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The Impact of Growing Government Debt on Economic Growth: Armenia's case

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Abstract

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Key words: Government Debt, Economic Growth, Armenia, ARDL, ARIMA

The increasing public debt across the world provoked an extensive debate among economists about the positive and negative consequences of borrowing and the efficiency of its use in general. This paper is specifically concentrated on studying the rising foreign debt impact on Armenia's economic growth. The initial hypothesizes imply negative short-term and positive long-term effect on gross domestic product. The historical information was used to conduct quantitative analysis developing several autoregressive distributed lag (ARDL) and autoregressive integrated moving average (ARIMA) models to estimate the population model for Armenia. Main results of this paper indicate short-run negative association between debt and economic growth, however fail to show any statistically significant impact in the long run.

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Introduction

One of the government's primary roles is to keep the economy healthy and smooth. The stable growth of a given economy is a strong indicator of a good government. Throughout their service, the vast majority of governments face a need to raise funds through borrowing debt. The funds are used to finance budget deficits, invest in various social and economic programs, but most importantly to secure smooth consumption and ensure capital investments. Thus, it may seem that borrowing is beneficial, and attracting more financial resources might help the government boost its economic growth. However, the theoretical literature tells that economic growth and public debt are negatively correlated in short-run. Many empirical findings support this theoretical assumption that there is a negative correlation between government debt and economic development. For instance, in their studies, Afonso and Alves (2014) found out that debt harmed economic growth both in the short-run and long-run. On the other side, Aschauer (1999) claims that depending on finances, debt might trigger economic growth in a positive direction.

Furthermore, recent studies tend to focus more on the possible non-linear relationship between public debt and economic growth. Checherita-Westphal and Rother (2012) found evidence that there is a non-linear relationship between public debt and per-capita GDP, with a turning point around 90-100%. Throughout the remaining parts of the paper, I will try to conduct a small econometric analysis to explain the relationship between public debt and government growth in Armenia.

This paper aims to explain the interrelationship between Armenia's government debt and its economic growth rate. For the sake of our analysis, country-specific GDP and government external debt data will be used. The data will be downloaded from the official databases International Monetary Fund and Statistical committee of RA, considering the high-quality data available on these two sources. GDP is one of the most widely used indicators of a country's economic performance.

The main research question that this paper is going to answer is:

RQ1: *Are the short-term and long-term impacts of increasing government debt significant on Armenian gross domestic product growth?*

Suppose our analysis yields a positive conclusion on the question above. In that case, additional estimations will be made to measure the type of relationship between

Debt and GDP, whether it is positive, negative, linear, or non-linear. A positive correlation would imply that the government correctly implied spending policies and assisted economic growth in the past, therefore may be allowed or even encouraged to take higher levels of debt. The opposite conclusion would indicate that, government is using less efficiently, e.g. paying high salaries, pension, renovating roads instead of investing in long-term projects.

RQ2: *Is there a statistically significant positive relationship between Armenian and Russian gross domestic products?*

There is rich literature supporting the hypothesis of strong Armenian political, social and specifically economic dependence on the Russian Federation. Assuming the above-mentioned hypothesis to be true, the different effects and shocks on Armenian GDP are controlled for, using the variable of Russian gross domestic product in the empirical analysis. Yet we have to confirm this hypothesis Thus, the secondary research question is to answer whether there is indeed a high positive correlation between two countries based on GDP in the process of estimating the models.

The 3 main hypothesizes of the paper are the following:

Hypothesis 1: There is statistically significant interdependence on Armenian economic growth and Russian economic growth.

Hypothesis 2: The cumulative estimated short-term coefficient of lagged variables of debt is significant and negative.

Hypothesis 3: The cumulative estimated long-term coefficient of lagged variables of debt is significant and positive.

Understanding the true relationship between debt and economic growth is of vital importance for any government. In the literature, various empirical studies yield different results. Debt may be related to economic growth positively, negatively or even non-linearly. Nevertheless, based on sample data for Armenia, any statistically significant relationship between public debt and economic growth in the long-term was not found in the scope of this paper. Even though, the results show no positive relationship between debt and economic growth I think that in the future with more available data on less volatile periods the results may change dramatically.

The remaining part of the paper will be organized into seven main parts. Next, after this paragraph, the literature review is done on the topic. The next section will be devoted to Armenia specific information and data collection. Section five will elaborate on the econometric model construction and the methodology. In section six, estimations will be done based on the models from section five. Following this, the seventh section is devoted to discussions related to assessments from section five. The findings are concluded in the seventh section.

Literature Review

Numerous scientists have done empirical studies to explore the possible relationship between public debt and economic growth. Varying conclusions have been reached that leaves a place for further research. A group of scientists sticks to the theoretical idea that there should be a negative interrelationship between public debt and economic growth (Diamond, 1965; Schlarek, 2004; Saint-Paul, 1992; etc.). Other scientists, such as Aschauer (1999), propose a theory that if public capital usage, including debt, is optimized, countries may experience a positive relationship between debt and economic growth. Moreover, some studies show evidence of a non-linear relationship between debt and economic development. For instance, Ayadi and Ayadi (2008) found a non-linear relationship between debt size and economic growth.

The article “Growth in a Time of Debt” written by *Carmen M. Reinhart and Kenneth S. Rogoff* is one of the most reviewed papers about the relationship of the government debt and the economic growth of the country. In their analysis, the authors included data of 200 years from 44 countries. In this paper are considered and compared data and economic models of both developing (emerging markets) and developed countries. One of the findings here is, that the relationship between the debt and growth depends on the level of the debt to GDP ratio. In the comparably normal levels of the government debt the link between the debt and the growth is not as strong as in the case of the high debt (about 90% of the DGP) - where growth rates were significantly lower. In the case of the high debt economic growth rate can even cut in half (roughly), whereas in the case of 60% it decreases by ~2% . This relationship between government debt and growth do not

differ much between the emerging markets and advanced economies. (Reinhart, C. M., & Rogoff, K. S. ,2010)

As the previous paper has caused many discussions and debates for years, authors *Juergen Amann and Paul Middleditch* in their "Revisiting Reinhart and Rogoff after the crisis: a time series perspective" paper tried to prove the contrary. While Reinhart and Rogoff showed that higher depth rates slow down growth rate, Amann and Middleditch viewed from time series perspective and their analysis showed that high levels of the government debt do not necessarily bring to the reduction in the economic growth rate. (Amann, J., & Middleditch, P.,2020)

Another interesting paper "The Impact of Government Debt, Foreign Trade, Population Growth Rate and Unemployment Rate on Iran's GDP Growth" by *Kasirlou Fatemeh and Rajaei Yadollah* is about Iran's economy. Linear and multivariate regression analysis helped the authors to conclude, that amongst other independent variables government debt had an impact on the GDP (which was the dependent variable), whereas unemployment rate did not have a significant relationship (and consequently impact) with the GDP growth rate. (Therefore, I have excluded the unemployment rate from the independent variables in the model). (KASIRLOU, F., & RAJAEI, Y. , 2017)

The paper "Is there a bubble component in government debt? New international evidence" *Chen, Shyh-Wei and Wu, An-Chi* is an interesting example of the analysis of advanced countries and economies and their debt - to - GDP ratios. Particularly with the right-tailed unit root test, the smooth-break and the momentum threshold autoregressive (MTAR) unit root tests and corresponding empirical results of this study authors show that the government debts of the developed countries are not always sustainable, which means that the governments of those countries need to balance their budgets (intertemporally) by taking debts that are equal to the discounted amount of the surplus that is expected in the future. (Chen, S.-W., & Wu, A.-C.,2018)

Even though the interrelationship of public debt and economic growth has been studied vastly, there are still questions that are not answered. An explanation of this phenomenon may be the fact that the global economy is changing fast, and what was true for the past may not be that actual today. Besides, there are not many studies that

concentrate on developing economies. One example is a paper by Spilioti and Vamvoukas (2015), where they claim that government debt is one of the key indicators to explain the growth of the gross domestic product. Another paper, tests the hypothesis that there is a negative relationship between growth rate and public debt for the Nigerian economy (Ayadi & Ayadi, 2008). To sum up, current literature has tested many hypotheses relating debt to growth rate, however there is no absolute explanation for the phenomenon yet.

Through this paper, I will try to contribute to the gaps in the literature by analyzing Armenia. Armenia is a developing country and is highly dependent on external financing. I hope that the analysis will yield valuable results regarding the intercorrelation of public debt and economic growth and open new frontiers for future research.

Background information

The increasing debt of Armenia has become one of the most popular topics for debate among the local economists. The 2008 world crisis and 2014-2015 Russian financial crisis have, apparently put considerable strains on debt and on public finances, in general (Seen in Figures 1,2 in appendixes section). However, the debt to GDP ratio is still considerably smaller than the average of the most developed countries where the ratio exceeds 80-90%. One may assume that this fact implies that the growing concern over the debt servicing issue lacks a strong academic basis. However, in the case of a country such as Armenia with a developing economy, the risks are significantly higher. The recent full-scale war with Azerbaijan proved that the region is far more volatile. Moreover, the recent pandemic is certainly going affect the economy horribly and a huge recession is expected. Reputable economist and former deputy prime-minister Vache Gabrielyan predicts at least 10% fall for this year only (Gabrielyan, 2020). Another special concern for Armenia's case is that more than 75% of public debt is a foreign debt owed to external parties.

Initially, total debt to GDP ratio was forecasted to be 65% for 2020, said finance minister Atom Janjugazyan in a recent interview, after which they expected a drop of 2% and have 63% debt to GDP ratio in the next year (2021) as for the debt-servicing extra resources are planned to be allocated from 2021 state-budget. However, as the minister

mentioned because of the global pandemic and the Artsakh war had their negative consequences: by the end of 2020 Armenia's debt to GDP reached 66,5% and for 2021 is forecasted to be 67% (Armbanks, 2020). As of September 2020 Armenia Government debt reached its all-time record highest number, and keeps rising (see Figure 3, appendix). Yet, as the minister mentioned, the public debt of the country was assessed to be stable, but containing risks.

This view of cutting debt in order to avoid risks was seriously challenged in a paper form**,** where the authors argue that allocating resources for cutting debt in a turbulent period may create more problems than it solves (Ostry, Ghosh, Espinoza 2015). Or in other words as once British former exchequer said, "fixing the roof while the sun is shining" is not the greatest approach. In a post-war period, for a country trapped in a deadly pandemic and estimated high levels of emigration for the coming year, one may argue that sun is definitely still shining and in a negative way. In this context, the risks should have been calculated beforehand, and additional debt if necessary should have been taken only to finance long-term projects with future economic benefits.

Data Description

Many factors affect the country's GDP, such as consumption, savings, imports, exports, etc. Since Armenia's and Russia's economies are closely integrated as seen in Figures 4 and 5 (appendix section), instead of controlling for all variables that may affect Armenia's GDP, one may just control for Russia's GDP, assuming that it includes all the global shocks affecting Armenian GDP that is not related to government debt level. Three primary variables in the econometric model will be used: Armenia's GDP, Armenia's government debt, and Russia's GDP.

The data originates primarily from the International Financial Statistics of International Monetary Fund and Statistical committee of Armenia databases. Quarterly time series data for the period from 2000 to 2019 was used. The choice of a period is based on the availability of data. It is including 80 observations and 7 variables. The GDP data from initial sources were in national currencies and nominal terms thus were modified, through the process of model estimation.

The data sources are given in Table 1. The related variables used in this empirical study are discussed as follows.

Table 1. Data Sources

Variables	(syntax)	Data Source
Real GDP of Armenia	(real_gdp_arm)	Internation Financial Statistics
Real GDP of Russia	(real_gdp_rus)	Internation Financial Statistics
Cumulative Foreign Debt of Armenia	(cum_debt)	Statistical Committee of Armenia
Consumer Price Index Armenia	(cpi_arm)	Internation Financial Statistics
Consumer Price Index Russia	(cpi_rus)	Internation Financial Statistics

Real GDP of Armenia - was calculated by deflating the nominal GDP in AMD by Armenian Consumer Price Index (CPI), with the base year 2010. This technique is widely used in the literature (Eichengreen & Gupta, 2013). The nominal GDP time series was obtained from the International Financial Statistics database. In the empirical models, percentage quarterly change in comparison to the same quarter previous year was used

Real GDP of Russia - was calculated by a similar technique by deflating the nominal GDP in rubles by Russian Consumer Price Index (CPI), with he same base year. The nominal GDP time series was obtained from the International Financial Statistics database. In the empirical models, percentage quarterly change in comparison to the same quarter previous year was used.

Cumulative Debt (cum_debt) - Cumulative debt of Armenia from 2000 quarter 1 to 2019 quarter 4 in USD. Obtained from International Financial Statistics. In the empirical models, percentage quarterly change in comparison to the previous quarter same year was used.

CPI Armenia, CPI Russia – measure Consumer Price index in Armenia and Russia, respectively. Both obtained from International Financial Statistics, with the base year 2010.

Table 2. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Δarm_growth(%)	76	7.83	11.91	-27.66	45.74

∆rus_growth(%)	76	5.49	9.02	-19.69	21.18
∆debt_growth(%)	79	2.87	5.69	-10.09	36.04

All the variables used in regression models are listed in the summary statistics in Table 2 above. The variables *∆arm_growth* and *∆rus_growth* are expressed in terms of quarterly growth rates for the given period compared to the same period last year. While, the variable *∆debt_growth,* is differenced in technique to express the quarterly increase in cumulative public foreign debt for the given period compared to previous quarter. The above-mentioned choice was based on the fact that the latter did not contain seasonal component seasonal component. Additionally GDP series are flow variables whereas debt is an example of a stock variable.

Econometric Model & Methodology

The Empirical model we are trying to estimate has the following form:

$$\Delta arm\_growth_t = \alpha_0 + \alpha_1 \Delta arm\_growth_{t-1} \dots \alpha_n \Delta arm_{growth_{t-n}} + \beta_1 \Delta rus_{growth_t} + \dots + \beta_n \Delta rus\_growth_{t-n} + \delta_1 \Delta debtgrowth_t + \delta_2 \Delta debtgrowth_{t-1} \dots + \delta_n \Delta debtgrowth_{t-n+} + \varepsilon_t, \quad (1)$$

In the above-mentioned candidate model yearly percentage economic growth for the given quarter is explained by its previous lags, the percentage change in Russian GDP and its lags as well as the main-focus explanatory variable debt growth for period *t*.

Given the low number of observations and a high number of lags that were aimed to controled in the model, a decision was made to exclude other important variables such as interest rates, unemployment rates, investment, etc.. The decision was made in the context of a usual trade-off between including more variables to increase the explanatory power of the final model, and the degree of freedom.

Table 3. P-values for Unit Root Tests

Variables	Dickey-Fuller Test	Philips Perron Test
∆arm_growth(%)	0.0001	0.0001
∆rus_growth(%)	0.16	0.051
∆debt_growth(%)	0.00001	0.00001

Augmented Dickey-Fuller and Philips Perron unit root tests were conducted to check the existence of random walk for each of the variables included in the candidate model. As we can see the only variable to contain an issue with stationarity is *∆rus_growth(%).* After a deeper analysis an assumption was made to include the latter in the model, with an additional dummy variable *crisis* controlling for the period of 2008 crisis, which one may assume (based on the additional tests) was the main cause of non-stationarity of the series. The model containing the dummy variable is as follows

ARDL(n) with crisis

$$\Delta arm\_growth_t = \alpha_0 + \alpha_1 \Delta arm\_growth_{t-1} \dots \alpha_n \Delta arm_{growth_{t-n}} + \beta_1 \Delta rus_{growth_t} + \dots + \beta_n \Delta rus\_growth_{t-n} + \delta_1 \Delta debtgrowth_t + \dots + \delta_n \Delta debtgrowth_{t-n} + crisis + \varepsilon_t, \quad (2)$$

The methodological framework of this paper is based on Autoregressive Distributed Lag Modeling Approach (ARDL) (Pesaran and Shin (1999)). This model lets us regress the dependent its own lags as well as lags of explanatory variables. Furthermore, ARDL lets multiple regressors to have different lags in the model, thus we might have a model of type ARDL(p,q,l) where q,p,l are the numbers of dependent, first independent and second independent variables, respectively.

ARDL(q,p,l) with crisis

$$\Delta arm\_growth_t = \alpha_0 + \alpha_1 \Delta arm\_growth_{t-1} \dots \alpha_n \Delta arm_{growth_{t-p}} + \beta_1 \Delta rus_{growth_t} + \dots + \beta_n \Delta rus\_growth_{t-q} + \delta_1 \Delta debtgrowth_t \dots + \delta_n \Delta debtgrowth_{t-l+} + \varepsilon_t, \quad (3)$$

Further, another model is to be estimated with Autoregressive Integrated Moving Average technique (ARIMA). The latter has two main advantages. Firstly it gives higher

freedom of choosing the lags that are of main interest in estimating the model. Say one wants to estimate the effect of 12th lag on the dependent variable. In case of ARDL model, he/she has to include all the lags from 0 to 12, while ARIMA allows skipping unnecessary lags. Secondly, it allows us to check the stability of the model, which is of great importance in this case, as the explanatory variable *Δrus_growth(%)* initially had an issue with stationarity (as discussed in the previous section).

ARIMA

$$\Delta arm\_growth_t = \alpha_0 + \alpha_1 \Delta arm\_growth_{t-1} \dots \alpha_n \Delta arm_{growth_{t-p}} + \beta_1 \Delta rus_{growth_t} + \dots$$
$$+ \beta_n \Delta rus\_growth_{t-q} + \delta_1 \Delta debtgrowth_{t-1} \dots + \delta_n \Delta debtgrowth_{t-l+} + \varepsilon_t, \quad (4)$$

In the estimation section both ARDL and ARIMA models will be used to estimate and test level relationships among the dependent and independent variables. The lags of each model will be chosen based on the Akaike Information Criterion. After estimating the models the following procedures will be conducted to check the accuracy of the model.

- **Shapiro Wilk/Francia** - Normality tests
- **T/F tests** - Joint significance test
- **(Partial) Serial Autocorrelation tests** – show the pattern of the residuals.
- **Stability** - armaroots test for ARIMA model

Estimation

In this section estimation results of the candidate econometric model are discussed. The regression output results of 4 ARDL models are summarized in **Table 4**, on the next page. The first three models in the output table represent 3 different lag combinations based on the first candidate model. The combinations are listed in the first row of the table under the corresponding model. In general, the **1st model** is better than **2nd** and **3rd models** both in terms of explanatory power and inaccurately estimating the short-term effect of the main explanatory variable on the dependent variable. However, it lacks long-term lags of Δ*debt_growth(%)* and therefore gives no information on the long-term relationship of those variables. Whereas, **2nd** and **3rd** models contain more lags of Δ*debt_growth(%)* representing 2 and 3 years period, respectively, and have a normal distribution of errors on any conventional level of significance. Nevertheless, none of the 3 models contains dummy variable *crisis* controlling for shock caused by 2008 crisis, therefore there is high probability for the models not to be stable. Further, **Model 4** is based on the candidate model 3, and contains variable *crisis*, as well as 12 lags for the main explanatory variable. Despite the high value of adjusted R square – 0.63, joint significance tests imply that Δ*debt_growth(%)* has no long term impact on the dependent variable. In Model 1-4, the lags of variables Δ*arm_growth(%)* and Δ*rus_growth(%)* were chosen based on a specific matrix aimed to achieve lowest Akaike and Bayesian scores, given the arbitrary choice of the number of lags for Δ*debt_growth(%)*.

Table 4.	Model 1	Model 2	Model 3	Model 4
Variables	(8,3,1)	(8,8,1)	(3,12,0)	(4,12,0,0)
L1.arm_growth	-0.026	-0.005	0.032	-0.013
	-0.22	(-0.04)	(-0.24)	(0.09)
L2.arm_growth	-0.038	-0.024	-0.3	-0.193
	-0.37	(-0.21)	(-2.83)**	(1.74)
L3.arm_growth	0.126	0.15	0.179	0.122
	-1.33	(-1.41)	(-1.93)	(1.24)
L4.arm_growth	0.02	-0.01	.	0.193
	-0.21	(-0.09)	.	(2.08)*
L5.arm_growth	0.132	0.096	.	.
	-1.43	(-0.94)	.	.
L6.arm_growth	-0.181	-0.223	.	.
	(2.07)*	(-2.39)*	.	.
L7.arm_growth	0.107	0.081	.	.
	-1.24	(-0.84)	.	.
L8.arm_growth	0.198	0.203	.	.
	(2.47)*	(2.38)*	.	.
debt_growth	-0.281	-0.218	-0.06	-0.017
	-2.36	(-1.64)	(-0.44)	(0.12)
L1.debt_growth	-0.406	-0.332	-0.26	-0.176
	(3.44)**	(-2.59)*	(-1.94)	(1.28)
L2.debt_growth	-0.324	-0.298	-0.25	-0.215
	(2.53)*	(-2.24)*	(-1.75)	(1.55)
L3.debt_growth	-0.353	-0.35	-0.308	-0.246
	(2.74)**	(2.66)*	(-2.03)*	(1.66)
L4.debt_growth	.	0.026	-0.038	0.049
	.	-0.2	(-0.26)	(0.34)
L5.debt_growth	.	-0.071	-0.215	-0.093
	.	(-0.54)	(-1.63)	(0.68)
L6.debt_growth	.	-0.088	-0.13	-0.09
	.	(-0.67)	(-0.96)	(0.69)
L7.debt_growth	.	-0.2	-0.227	-0.186
	.	(-1.54)	(-1.73)	(1.47)
L8.debt_growth	.	0.024	-0.079	-0.097
	.	(-0.18)	(-0.59)	(0.74)
L9.debt_growth	.	.	-0.262	-.229
	.	.	(-1.98)	(1.79)
L10.debt_growth	.	.	-0.084	-0.108
	.	.	(-0.63)	(0.83)
L11.debt_growth	.	.	-0.118	-0.095
	.	.	(-0.88)	(0.74)
L12.debt_growth	.	.	0.002	-0.003
		.	-0.02	(0.02)
Rus_growth	0.778	0.738	0.681	0.589
	(4.79)**	(4.35)**	(4.73)**	(4.10)**
L1.rus_growth	-0.424	-0.335	.	.
	(2.54)*	(-1.77)	.	.
crisis	.	.	.	-5.124
	.	.		(1.81)
Constant	5.555	6.314	8.929	7.137
	(4.26)**	(-3.71)**	(-3.91)**	(3.09)**
Adjusted R_sq	0.69	0.68	0.6	0.63
N	68	68	60	67

Further, we estimate the **final 5th model** (shown in **table 5**), based on the 4th candidate model. The last model has several advantages compared to previous models. Most importantly it allows us to choose desired combinations of lags, based on autocorrelation statistics of the given variable. Whereas autoregressive and moving average terms were chosen based on AIC&BIC criterion. Secondly, a stability test was conducted confirming stationarity of the model.

In all the estimated models existence of auto-correlation or partial auto-correlation was rejected, and the errors were normally distributed at a 90% level of significance.

Table 5. Final Model – *ARIMA AR(1/1 8) MA(1/1)*

arm_growth	Coefficient	Standard Error	Z-stat
Δarm_growth(%)(-1)	-0.218	0.092	(-2.36)*
Δarm_growth(%)(-2)	0.099	0.075	(1.32)
Δarm_growth(%)(-3)	-0.026	0.067	(-0.39)
Δarm_growth(%)(-8)	0.381	0.069	(5.52)**
Δdebt_growth(%)	-0.294	0.110	(-2.68)**
Δdebt_growth(%)(-1)	-0.387	0.109	(-3.56)**
Δdebt_growth(%)(-2)	-0.353	0.129	(-2.73)**
Δdebt_growth(%)(-3)	-0.304	0.135	(-2.25)**
Δdebt_growth(%)(-8)	-0.008	0.161	(-0.05)
Δdebt_growth(%)(-12)	-0.106	0.124	(-0.85)
Δrus_growth	0.484	0.123	(3.93)**
Crisis	-5.049	3.429	(-1.47)
Constant	5.635	1.703	(3.31)**
ARMA			
Autroreggresive Term			
L1.AR	-0.533	0.129	(-4.14)**
L8.AR	-0.292	0.147	(-1.99)*
Moving Average Term			
L1.MA	1.000	0.212	(4.71)**
/sigma	4.492	.	.

Discussion/Recommendations

Based on the Regression outputs we can confidently say that hypothesis 1 was confirmed on strong a basis, thus there is a significant negative impact on Armenian GDP growth in the short term. More precisely 1 percentage increase in debt results in **-1.338 percent** decrease in GDP. The government may have wished to undertake this cost to ensure future long-term economic benefits. However, as we have seen in all the examples of the models that were focusing on long term effects of debt growth, the impact was zero or insignificant. Sadly, no arguments were found in favour of confirming the 2nd main hypothesis of the paper on the contrary to the initial expectations.

As Armenia is constantly relying on foreign debt sources to secure fully operational economy, fill budget deficits and implement various developing programs ranged from infrastructure developments to various social education programs. Therefore, it would be unrealistic to recommend the Armenian Government not to take debts in the future. On contrary, we should expect the government to take a large amount of debt in the upcoming period, as major the recession is forecasted by various reputable economists. However, I strongly suggest that future debts should be used strictly in long term projects, rather than financing public expenditure. Additionally, all the steps are to be taken to fight corruption. I strongly believe that if the money were spent efficiently the strong long term positive effect should have been observed in Armenia.

The third main hypothesis of the paper implying a statistically significant relationship between Russian and Armenian gross domestic products was confirmed in all cases. Specifically, 1 per cent increase in Russian GDP results in 0.484 per cent increase in Armenian GDP. Given the high volatility of the Russian economy. For this reason the recommendation is for Armenian government to implement policies to increase risk diversification, in order to decrease high dependence on the former.

Although, I do not want to be highly critical of this paper I acknowledge that at least some bias may be found in the high coefficient of Russian GDP. There are 2 major

reasons for that. First of all, the only variable controlling for external shocks except for dummy variable crisis in the model was Russian GDP. Secondly, the information on the economic history of Armenia was quiet limited. Therefore, Quarterly data was used for model estimation to make strong assumptions. Apparently, quarterly data raises issues with seasonality. The dependent variable Armenian GDP and Russian GDP are strongly dependent on seasonality while main explanatory variable government debt does not depend on it. This issue was partly fixed by calculating the real GDP based on the CPI index. This may also be the cause for a low significance level of the main explanatory variable, which contradicts the example of different developing countries.

Conclusion

In this paper the impact of government debt on economic growth was studied, based on the autoregressive distributed lag modeling approach. The efficient choice of the number of lags was grounded on Akaike Bayesian criterion.

The main findings are as follows: (i) in the short run debt affects economic growth negatively; (ii)In the long run, however, effects disappear and we do not observe any evidence that debt has a statistically significant effect on economic growth; (iii) a strong evidence was found, that there is a statistically significant relationship between Armenian and Russian economies.

My main policy recommendations concentrate on the idea that optimized government spending should trigger higher economic growth. I believe that by minimizing the inefficiencies in processes of government spending, and by directing resources to economically productive projects Armenia might experience economic growth with respect to debt growth.

Considering the very short history of Armenia, and scarcity of data I think that the results might shift dramatically in future when more data will be available, and the study will take more extensive form. Although, the results yielded precise results I think the further researches should be conducted to expand the study with more data and double-check the results of this paper.

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Appendix

Figure 1

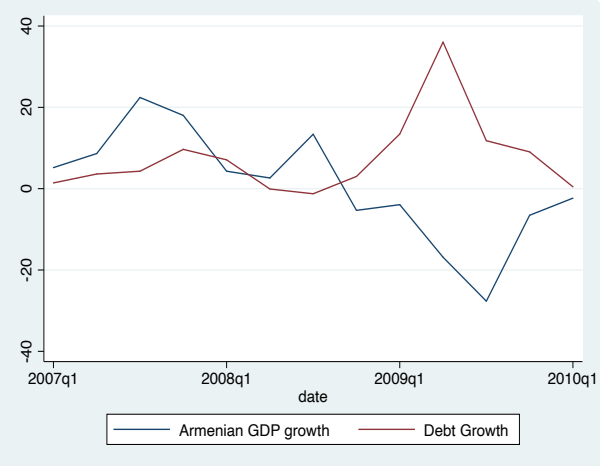

Figure 2

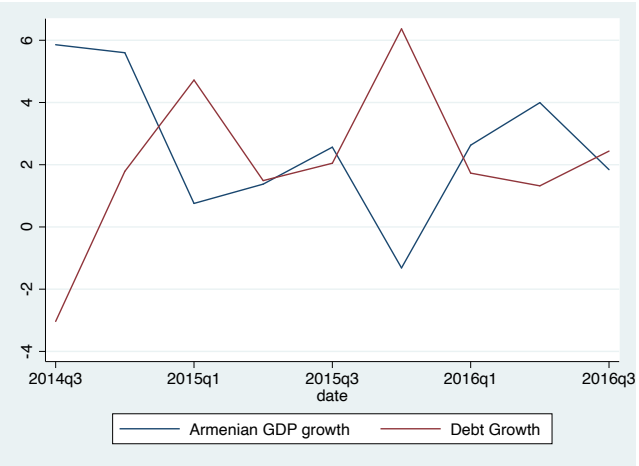

Figure 3

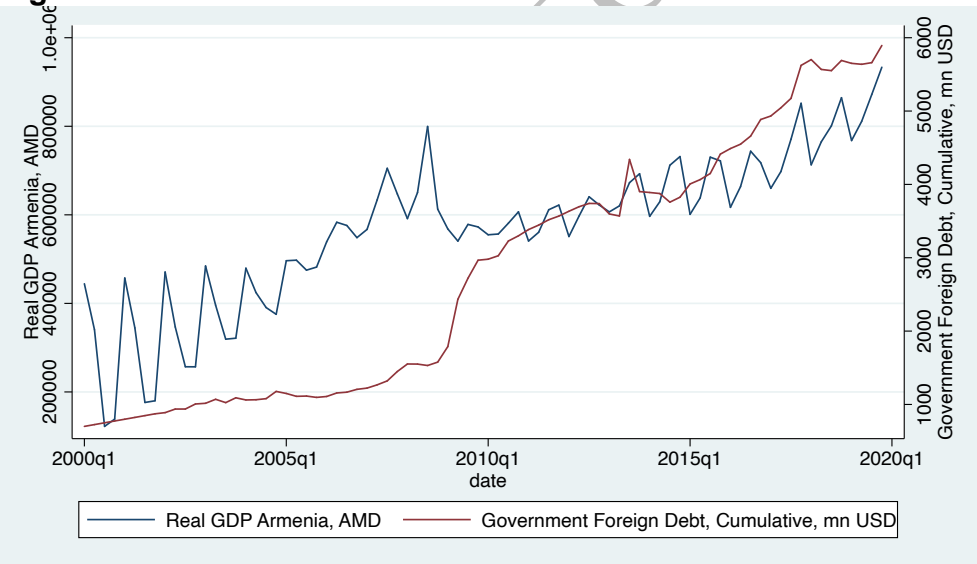

Figure 4

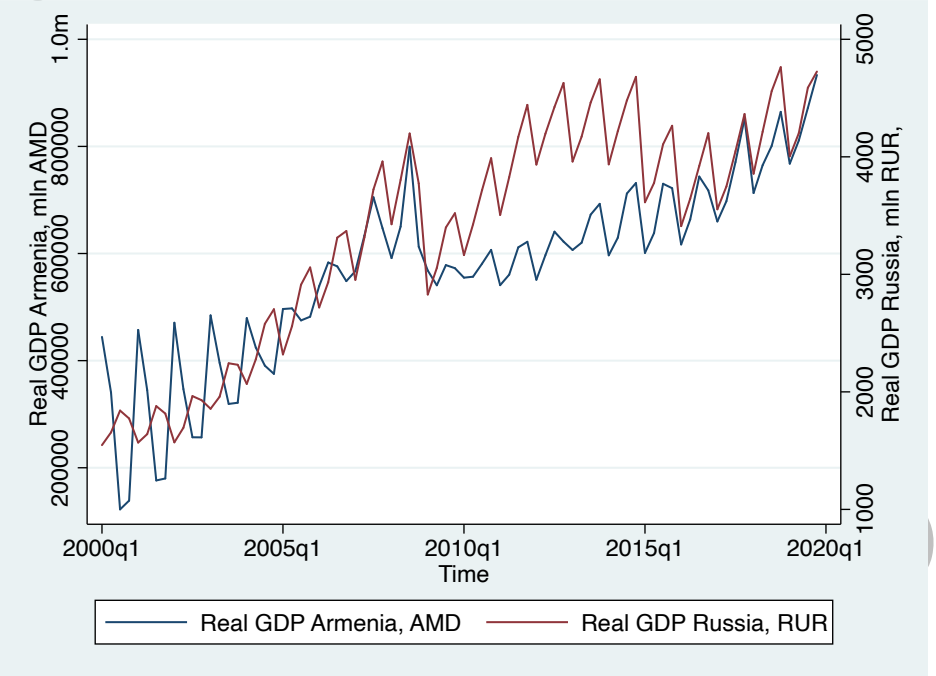

Figure 5