Armenian current level of indebtedness is 42.7% of its GDP.

Table1. Linear and Quadratic Effects on Growth

	OLS	
	Linear	Quadratic
Debt/GDP ratio	-0.224	2.876**
	(0.47)	*(1.25)*
Squared Debt/GDP ratio	-	-0.042**
		(0.02)
FDI as share of GDP	-0.017	-0.061
	(0.13)	*(0.13)*
Volume of trade as share of GDP	-1.768**	-1.460**
	(0.59)	*(0.62)*
Log(Population growth)	-428.975***	-413.015***
	(108.22)	*(97.51)*
Constant	135.606***	75.623**
	(17.18)	*(34.57)*
R-square	0.5062	0.5511
Number of observation	54	54

As at this level of indebtedness increasing the level of borrowings from the rest of the world will decrease the economic growth of Armenia, and sooner or later Armenia will face the problem of debt sustainability. If Armenia is not able to pay its debts back, IMF and other international monetary institutions will apply to their "HIPC debt relief policy". HIPCs (heavily indebted poor countries) are those countries that have high level of debt and cannot sustain them. IMF (or other international monetary agency that supplies money to the countries) forgives part of the debt in order to help the country to avoid the default and be able to pay back at least the rest part of the debt later. In the situation of high indebtedness this policy is beneficial for both of the sides. However, as indicated in Reinhart et al (2003) the record about the country will always stay in the history and will affect the interest rate the country is borrowing with. Armenian economy is significantly small, and still in a transition period as Armenia did not find its comparative advantages in the international trade and is changing the structure of its economy constantly trying to find the optimal structure for its growth. In this context Armenia cannot stop borrowing, as borrowing means investment in those branches of the economy where they are needed.

All the loans taken by Armenia starting from 1999 are divided into five main groups. In order to understand which type of loans are more efficient for the economy the following type of estimations are done:

$$y_{it} = \alpha_{i,t} + \beta \cdot X_{i,t} + \gamma \cdot L_{i,t} + \varphi \cdot L_{i,t} \cdot l + \delta \cdot l + \varepsilon_{i,t}$$

Table 2 shows the linear OLS coefficients estimates of the types of loans as share of GDP and the control variables. From the obtained coefficients one can conclude that social programs have significantly negative impact on GDP per capita growth. Increasing the share of loans taken for social programs by 1% decreases GDP per capita growth by 5%. To interpret the impacts of other types of loans one needs to subtract the effect of the social programs. Loans taken for infrastructural changes have less negative effect on GDP per capita growth than loans taken for social programs. The impact of the "development" type of loans is not significant. This may be due to the fact that not all the loans are working efficiently to increase the per capita GDP growth. The next group of loans is loans taken for reforms in educational or health systems. These are the only type of loans that have positive impact on the dependent variable of our interest. The last group is just deposits. If we compare its impact with other types but "reforms" it has the least negative effect. The development loans are directly taken in order to develop the economy or some part of it. Accordingly, it is intuitive to expect development to have significant and positive effect on per capita growth. However, the results do not accept that hypothesis. Meanwhile, only "reforms" increase per capita GDP growth. If we do not consider "development" loans (as their impact is insignificant), social programs have the most negative impact on per capita growth. The intuition behind this is that social programs affect economic activities less, as they are targeting more vulnerable groups to ensure better standards of living. Infrastructural changes like building roads and other ways of communication affect trade and correspondingly the growth of the economy.

Table 2. Types of Loans

	OLS-linear
Social programs(cons)	-5.010***
	(0.59)
Infrastructure	2.606***
	(0.30)
Development	-0.066
	(0.75)
Reforms	6.260***
	(0.62)
Just deposits	4.189***
	(0.67)
FDI as share of GDP	-0.050***
	(0.03)
Volume of trade as share of GDP	-1.803***
	(0.07)
Log(Population growth)	-357.952***
	(57.01)
R-square	0.4977
Number of observation	268

Conclusion

Although public debt economics is an urgent topic and is under the consideration of global changing, the theory of having threshold for external debts still can be supported. In the estimations a try was made to estimate both linear and quadratic type of relationship between debt and growth. The work tests all the relationships suggested by Pattillo et al. (2002). As the theory suggests linear and quadratic relationships should be tested to define the impact of debt on growth. The goal of this work was to check whether there is a threshold where the debt becomes non-sustainable. According to the estimations it is around 34.5%. The ratio of debt/GDP is more than the threshold level (currently it is 42.7%), which means Armenia is in the declining part of the inverted U-shape graph. If Armenia continues borrowing it will mean that the debt will become more and more unsustainable, and the default will be fatal and it will affect the interest rate at which Armenia is borrowing.

In 1999 Armenia had a very high level of indebtedness (82%) and succeeded continuing growing by managing the debt correctly. The reconstruction of debt payback schemes is a good way of managing the debt in “bad times”. Nevertheless, having the threshold at 34.45% is not irreversible as the examples of many countries show us.

The estimation of the impact of different types of loans on growth show that social programs have negative impact on growth due to the fact that they do not affect economic activity much, but they are targeted to help more vulnerable groups of the society. Meanwhile, in comparison to the social program loans other types of loans seem to have positive effect on growth. Among the five loan groups the one which has the only positive impact have reforms. Thus, in the times of debt overhang Armenia should more focus on loans taken for reforms in the health and educational systems.

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