6. EXTERNAL DEBT- ECONOMIC GROWTH NEXUS IN SELECTED CEE COUNTRIES

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Abstract

This paper presents new evidence regarding the potential adverse effects of external debt on long-run economic growth in a sample of twelve emerging economies of Central and Eastern Europe (CEE). The empirical findings of the paper suggest that policy makers in many of CEE countries should be encouraged to evaluate the long-run costs and benefits of existing fully liberalized capital account regimes which allow both private and public sectors to finance their expenditures by external borrowing. These basic insights of the paper are obtained from the application of panel regression and Granger causality analysis for a sample of twelve CEE countries using annual data for the period of 1995- 2014. The Granger causality tests have shown that there is a statistically significant causal effect of external debt on economic growth in eight countries.

Keywords: external debt, GDP growth, investment, trade openness, inflation
JEL Classification: F34, O11, E24

1. Introduction

The nature of the relationship between accumulation of external debt and economic growth has been continuing to be a topic of interest both for academics and policy makers. Financing additional domestic investment by foreign borrowing seems to be a rational policy choice for most developing countries particularly if they are constrained by relatively low saving rates. However, if the stock of external debt (as % of GDP) rises above some threshold levels, the process of economic growth might be adversely affected through certain mechanisms. The most critical one of them is the fact that the country in question is likely to divert increasingly larger amount of its resources for debt servicing instead of using them for financing domestic investment. In addition, foreign capital inflows might start falling (due to the possible increase in the degree of macroeconomic uncertainty), which can exert additional growth retarding effects. But this argument implicitly suggests that one of the most critical issues facing policy makers (in terms of external debt-growth nexus) is likely to be the ambiguity about the critical threshold levels for external debt beyond which the growth retarding effects of external debt might more than offset its growth enhancing effects. The main reason for this ambiguity seems to be (at least partly) related to the varying nature of the empirical results reported by

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different authors. For example, Cordella, Ricci, Ruiz-Arranz (2005) have reported that while countries with good policies and institutions are likely to start experiencing adverse growth effects of external debt beyond 15-30% of GDP, this threshold seems to be lower in countries with bad policies and institutions. The earlier estimates obtained by Pattillo, Poirson, Ricci (2003) and Nguyen, Clements and Bhattacharya (2003) are also in the range of 20%. However, it is worth to note that these (relatively low) estimates for threshold levels seem to be in sharp contrast to earlier findings of Elbedawi, Ndulu and Ndung'u (1997) who (based on sample of 99 developing countries) have found out a much higher threshold level of external debt (approximately 100%). But a more recent study by Pattillo and Ricci (2011) (who have carried out a panel data analysis of 93 developing countries) has suggested that the average impact of debt becomes negative at about 35-40% of GDP, and the marginal impact of debt at about half these values. In our opinion, even if one would consider these latter estimates reported by Pattillo and Ricci (2011) as relatively more reasonable basis for policy guidance, the insights obtained from panel data analysis should almost always be supplemented by individual country analysis particularly in terms of 'causality testing'. This is simply because of the fact that the negative relationship obtained from panel studies does not indicate the existence of a causal relationship between external debt and economic growth for each individual country in the sample. In light of the points raised above the main motivation of this paper is to empirically investigate the 'external debt-economic growth nexus' for a sample of 12 Central and Eastern European (CEE) countries using both panel regression analysis and Granger causality tests.

In particular, we attempt to answer the following two questions: a) Is the stock of external debt (as a % of GDP) negatively correlated with economic growth for an average country in our sample? b) What is the nature of the causal relationship between external debt and economic growth in each individual country?

The fact that the external debt levels of almost all the countries in our sample have already risen (in 2014) above the critical threshold levels (35-40% of GDP) reported by Pattillo and Ricci (2011) suggests that the results of our study are likely to yield at least some insights for the policy makers of these countries regarding whether or not the accumulation of additional external debt should be discouraged. For example, the respective GDP ratio of external debt levels of Czech Republic, Poland, Romania, Hungary and Croatia (which are five of the twelve countries making up our sample) have been 64.2%, 68.6%, 89.8%, 109.1%, and 105.7%, respectively, in 2014 [3].

The rest of the paper is structured as follows: the next section is devoted to a brief discussion of both theoretical and empirical aspects of the findings of some of the relevant past literature. The third section is the 'Data and Methodology' section. The empirical results based on panel regressions and Granger causality tests are presented and discussed in the fourth section. And the last section concludes with a brief summary of results and their policy implications.

2. Literature Review

The mechanism through which an increase in external debt (as a % of GDP) can affect economic growth seems to be a complex economic phenomenon like many other economic relationships between two variables. By complexity we particularly mean the possibility of the presence of alternative channels through which direct and indirect effects of external

[3] *Source: data.worldbank.org.*

debt on economic growth are transmitted. While some of these channels may generate positive effects on the process of economic growth, the effects transmitted by others can be negative. For example, as Poirson, Ricci and Pattillo (2004) argue, the levels of external borrowing by a developing country may be growth enhancing to the extent that the borrowed funds are allocated to high-return projects by private and public sectors. However, these positive growth effects of external debt through increased rate of physical capital accumulation are likely to take place in the absence of macroeconomic instability and policies that distort economic incentives and economic growth.

Particularly since Krugman (1988) and Sachs (1989), the main channel through which adverse growth effects of external debt accumulation would be operational has been formulated in the context of 'debt-overhang hypothesis'. Simply put this hypothesis can be defined as a situation in which debtor country benefits very little from the return to any additional investment because of debt-service obligations, and in case there is some likelihood that in the future, debt will be larger than the country's repayment ability, expected debt-service costs will discourage further domestic and foreign investment (Agenor and Montiel, 1996; Serven, 1997). Under these circumstances, it is likely that not only the volume of investment will fall, but also the efficiency of investment declines as relatively larger percentage of investment will flow into low-risk, low-return projects and/or will flow out of the country (Oks and Wijinbergen, 1995). Similarly, foreign capital flows will decline due to increased macroeconomic uncertainty and risks associated with the future state of the domestic economy (Claessens *et al*, 1997; Imbs and Ranciere, 2005).

A relatively recent theoretical contribution by Qayyum, Din and Haider (2014) who have extended Ramsey-Cass-Koopman's growth model in an open economy framework has shown that even though external debt does not affect the growth rate of consumption, it does have an impact on the level of consumption and creates a burden on the economy.

After reviewing the results of the relevant empirical literature, Dijkstra and Hermes (2001) have concluded that the empirical evidence in favor of a negative relationship between external debt and growth is inconclusive. In the remainder of this section we first present the results of the selected literature which have been able to produce evidence of adverse effects of external debt on growth through different channels. And then we do the same for selected past studies that were unable to detect such a negative relationship.

Morisset (1991) is among the relatively earlier group of studies which analyzed the external debt-growth nexus and the channels through which it operates by focusing specifically on Argentina. Based on the results of three-stage least squares estimation methodology that utilized data for the sample period of 1962-1986, he concluded that external debt has had a negative impact on economic growth mainly through debt overhang channel which leads to a reduction in domestic investment. Similarly Levy and Chowdhury (1993) who have carried out a panel data analysis of thirty-seven developing countries from Latin America, Asia-Pacific and Sub-Saharan Africa have produced evidence of a similar negative effect of external debt on investment due to the increase in the limitations on external sources of financing and encouragement of capital flight as a result of increased external debt burden.

Hofman and Reisen (1991) and Faini and De Melo (1990) are among those authors who investigated the effects of external debt on investment rates instead of growth directly. Their results suggest that external debt is likely to have adverse effects on both investment rates and total factor productivity both of which are critical determinants of economic growth. The results of Fosu (1996) (who has empirically analyzed thirty-five Sub-Saharan African countries) and those of Deshpande (1997) (who has carried out panel data analysis of a sample of thirteen countries for the period of 1971-1991) have also been in support of debt

overhang hypothesis. One of the critical aspects of external debt particularly for developing countries is the fact that it is denominated in foreign currency which has become a major source of risk in terms of raising the probability of financial crisis. And the resulting increase in the frequency of crisis has been found to be causing permanent reductions in output (Bordo, Meissner and Stuckler, 2010).

One of the few studies that have focused on analyzing the nature of the relationship between external debt and economic growth specifically for a sample of CEE countries is Ciftcioglu and Begovic (2008). Their panel data analysis of CEE countries for the sample period of 1995-2003 has provided one of the relatively earlier evidence of a negative correlation between external debt and economic growth in selected transition economies over the post-communist era. It is worth to note that several authors have suggested that the main determinants of economic growth for these economies during transition period were largely structural reforms, macroeconomic stability and decreased role of government activity (Fischer and Sahay, 2000; Mora *et al.*, 2002). Accumulation of external debt can potentially lead to appreciation of the real exchange rate which can worsen the current account balance. The empirical results of Aristovnik (2008) for a sample of transition economies for the period of 1992-2003 have suggested that real exchange rate appreciation has indeed been a determinant of current account deficits in these countries as a group. Therefore, accumulation of external debt in these countries can potentially increase the risks for sustainability of current account deficits by causing appreciation of the real exchange rate which can change the composition of GDP in favor of non-traded goods. Such a change is likely to have growth retarding effects since traded goods sectors are usually associated with relatively higher total factor productivity growth (Sachs and Larrain, 1993; Weil, 2005). It is worth to note that the sustainability of current account deficits has been shown to be a critical issue for at least two of the countries in our sample (Czech Republic and Hungary) by Chen (2011). Another country where excessive burden of external debt raised the default risk (in the case of limitations in external financing) is Romania (Zaman and Georgescu, 2010).

As stated earlier there are a number of studies with opposite or inconclusive results regarding the nature of the relationship between external debt and economic growth. For example, Hansen (2001) who utilized data from a sample of fifty-four underdeveloped countries was unable to produce any kind of negative association between external debt and economic growth. A similar result was earlier reported by Savvides (1992). And Fosu (1999) has concluded that for Sub-Saharan African countries (in general) debt overhang hypothesis is not statistically supported by the data. Similarly, Nguyen *et al.* (2003), Nguyen *et al.* (2005) and Savvides (1992) are among those studies whose empirical results do not support the debt overhang hypothesis. But an empirical study by Doğan and Bilgili (2014) based on Markov Regime-switching approach has shown that not only external debt affects economic growth negatively, but also the effect is higher for public debt relative to private debt in the case of Turkey.

One of the studies that chose to analyze the individual country experiences regarding the relationship between external debt and growth is that of Chowdhury (1994). He has reported statistically significant positive effects of external debt on investment and growth for Bangladesh, Indonesia and South Korea. Hameed, Ashraf and Chaudhary (2008) is another example of individual country studies which has produced evidence of a statistically significant positive impact of external debt on economic growth in Pakistan. They have attributed this positive effect to the favorable effects of external debt on the productivities of labor and capital in the short-run.

The empirical results of Ayadi and Ayadi (2008) lend support to the idea that the nature of the impact of external debt on economic growth is likely to vary between countries; they have found out that while the external debt had positive effects on output growth in Nigeria, the opposite is true for South Africa. Similar mixed results about the experiences of different countries have been reported by Cordella *et al.* (2005) and Pushpa (1994).

The empirical results of some studies that applied 'causality tests' to investigate the individual country experiences are also mixed in nature. For example, while Karagol (2002) has produced evidence of a statistically significant unidirectional causality running from external debt to GNP level in Turkey, Nawaz, Qureshi and Awan (2012) has reported opposite results for Pakistan where the causality runs from GNP level to external debt.

It is worth to note that a recent study by Semmler and Tahri (2017) has developed and used a new empirical methodology to evaluate the sustainability of external debt in the framework of current account, investment, and consumption dynamics for Italy, Spain and Germany. Their new approach based on using the ratio of external debt to assets (instead of the ratio of external debt to GDP) reveals that Germany has moved into a stable environment, whereas Italy and Spain have moved toward a slow-moving debt crisis.

And finally, we underline the fact that the negative growth effects of external debt are likely to be much higher for highly indebted poor countries particularly when they face adverse global shocks in their export prices (Siddique, Selvanathan and Selvanathan, 2016)

3. Data and Methodology

3.1 Data

To empirically examine the relationship between external debt and economic growth we used annual data from 1995-2014 for 12 countries from Central and East Europe. The countries in our sample are Czech Republic (Czechia), Albania, Hungary, Poland, Romania, Croatia, Bulgaria, Macedonia, Georgia, Ukraine, Belarus and Turkey. All of the data are obtained from Thomson Reuters Eikon[4] and the World Bank's World Development Indicators (WDE) 2016 data base[5]. The selection of countries and period is based on the availability of data.

Figure 1 shows the respective average values of external debt % of GDP, GDP growth annual % (GR1) and GDP per capita growth annual % (GR2) for each country over the sample period (1995-2014). It is interesting to note that Hungary which has the highest average external debt % of GDP value (89.1%), has had the second lowest average growth (in terms of both GR1 and GR2) out of all 12 countries. And Albania and Belarus, the two countries which have had the lowest average external debt % of GDP values, are also the countries which have had the highest average growth performance over the sample period.

Figure 2 presents external debt % of GDP for the year 2014 (the last year of our sample period). It clearly shows that the respective stocks of external debt (as % of GDP) of almost all 12 countries have risen above the critical threshold levels reported by most of the past literature.

[4] *eikon.thomsonreuters.com.*
[5] *data.worldbank.org.*

Figure 1

Average Growth Rate and Average External Debt (% of GDP)

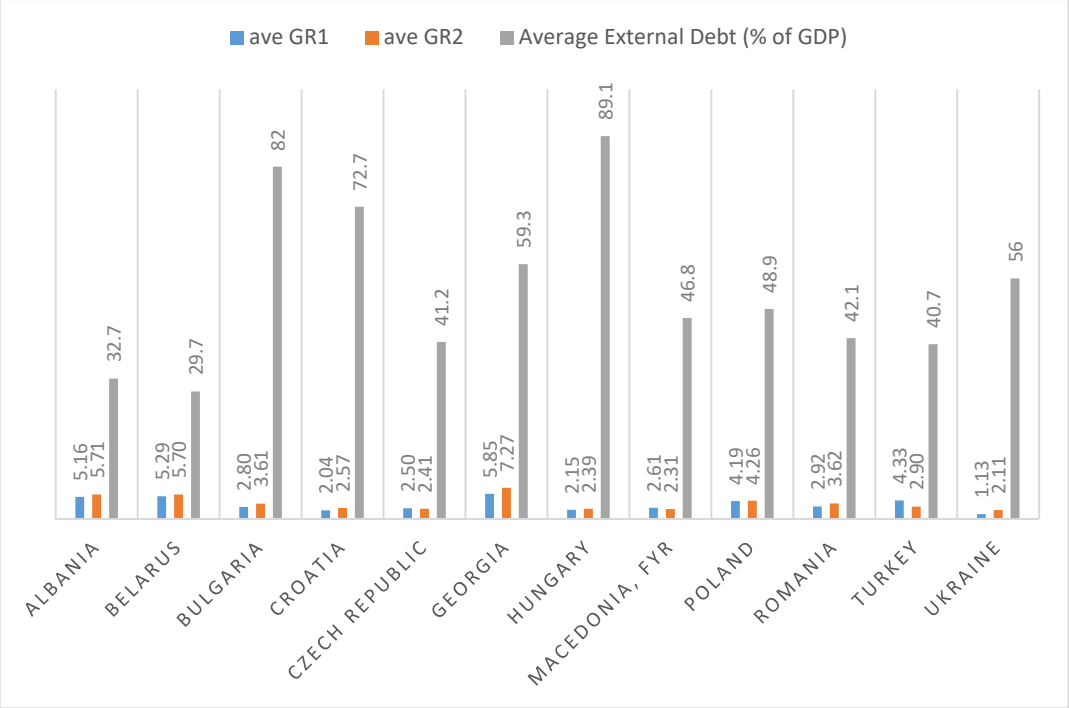
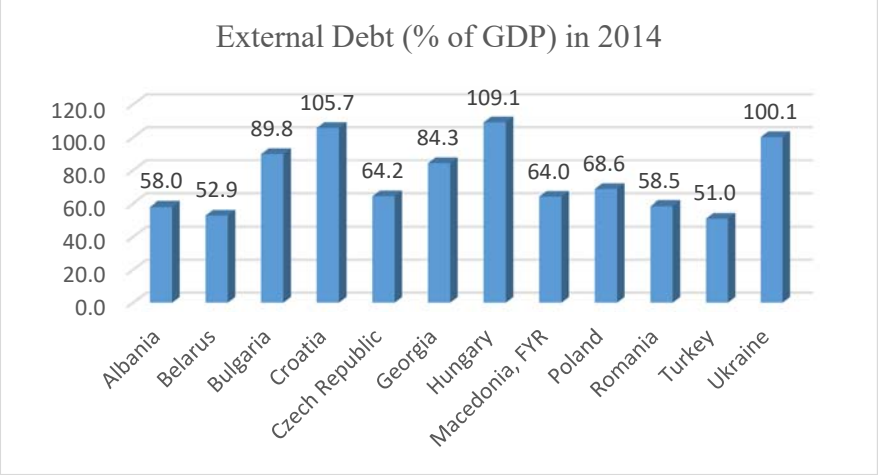


Figure 2

External Debt (% of GDP) in 2014



3.2 Methodology

We used two alternative methodologies to investigate the nature of relationship between external debt and economic growth; panel regression analysis and causality tests which are detailed below respectively.

3.2.1 Panel Estimation

The specification of the 'fixed-effects' version of panel regression model that we have used in our empirical analysis is given below by eq. (1)[6];

$$GR_{it} = a_i + b_1 INV_{it} + b_2 INF_{it} + b_3 TO_{it} + b_4 SSE_{it} + b_5 FD_{it} + b_6 ED_{it} + u_{it} \quad (1)$$

where: GR is a measure of annual economic growth for which we use two alternative proxies; the growth rate of real GDP (GR1) and the growth rate of per capita real GDP (GR2). ED (the stock of external debt % of GDP) is the explanatory variable which is the main focus of our study. The other explanatory variables (investment % of GDP (INV), inflation rate (INF), exports plus imports % of GDP (TO), secondary school enrollment ratio (SSE) are included as controlling variables to the growth equation as each one of them is theoretically expected to affect the value of the dependent variable (GR proxied by GR1 or GR2). We have also used two alternative proxies for one of the explanatory variables, FD; FD1 and FD2. FD1 is M2/GDP (the ratio of broad measure of money supply to GDP) and FD2 is the 'total credit provided by the financial sector'. Both of them are indicators of the level of 'financial development' (FD). Since they are highly correlated we do not include them in the same regression equation, and instead we run two alternative regressions for each proxy of economic growth (GR1 and GR2); each one having a different proxy for FD.

Therefore, altogether we run four alternative panel growth regressions to investigate the relationship between external debt and economic growth. The main reason in doing so is to see whether or not the estimation results are robust to the choice of alternative proxies for economic growth (dependent variable) and financial development (an independent variable).

The expected signs of the coefficients of explanatory variables specified on the right-hand side of eq. (1) are as follows: the respective signs of coefficients of INV, TO and SSE are expected to be positive whereas the sign of the coefficient of INF (a measure of financial instability) is expected to be negative. On the other hand, the expected signs of the coefficients of FD and ED are theoretically ambiguous. The potential effect of financial development (FD) on economic growth (GR1 or GR2) is theoretically ambiguous due to its ambiguous effects on investment and saving rates. Similarly, as we briefly discussed in the previous section, the impact of a given increase in external debt (ED) on economic growth is also theoretically ambiguous.

Finally, we note that a limited number of observations particularly for secondary school enrollment ratio (SSE) are missing for certain countries in our panel data set. Therefore, our model is an 'unbalanced model' in terms of panel estimation. However, as Stock and Watson (2003) pointed out, an 'unbalanced model' is also capable of generating informative estimates.

3.2.2 The Granger Causality Test

Granger causality is extensively applied to examine the nature of the causal relationship between two or more variables. According to equation (2), GR (either in the form of GR1 or

[6] *We applied Hausman test to determine whether 'fixed-effects' or 'random-effects' version of the panel regression model that takes into account the 'country-specific' effects on economic growth should be used in estimating each alternative growth equation. In all four alternative regressions, Hausman test indicated that 'fixed-effects' model should be preferred.*

GR2) and ED are two variables investigated when determining causality relationship. In equation (2) below, the variable ED is said to granger-cause the variable GR if the past and present values of ED assist in predicting the direction of GR. And equation (3) gives the reverse relationship between the two variables. Two-way causality exists when GR is causing ED and ED is causing GR.

$$GR_t = c + \sum_{i=1}^{p\ lag} \propto_i GR_{t-i} + \sum_{j=1}^{p\ lag} \beta_i ED_{t-j} + \varepsilon_t \quad (2)$$

$$ED_t = d + \sum_{i=1}^{p\ lag} \gamma_i GR_{t-i} + \sum_{j=1}^{p\ lag} \delta_i ED_{t-j} + \eta_t \quad (3)$$

where: c and d are constant terms and ε_t and η_t are serially uncorrelated white-noise residuals.

4. Empirical Results

4.1 Panel Regression Results

Tables 1 and 2 report panel estimation results for each one of the two alternative proxies we used for dependent variable (GR); the annual growth rate of real GDP (GR1) and the annual growth rate of per capita real GDP (GR2) respectively. Each table reports two alternative regression results (A and B respectively), each of which is estimated with a different proxy for financial development (FD1 or FD2); regression A(B) reports the estimation results obtained from the use of FD1(FD2) as a proxy for financial development.

Table 1[a]

Dependent Variable: Growth Rate of Real GDP (GR1)

Regressor	A	B
INV	0.10 (1.86)*	0.10 (1.84)*
INF	-0.10 (-4.10)***	-0.10 (-4.10)***
TO	0.07 (3.31)***	0.06 (3.01)***
SSE	0.01(0.33)	0.01 (0.52)
FD1	-0.02 (-0.76)	
FD2		-0.03 (-1.36)
ED	-0.11 (-4.82)***	-0.10 (-4.26)***
Constant	1.33 (0.69)	1.55 (0.81)
R^2	0.34	0.34

- These regressions are estimated using unbalanced panel data for twelve countries in our sample (225 observations total)
- Heteroscedasticity – robust t statistics are given in parenthesis under the coefficient
- ***, **, * represent statistical significance of the individual coefficient at 1%, 5% and 10% levels, respectively.

Table 2[b]

Dependent Variable: Growth Rate of per Capita Real GDP (GR2)

Regressor	A	B
INV	0.08 (1.46)	0.08 (1.32)
INF	-0.10 (-4.06)***	-0.10 (-4.14)***
TO	0.07 (3.07)***	0.06 (2.79)***
SSE	0.01 (0.42)	0.02 (0.59)
FD1	-0.03 (-0.76)	
FD2		-0.03 (-1.27)
ED	-0.11 (-4.72)***	-0.10 (-4.28)***
Constant	2.40 (1.22)	2.61 (1.32)
R^2	0.34	0.35

b

- These regressions are estimated using unbalanced panel annual data for the twelve countries in our sample (225 observations total)
- Heteroscedasticity – robust t statistics are given in parenthesis under the coefficient
- ***, **, * represent statistical significance of the individual coefficient at 1%, 5% and 10% levels, respectively.

Each column in Tables 1 and 2 reports a different regression and each row reports a coefficient estimate and its t-statistic for each of the two regressions (A and B) respectively. The main findings of the estimation results presented in Tables 1 and 2 are stated and discussed below:

'External Debt' (ED) was found to be negatively correlated with both proxies used for 'economic growth' (GR1 and GR2). The estimated coefficient of ED is statistically significant (at 1% level) in all four regressions. Furthermore, the estimated value of the coefficient of ED seems to be robust to the choice of proxy for economic growth, namely growth rate of real GDP (GR1) or growth rate of per capita real GDP (GR2). Similarly, the choice of proxy for financial development (FD1 or FD2) seems to have a negligible effect on the estimated value of the coefficient of ED.

The estimation results presented above can be taken as an empirical evidence for a statistically significant negative relationship between external debt and economic growth for an average country in our sample of CEE countries over the sample period of 1995-2014.

Financial development (FD), regardless of the chosen proxy (FD1 or FD2) was found to be 'insignificantly' correlated to both proxies used for economic growth (GR1 and GR2). This finding might be interpreted as an evidence for the relative ineffectiveness of financial liberalization policies in transition economies of Central and Eastern Europe in having favorable effects on economic growth which were originally expected. On the other hand, the coefficient of TO (trade openness) is both positive and highly significant in all four regressions reported in Tables 1 and 2. This suggests that liberalization of trade accompanied by greater degree of integration in terms of goods and services markets with

other economies could have been playing a critical role in the process of economic growth in an average country in our sample. And this is consistent with the view that producing a larger share of GDP for global markets in the form of exports and simultaneously allowing imported products to penetrate domestic markets at a higher rate (relative to GDP) is likely to affect economic growth positively both through efficiency gains and higher rate of investment.

One of the critical indicators of macroeconomic instability (in general) and financial instability (in particular) is the level of inflation rate. Higher inflation is likely to affect economic growth adversely particularly through the investment channel; both the volume and efficiency of investment may decrease at higher inflation rates due to the increase in the risks perceived by investors. This hypothesis seems to be supported by the estimation results reported in Tables 1 and 2; the estimated coefficient of INF is not only negative but also highly statistically significant in all four regressions.

As one may see from Tables 1 and 2, the sign of INV variable is positive in all four regressions but statistically significant only in the regressions reported in Table 1. In other words, when economic growth is proxied by per capita real GDP growth (GR2) estimation results also produced a positive correlation between INV and economic growth (GR2) as theoretically expected. However, the estimated coefficient of INV is not statistically significant. This result may suggest that (for the average country in our sample) increasing domestic rate of investment may not be very effective in raising the growth of per-capita (real) income indefinitely. This finding is also consistent with the insights of Solow's neo-classical growth model which predicts that per-capita income cannot increase indefinitely during the process of physical capital accumulation (Solow, 1956; Solow, 1957).

And finally, we note that even though the sign of the coefficient of SSE (secondary school enrollment ratio) is positive in all four regressions, the estimated coefficient is statistically insignificant in all of them. This in turn suggests that for the average country in our sample either SSE is not the most critical determinant of the (average) stock of human capital per worker or human capital is not a significant determinant of the process of economic growth. Naturally this is an empirical matter for each country in our sample, meaning that careful empirical analysis of the potential growth effects of human capital accumulation in each country can yield critical insights for the policy makers of these countries in terms of public policy making in relation to general education and training programs.

4.2 The Granger Causality Test Results

Tables 3 and 4 report the results of Granger causality tests that have been carried out to investigate the existence (and direction) of causality between each alternative proxy of economic growth (GR1 and GR2 respectively) and external debt (ED) for each individual country separately. The results of Augmented Dickey Fuller (ADF) tests showed that series for GR1 and GR2 are stationary for all 12 countries. The series for ED are found to be stationary in the 'first difference' form for ten countries, and for the remaining two countries the series for ED are stationary in the 'second-difference' form.[7]

[7] *The authors have not presented the ADF tests due to space limitations. However, they are available upon request.*

Table 3

Granger Causality between GR1 and ED for Selected CEE Countries

	Null Hypothesis		
Country	GR1 does not Granger-cause ED	ED does not Granger-cause GR1	Results
Albania	2.439 (0.143)	6.840 (0.0145)**	ED→GR1
Belarus	0.370 (0.697)	5.203 (0.021)**	ED→GR1
Bulgaria	1.882 (0.2330)	7.866 (0.0145)**	ED→GR1
Croatia	1.575 (0.246)	5.067 (0.025)**	ED→GR1
Czech Republic	1.846 (0.196)	3.233 (0.072)*	ED→GR1
Georgia	0.507 (0.618)	3.556 (0.058)*	ED→GR1
Hungary	0.286 (0.755)	10.645 (0.001)***	ED→GR1
Macedonia	0.859 (0.446)	0.038 (0.962)	No
Poland	0.227 (0.800)	0.419 (0.666)	No
Romania	4.071 (0.0514)*	0.516 (0.728)	GR1→ED
Turkey	0.708 (0.5687)	2.733 (0.099)*	ED→GR1
Ukraine	1.040 (0.380)	0.648 (0.538)	No

Note: The numbers given in () are p-values. ***, ** and * denote rejection of the null hypothesis at 1%, 5% and 10% levels, respectively.

Table 4

Granger Causality between GR2 and ED for Selected CEE Countries

	Null Hypothesis		
Country	GR2 does not Granger-cause ED	ED does not Granger-cause GR2	Results
Albania	2.227 (0.143)	9.966 (0.002)***	ED→GR2
Belarus	0.323 (0.729)	5.231 (0.021)**	ED→GR2
Bulgaria	6.157 (0.015)**	9.773 (0.003)***	ED↔GR2
Croatia	1.925 (0.188)	4.620 (0.032)**	ED→GR2
Czech Republic	1.602 (0.238)	3.686 (0.053)*	ED→GR2
Georgia	0.612 (0.556)	3.094 (0.0796)*	ED→GR2
Hungary	0.262 (0.772)	0.926 (0.001)***	ED→GR2
Macedonia	0.883 (0.436)	0.109 (0.897)	No
Poland	0.428 (0.661)	0.673 (0.528)	No
Romania	3.900 (0.056)*	0.401 (0.803)	GR2→ED
Turkey	0.720 (0.563)	2.742 (0.099)*	ED→GR2
Ukraine	1.060 (0.374)	0.676 (0.525)	No

Note: The numbers given in () are p-values. ***, ** and * denote rejection of the null hypothesis at 1%, 5% and 10% levels, respectively.

The main findings of the results reported in Tables 3 and 4 can be summarized as follows: Granger causality tests revealed the existence of unidirectional causality running from external debt (ED) to economic growth in terms of both GDP growth and per capita GDP growth (GR1 and GR2), respectively, in eight of twelve countries. These countries are: Albania, Belarus, Bulgaria, Croatia, the Czech Republic, Georgia Hungary, Turkey. And only in one country (Romania) the direction of causality is from the respective growth rates of GDP and per capita GDP to external debt.

One possible explanation of this result for Romania could be the presence of 'multiplier-accelerator' type of mechanism in terms of investment behavior. In this kind of investment behavior, higher growth rate of GDP leads to an increase in the investment which can (at least partly) be financed by additional external borrowing in the case of Romania. In addition, higher income growth might be increasing the growth of domestic consumption more than savings necessitating additional external borrowing. And the fact that Romania has been found to be one of the few countries in our sample for which external debt had no causal effect on economic growth might be due to the fact that the critical threshold level of external debt (in terms of percentage of GDP) beyond which 'debt overhang' becomes operational may not have been reached yet.

The obvious implication of these results is the fact that, in eight countries stated earlier, the accumulation of additional external debt is likely to cause changes in the respective annual growth rates of both real GDP and per capita real GDP. And there is no evidence of causality between external debt and economic growth (in both directions) in the remaining three countries which include Macedonia, Poland and Ukraine.

5. Conclusions

This study contributes to the existing literature on external debt- growth nexus mainly in three alternative ways; first, it focuses on a specific sample of twelve countries all of which (except one) not only can be categorized as post-communist transition economies (from Central and Eastern Europe), but also are countries whose external debt levels (as % of GDP) have exceeded critical threshold levels suggested in most of the past literature. Secondly, it uses 2 alternative methodologies to empirically analyze the nature of the relationship between external debt and economic growth; panel regression analysis and individual granger causality testing for each country. And thirdly, it uses 2 alternative proxies as a measure of economic growth; annual GDP growth and annual per capita GDP growth. Given the fact that past literature investigating external debt-growth nexus for CEE countries is very limited (to the best of our knowledge) the empirical findings of the present study which are summarized below might be of critical importance for policy makers and researchers in these countries.

The panel growth regressions we have performed have produced evidence of a 'statistically significant' negative correlation (or association) between external debt and economic growth. And we have shown that this result is robust to the choice of proxy for economic growth. For an average country in our sample, this finding suggests that an increase in the stock of external debt (as a % of GDP) is highly likely to be associated with lower respective growth rates of real GDP and per capita real GDP. Since this result holds for an average country in our sample and only shows correlation (or association) between external debt and growth, we have applied the Granger causality tests for each individual country to investigate whether or not there is a causal relationship between the two variables.

The Granger Causality tests (we have carried out) have produced evidence of a 'statistically significant' causal effect of external debt on economic growth (for both proxies of growth) in eight of the twelve countries investigated. Furthermore, the results of these tests have revealed that there exists a causal effect of economic growth on external debt in only one of the twelve countries analyzed. These causality test results coupled with the negative correlation obtained from the panel regression results suggest that accumulation of additional external debt is likely to have growth retarding effects in most of the countries investigated. Therefore, the evaluation of expected costs and benefits of foreign borrowing

must be carried out in light of this finding. If careful policy analysis shows that adverse growth effects of external debt are sufficiently high relative to expected social benefits, then policies that can discourage additional external borrowing should be considered both for private and public sectors. It is worthy to note that usually reduction in stock of external debt requires an improvement in current account balance. To achieve this, one of the necessary conditions is depreciation of the real exchange rate which can allow for changes in the sectoral composition of output and employment in favor of tradables (exportables and importables). To the extent that intersectoral mobility of labor and capital is low, this process can be relatively painful in terms of the size and duration of additional unemployment that may temporarily emerge. In that case government may find it welfare improving to apply policies that can increase the degree of intersectoral mobility of resources. Such policies may include 'training programs' for labor force that will move from contracting 'non-tradable' sectors to expanding tradable sectors.

As pointed out earlier in the paper, the nature of the linkages between external debt and economic growth is likely to be complex and dynamic, incorporating alternative channels. And the relative size of the opposing effects transmitted through different channels may change over time. Therefore, as new data becomes available, new research may produce different results regarding the nature of the relationship between external debt and economic growth.

Further limitations of present study and directions for future research can be summarized as follows: We have not carried out impulse responses analysis for each country that can shed additional light on the nature of the dynamic response of economic growth to shocks in external debt in countries where external debt had a causal effect on economic growth. Secondly, in our study we didn't investigate the differential growth effects of alternative sub-components of external debt such as private vs. public external debt and short-term vs. long-term external debt. Future research may attempt to investigate the causal effects of each one of these sub-components of external debt on economic growth separately so as to provide more specific insights for policy makers in the formulation of their debt management policies.

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