

FOREIGN DEBT AND ECONOMIC GROWTH: EMPIRICAL EVIDENCE FROM THE DEVELOPING COUNTRIES

¹ALTAN-ERDENE BATBAYAR, ²MYAGMARSUREN BOLDBAATAR

¹Accounting Department, National University of Mongolia

²Department of Economics, National University of Mongolia

E-mail: ¹myagmarsuren.b@num.edu.mn, ²altanerdene.b@num.edu.mn

Abstract- This paper empirically analyzes the relationship between foreign debt and economic growth of developing countries and attempts to estimate debt threshold for every classification of countries by income level and lending categories using linear as well as non-linear models. Our study is the broadest one regarding the coverage (118 developing countries) and time period (1990 to 2015). The empirical results show that foreign debt has a non-linear effect on economic growth regardless of in which income group and lending categories they belong to. The debt threshold is estimated from 30 percent (countries of IDA and Blend category) to 90 percent (countries of upper-middle income group).

Keyword- economic growth, foreign debt, debt threshold, income level, lending category

I. INTRODUCTION

External debt or foreign debt is an outstanding amount of liabilities, as defined by the International Monetary Fund (IMF), that are owed to nonresidents of an economy. As noted Dogruet al.(2007), due to the 1980's debt crisis, the relationship between external debt and economic growth in developing countries has caught special attention and the related literature is increased significantly.

According to the Clements et.al. (2005), the theory suggests that the external debt stock and its service affect growth by discouraging private investment or altering the composition of public spending. Higher external interest payments can increase country's budget deficit, therefore, reducing public savings if private savings do not increase to offset the difference. This, in turn, may either drive up interest rates or crowd out the credit available for private investment, depressing economic growth. Debt services may discourage growth by squeezing the public resources available for investment in infrastructure and human capital.

Moreover, the external debt may have nonlinear effects on growth, either through capital accumulation or productivity growth. According to debt overhang effect hypothesis, an accumulated debt discourages and overhang investment, mainly private investment; as private investors expect an increase in tax by the government to pay the accumulated debt. Serven (1997) argues that high debt creates uncertainties and unstable environment which make the resources are likely to be misallocated and poor quality investments undertaken which slows productivity growth.

On the other hand, taking an external debt generally means an increase in the supply of financial asset in the economy which enhances financial deepening. From this point of view, some part of the external

debt may enhance financial deepening ultimately economic growth.

Generally, theory either previous studies show that debt has significant negative effect on economic growth. Basing on the previous statement, we build following three hypotheses on the relationship between external debt and economic growth.

Hypothesis 1. Total external debt has a negative effect on economic growth in developing countries.

Hypothesis 2. This effect is non-linear.

Hypothesis 3. Depending on the income level and lending categories of countries, the debt threshold might be different.

In previous studies, debt has a significant negative effect on economic growth. Those results are based on the, at most, 93 developing countries covering 36 years' data. In this study, we analyze most available panel dataset covering 27-years data of 118 developing countries which are classified in three income groups (low-income, lower-middle-income, and upper-middle income) and three lending categories (IDA, Blend, IBRD).

This study consists of three sections. The first section is devoted to the theoretical background and literature review on the relationship between economic growth and external debt. In section two, we study the connection between economic growth and external debt applying fixed effects and GMM (Generalized Method of Moments) estimators. In the third section, the estimation results and implications are provided. Finally, it concludes.

II. LITERATURE REVIEW

Debt is one of the sources of financing the capital formation in any economy. Diallo (2007) emphasized that there are two main opposing schools of thought on the economic theory of external debt and growth,

namely the Keynesian and the neoclassical. To the Keynesians, indebtedness does not bring about charges either for future generations or present generations as a result of the investments that it generates. According to this theory, indebtedness, which revives demand, results in a more proportionate increase in investment through the accelerator effect. This, in turn, leads to a rise in production. By contrast, the classical economists consider indebtedness as a future tax and attribute it to the State. It is a negative connotation because to them, public indebtedness hinders capital accumulation and consumption by present and future generations.

The theoretical literature suggests that foreign borrowing has a positive impact on investment and growth up to a certain threshold level; beyond this level, however, its impact is adverse. As indicated in Cohen (1993), the relationship between the face value of debt and investment can be represented as a "Laffer curve": as outstanding debt increases beyond a threshold level, the expected repayment begins to fall as a consequence of the adverse effects mentioned above. The implication is that an increase in the face value of debt leads to an increase in repayment up to the "threshold" level; along the "wrong" side of the debt Laffer curve, on the other hand, increases in the face value of debt reduce expected payments. Given the positive effects of capital accumulation on economic activity, a similar

type of Laffer curve between external debt and growth could also be expected, as in Clements et al. (2003).

The literature of the relationship between external debt and economic growth in developing countries were increased smoothly after 1980's debt crisis (Theodore, 2009). The debt crisis became a serious macroeconomic problem for many developing countries during that period and had originated from the first oil price shock around 1973 and 1974 (Cline, 1983).

In the second half of the 1990s, high external indebtedness of developing countries has received increased attention from policymakers and public opinion around the world, as one of the main factors contributing limit the development of numerous poor countries, as in Pattillo et al. (2002). According to the Figure 1, the Average External Debt to GDP had been increasing until 1990 and since then started to decline. Numerous empirical studies are issued since this time. The main objective of these studies centered mainly on the external debt impact on economic growth. The result from studies showed that the impact of external debt on economic growth was mostly observed negatively, but a few not (Shabbir, 2013). Particularly, Savvides (1992) found that the ratio of debt to GNP has no statistically significant effect on growth. Some of these studies are stated below.

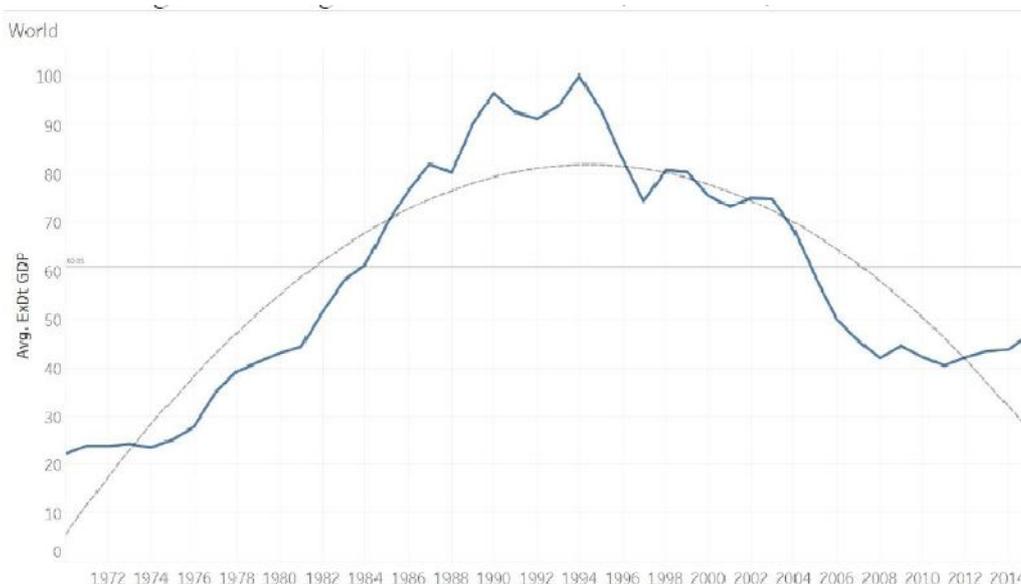


Figure 1. Average External Debt to GDP, worldwide, 1970-2016

Source: authors' calculation

Among the pioneering studies, Geiger (1990) used the lag distributional model to assess the impact of external debt on economic growth for 9 South American countries over a period of 12 years (1974-1986) and found a statistically significant inverse

relationship between the debt burden and economic growth.

While analyzing 13 developing countries for a period of 1960-1981 and 1982-1989, Warner (1992) could not find any conclusive evidence whether the debt has

any negative effect on economic growth or it may have adepressed investment in those developing countries.

Cohen (1993) used a larger data set of 81 developing countries over a period of 1965-1987 and did not find any evidence of a negative relationship between external debt and economic growth.

Chowdhury (1994) attempted to resolve the controversy of cause and effect relationship between external debt and economic growth, by conducting Granger causality tests for Asian and Pacific Countries over a period of 1970-1988. He found that both the public and private external debt has a relatively petite impact on GNP, and both have opposite signs. He found that any increase in GNP leads to a higher level of external debt, but overall external debt does not have any negative impact on economic growth.

Gerald (1994) employed the simple neo-classical model to evaluate whether capital imports can increase output and whether there are enough exports to meet the external debt servicing in 31 Sub-Saharan African countries. His model suggested that actual surplus available for debt service may be much smaller and may lead to debt overhang.

Iyoha (1999) used a simulation approach to investigate the impact of external debt on economic growth in sub-Saharan African countries estimating a small macro-econometric model for the period 1970-1994. He found an inverse relationship between debt overhang, crowding out and investment thereby concluding that external debt depresses investment through both a “disincentive” effect and a “crowding out” effect, thus affecting economic growth.

Dijkstra et al. (2001) reviewed a number of studies on the “debt overhang” hypothesis and concluded that the empirical evidence is incomplete.

Hansen (2002) found that in a sample of 50 developing countries (including 17 HIPC's), the inclusion of three additional explanatory variables (budget surplus, inflation, and openness) leads to the negative effect of debt service on growth and investment.

Pattillo et al. (2002) found a negative effect of external debt on growth basing on the large panel dataset of 93 developing countries over 1969-1998. Their next study (2004) confirmed the negative effect applying the panel regressions for 61 developing countries over the same period. They employed various estimation methods namely, OLS, IV, fixed effects, differenced GMM, and system GMM, and four debt indicators (Debt to exports, Debt to GDP, NPV of debt to exports, and NPV of debt to GDP) in their two studies. In the second study, they detected that an impact of debt on growth was disparate between low and high levels of debt. At low levels, the effect was generally positive but often not significant. At high levels, there was a large negative

significant impact. In addition, the policy environment also affects the debt and growth relationship.

Clements et al. (2003) found that “high levels of debt can depress economic growth in low-income countries”. This view is supported by many researchers: Moss et al. (2003) review that a vast literature that addresses high-level debt has negative effects on growth.

Schclarek (2004) investigated the relationship between debt and growth in both developing and industrial countries. For developing countries, they found that lower total external debt levels are associated with higher growth rates and that this negative relationship is driven by the incidence of public external debt, and not by private external debt. For industrial countries, they didn't find any significant relationship between gross government debt and economic growth. They used the system GMM technique, four different dependent variables (GDP per capita growth rate, Total factor productivity growth rate, Capital accumulation growth rate, and Private savings rate) and three debt indicators (Total external debt to GDP, Public external debt to GDP, and Private external debt to GDP) for developing countries. Their dataset consists of a panel of 59 developing and 24 industrial countries with data averaged over each of the seven 5-year periods between 1970 and 2002.

Uzun et al. (2012) analyzed the relationship between external debt and growth rate by panel autoregressive distributed lag (ARDL) model for 19 transition countries over a period of 1991-2009. They chose GDP per capita growth rates as a dependent variable and External debt to GNI and Openness as independent variables. Their estimation results were presented that the debt has a negative effect on growth rate in short run and has a positive effect on the long run for those transition countries.

Shabbir (2013) found that current stock of external debt would slow down the economic growth and also found a strong inverse relationship between external debt services and growth rate. They observed 70 developing countries for thirty-six years, covered the period from 1976 to 2011.

Summarizing the results of the previous studies, debt has a significant negative effect on economic growth. Those results are based on the, at most, 93 developing countries covering 36 years' data.

III. DATA DESCRIPTION AND ESTIMATION METHOD

We applied most available 118 developing economies dataset covering from 1990 to 2015. The data are from various sources. The description for all variables is provided in Table 1

| Variable name | Coverage | Variable description |
|--|-----------|--|
| <i>Dependent variables– Source: WDI Database, WB, 2016</i> | | |
| GDPGrwth | 1990-2015 | GDP growth (annual %) |
| GDPPrCpGr | 1990-2015 | GDP per capita growth (annual %) |
| <i>Control variables related to the income – Source: WDI Database, WB, 2016</i> | | |
| LnPerCap | 1990-2015 | Calculated: the log of GDP per capita (constant 2010 US\$) |
| FDI_GDP | 1990-2015 | Foreign direct investment, net inflows (% of GDP) |
| Exp_GDP | 1990-2015 | Exports of goods and services (% of GDP) |
| GFCF_GDP | 1990-2015 | Gross fixed capital formation (% of GDP) |
| GovCnsmpl_GDP | 1990-2015 | General government final consumption expenditure (% of GDP) |
| <i>Control variables related to the financial market – Source: GFDDatabase, WB, 2016</i> | | |
| BnkCrisis | 1990-2011 | Banking crisis dummy (1=banking crisis, 0=none) |
| ka_open | 1990-2015 | The Chinn-Ito financial openness index. Source: web.pdx.edu/~ito/Chinn-Ito_website.htm |
| <i>Control variables related to the labor market – Source: WDI Database, WB, 2016</i> | | |
| PopulGrwth | 1990-2015 | Population growth (annual %) |
| Unemp_LF | 1990-2015 | Unemployment, total (% of total labor force) |
| <i>Control variables related to the rate – Source: WDI Database, WB, 2016</i> | | |
| Inflation_CPI | 1990-2015 | Inflation, consumer prices (annual %) |
| <i>Control variables related to the governance – Source: WGI Database, WB, 2016</i> | | |
| WGI_PolStab | 1996-2015 | Political Stability and Absence of Violence/Terrorism |
| <i>External debt indicator variables – Source: IDS and WDI Database, WB, 2015</i> | | |
| ExDt_GDP | 1990-2015 | Calculated: Total external debt stocks (DOD ²) at current USD divided by GDP at current USD |
| LnExDt_GDP | 1990-2015 | Calculated: the log ExDt_GDP |
| LnExDt_GDPsq | 1990-2015 | Calculated: square of LnExDt_GDP |

Table 1. Variable Description: External Debt and Economic Growth

Descriptive statistics of variables are shown in Table 2.

| Variables | Obs. | Mean | Std.dev. | Min | Max |
|---------------|------|---------|----------|----------|-------------|
| GDPGrwth | 2976 | 3.8785 | 6.2817 | -51.0309 | 106.2798 |
| GDPPrCpGr | 2976 | 2.1171 | 6.1145 | -50.2301 | 92.1233 |
| LnPerCap | 2976 | 7.4932 | 1.0410 | 4.7518 | 9.5923 |
| FDI_in_GDP | 2926 | 3.9879 | 6.3634 | -82.8921 | 89.4760 |
| Exp_GDP | 2899 | 33.5716 | 18.4697 | 0.0995 | 127.5553 |
| GFCF_GDP | 2754 | 21.6422 | 8.1118 | -2.4244 | 68.0227 |
| GovCnsmpl_GDP | 2767 | 14.2892 | 5.3332 | 2.0471 | 50.0000 |
| BnkCrisis | 2596 | 0.0890 | 0.2848 | 0 | 1 |
| ka_open | 2893 | 0.3727 | 0.3150 | 0 | 1 |
| PopulGrwth | 3068 | 1.7007 | 1.3467 | -10.9552 | 7.9179 |
| Unemp_LF | 2875 | 9.5428 | 7.0917 | 0.1000 | 39.3000 |
| Inflation_CPI | 2830 | 54.3518 | 704.8446 | -35.8367 | 24,411.0300 |
| WGI_PolStab | 1986 | -0.4613 | 0.8564 | -2.9741 | 1.3847 |
| ExDt_GDP | 2941 | 66.7971 | 92.9269 | 0.1404 | 1,846.5500 |
| LnExDt_GDP | 2941 | 3.8490 | 0.8192 | -1.9630 | 7.5211 |
| LnExDt_GDPsq | 2941 | 15.4853 | 6.2653 | 0.0124 | 56.5666 |

Table 2. Descriptive statistics

We use income level classifications by World Bank to estimate the threshold level of external debt on growth of those group. The 118 developing countries are assigned into three income groups and three lending categories (see Table 3).

| Lending category | Low-income countries | Lower-middle-income countries | Upper-middle-income countries | Total |
|------------------|----------------------|-------------------------------|-------------------------------|------------|
| IDA | 26 | 24 | 2 | 52 |
| Blend | 1 | 11 | 4 | 16 |
| IBRD | - | 11 | 39 | 50 |
| Total | 27 | 46 | 45 | 118 |

Table 3. Number of countries, by income level and lending categories

Economies are divided into IDA, IBRD, and Blend countries based on the operational policies of the World Bank. International Development Association (IDA) countries are those with low per capita incomes that lack the financial ability to borrow from the International Bank for Reconstruction and Development (IBRD). Blend countries are eligible for

IDA loans but are also eligible for IBRD loans because they are financially creditworthy.

The unit root tests are conducted and we employ a Fisher-type unit-root test, which works well with unbalanced panel. The results are shown in Table 4.

| Variables | Country No | Z-statistic | Variables | Country No | Z-statistic |
|--------------|------------|-------------|---------------|------------|-------------|
| GDPGrwth | 118 | -28.665*** | ka open | 118 | -21.053*** |
| GDPPrCpGr | 118 | -29.082*** | PopulGrwth | 118 | -29.511*** |
| LnPerCap | 117 | -16.062*** | Unemp_LF | 115 | -19.659*** |
| FDI_in_GDP | 118 | -22.609*** | Inflation_CPI | 118 | -28.303*** |
| Exp_GDP | 118 | -17.895*** | WGI_PolStab | 118 | -16.681*** |
| GFCF_GDP | 116 | -18.313*** | ExDt_GDP | 118 | -14.936*** |
| GovCnsmp_GDP | 115 | -20.986*** | LnExDt_GDP | 118 | -13.611*** |
| BnkCrisis | 118 | -22.334*** | LnExDt_GDPsq | 118 | -13.752*** |

Note: *** indicates 1% significance level

Table 4. Unit Root Test Results

All variables were stationary in levels. We employ two estimation methods: panel fixed effects estimation and generalized method of moments (GMM) which is developed by Arellano and Bover (1995) and Blundell and Bond (1998).

The regression model is specified as follows:

$$ED_{it} = \beta_X X_{it} + \beta_{EDT} EDT_{it} + \delta_i + \varepsilon_{it}$$

- i and t – country and time, respectively;
- ED – the dependent variables related to economic development (growth rates of GDP, growth rates of GDP per capita);
- X – the set of control variables (related to the education, labor market, financial market, etc.);
- EDT – the external debt variables (log of total external debt to GDP and its square);
- δ – the fixed effect (country);
- ε_{it} - an idiosyncratic shock and it is assumed $\varepsilon_{it} \sim iid(0, \sigma^2)$, and independent of δ_i and other

independent variables [$E(\varepsilon_{it} | X_{it}, EDT, \delta_i) = 0$]; and serially uncorrelated.

IV. ESTIMATION RESULTS AND ITS IMPLICATION

Table 5 shows the estimation results for linear model which is estimated by fixed effects and system GMM estimators. The most coefficients of control variables are statistically significant and have the expected (reasonable) signs.

Here we use several types of control variables related to the income, education, financial market, labor market, rates, and governance. The coefficient signs of the control variables are expected as follows:

- The logged per capita is expected to have a negative coefficient due to the convergence effect while the coefficients on foreign direct investment, trade openness, gross fixed capital formation, and terms of trade are predicted to be positive.
- Banking crisis is expected to have a negative while domestic credit to private sector and financial openness index are predicted to be positive.
- Population growth is expected to be positive when the dependent variable is GDP growth, negative when it is GDP per capita growth. Unemployment is awaited to be negative.
- Inflation is predicted to have negative coefficients.
- Finally, according to the previous studies, external debt variable is expected to have a negative sign.

| | Model 1 | | Model 2 | | Model 3 | |
|-------------------|------------------|------------------|------------------|------------------|------------------|-----------------|
| | FE | SGMM | FE | SGMM | FE | SGMM |
| Intercept | 11.374*** | 5.104*** | 14.094*** | 0.000 | 6.432*** | 0.000 |
| GDPGrwth, lagged | | 0.247*** | | 0.239*** | | 0.286*** |
| LnPerCap, lagged | -0.586*** | | -0.575*** | | -0.568*** | |
| FDI_GDP | 0.047*** | 0.036 | 0.034* | 0.015 | | |
| Exp_GDP | 0.022*** | 0.010 | | | | |
| GFCF_GDP | | | | | 0.136*** | 0.092*** |
| GovCnsmp_GDP | | | -0.067*** | -0.049* | | |
| BnkCrisis | | | -2.201*** | -2.263*** | | |
| ka_open | | | 0.584 | 0.396 | | |
| PopulGrwth | 0.301*** | 0.369*** | | | | |
| Unemp_LF | | | | | -0.030* | -0.027 |
| Inflation_CPI | -0.000** | -0.000*** | -0.000** | -0.000*** | | |
| WGI_PolStab | 0.213* | 0.073 | 0.227 | 0.022 | | |
| LnExDt GDP | -0.920*** | -0.588*** | -1.045*** | -0.650*** | -0.575*** | -0.352** |
| F statistic | 12.196 | | 10.716 | | 14.914 | |
| p-value | (0.000) | | (0.000) | | (0.000) | |
| Observations | 1826 | 1834 | 1277 | 1276 | 1760 | 1768 |
| Countries | 118 | 118 | 109 | 109 | 112 | 112 |
| Adjusted R-square | 0.124 | | 0.132 | | 0.142 | |
| Instruments | | 56 | | 45 | | 54 |
| Hansen's p-value | | 0.058 | | 0.028 | | 0.088 |
| AB test for AR(1) | | 0.000 | | 0.000 | | 0.000 |
| AB test for AR(2) | | 0.571 | | 0.551 | | 0.594 |

Note: ***, ** and * indicate 1%, 5% and 10% level of significance, respectively.

Table5. Foreign debt and Economic growth, linear model, all countries

For debt variable, the coefficients have similar signs as previous studies and are significant at the 5 percent level. Particularly, the coefficient of Model 1 estimated by fixed effect is -0.920, on average, indicating that high external debt decreases the

growth rate of the economy by 0.920 percentage points for developing countries.

Table 6 shows the estimation results for nonlinear model which are estimated by fixed effects and system GMM model. The signs of control variables' coefficients are similar to previous results.

| | Model 1 | | Model 2 | | Model 3 | |
|---------------------|------------------|------------------|------------------|-----------------|------------------|------------------|
| | FE | SGMM | FE | SGMM | FE | SGMM |
| Intercept | 5.682*** | -0.261 | 9.177*** | 1.754 | 2.154 | -2.328* |
| GDPGrwth, lagged | | 0.239*** | | 0.233*** | | 0.281*** |
| LnPerCap, lagged | -0.592*** | | -0.596*** | | -0.573*** | |
| FDI_GDP | 0.054*** | 0.042 | 0.043** | 0.022 | | |
| Exp_GDP | 0.026*** | 0.012 | | | | |
| GFCF_GDP | | | | | 0.138*** | 0.094*** |
| GovCnsmp_GDP | | | -0.067*** | -0.050** | | |
| BnkCrisis | | | -2.071*** | -2.184*** | | |
| ka_open | | | 0.625* | 0.425 | | |
| PopulGrwth | 0.318*** | 0.390*** | | | | |
| Unemp_LF | | | | | -0.029* | -0.028 |
| Inflation_CPI | -0.000** | -0.000*** | -0.000** | -0.000*** | | |
| WGI_PolStab | 0.110 | -0.009 | 0.172 | -0.027 | | |
| LnExDt GNI | 2.343*** | 2.007*** | 1.761** | 1.445* | 1.853*** | 1.492** |
| LnExDt GNIsq | -0.451*** | -0.360*** | -0.375*** | -0.280** | -0.333*** | -0.253*** |
| F statistic | 12.953 | | 10.797 | | 15.026 | |
| p-value | (0.000) | | (0.000) | | (0.000) | |
| Observations | 1826 | 1834 | 1277 | 1276 | 1760 | 1768 |
| Countries | 118 | 118 | 109 | 109 | 112 | 112 |
| Adjusted R-square | 0.136 | | 0.139 | | 0.149 | |
| Instruments | | 57 | | 46 | | 55 |
| Hansen's p-value | | 0.020 | | 0.022 | | 0.032 |
| AB test for AR(1) | | 0.000 | | 0.000 | | 0.000 |
| AB test for AR(2) | | 0.603 | | 0.555 | | 0.600 |

Note: ***, ** and * indicate 1%, 5% and 10% level of significance, respectively.

Table 6. Foreign debt and Economic growth, non-linear model, all countries

The number of countries and instruments are reported with GMM estimation results. We collapse instruments to reduce its number when estimating system GMM. The Arellano-Bond (AB) tests and Hansen's test are reported the reliability of estimation.

The result shows that the debt variable has a significant positive effect on growth while the square of debt variable has a significant negative effect. Since debt has nonlinear effect on growth, we attempted to estimate a threshold level of debt for several groups of countries and the results are presented in Table 7-11.

| Threshold level | 20% | 30% | 40% | 50% | 60% | 70% |
|-------------------|------------------|------------------|------------------|------------------|-------------------|-------------------|
| LnExDt_GNI | 0.990* | -0.044 | -0.411 | -0.534** | -0.464** | -0.584*** |
| F statistic | 3.757 (0.000) | 5.768 (0.000) | 6.455 (0.000) | 8.138 (0.000) | 10.651 (0.000) | 12.784 (0.000) |
| Observations | 231 | 581 | 841 | 1020 | 1219 | 1371 |
| Countries | 39 | 83 | 94 | 105 | 111 | 116 |
| Adjusted R-square | 0.216 | 0.159 | 0.13 | 0.139 | 0.154 | 0.165 |

Table 7. Threshold level, all countries

| Threshold level | 20% | 30% | 40% | 50% | 60% | 70% |
|-------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| LnExDt_GNI | 0.044 | -1.195* | -1.275** | -0.997* | -0.738 | -0.525 |
| F statistic | 1.580 (0.102) | 1.455 (0.086) | 2.596 (0.000) | 3.752 (0.000) | 4.498 (0.000) | 5.650 (0.000) |
| Observations | 78 | 275 | 413 | 516 | 623 | 699 |
| Countries | 19 | 46 | 54 | 62 | 65 | 67 |
| Adjusted R-square | 0.108 | 0.037 | 0.082 | 0.109 | 0.115 | 0.133 |

Table 8. Threshold level, IDA and Blend lending categories countries

| Threshold level | 20% | 30% | 40% | 50% | 60% | 70% |
|-------------------|------------------|------------------|------------------|------------------|-------------------|-------------------|
| LnExDt_GNI | 0.951 | 0.279 | 0.006 | -0.228 | -0.171 | -0.493** |
| F statistic | 3.644 (0.000) | 5.700 (0.000) | 8.222 (0.000) | 8.593 (0.000) | 10.327 (0.000) | 11.829 (0.000) |
| Observations | 172 | 347 | 504 | 625 | 746 | 853 |
| Countries | 22 | 44 | 50 | 57 | 61 | 65 |
| Adjusted R-square | 0.262 | 0.238 | 0.248 | 0.219 | 0.224 | 0.226 |

Table9. Threshold level, IBRD and Blend lending categories countries

| Threshold level | 20% | 30% | 40% | 50% | 60% | 70% |
|-------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| LnExDt_GNI | 4.260 | -1.096 | -2.781* | -2.344* | -2.497** | -2.287*** |
| F statistic | 1.836 (0.075) | 1.790 (0.035) | 2.100 (0.006) | 2.230 (0.003) | 2.236 (0.002) | 3.088 (0.000) |
| Observations | 46 | 154 | 203 | 222 | 254 | 283 |
| Countries | 11 | 23 | 25 | 26 | 26 | 27 |
| Adjusted R-square | 0.229 | 0.081 | 0.094 | 0.100 | 0.101 | 0.146 |

Table10. Threshold level, low-income countries

| Threshold level | 20% | 30% | 40% | 50% | 60% | 90% |
|-------------------|------------------|------------------|------------------|------------------|------------------|-------------------|
| LnExDt_GNI | 2.117** | 1.030** | 0.771** | 0.313 | 0.200 | -0.485** |
| F statistic | 2.850 (0.000) | 6.313 (0.000) | 8.816 (0.000) | 8.404 (0.000) | 9.749 (0.000) | 11.135 (0.000) |
| Observations | 123 | 236 | 341 | 429 | 491 | 647 |
| Countries | 16 | 28 | 33 | 39 | 41 | 45 |
| Adjusted R-square | 0.259 | 0.342 | 0.346 | 0.285 | 0.291 | 0.265 |

Table 11. Threshold level, upper-middle income countries

Table 7 reports that threshold level is 50 percent which indicates that if debt-GDP ratio exceeds 50 percent, debt effect to growth diverts from positive to negative. This estimate is for all countries, however, if we take into account classification of countries (by income level and lending category) the threshold would be different.

For instance, threshold level is 30 percent for countries of IDA and Blend lending category while it is 70 percent for IBRD and Blend lending category countries. For the low-income countries the threshold level is only 40 percent but 90 percent is for the upper-middle income countries.

In order to check the robustness of the estimation results, we replace GDP per capita growth (GDPPrCpGr) instead of GDP growth (GDPGrwth). Those results confirm the relations between debt and growth; however, they are not reported here to save space.

CONCLUSION

In this paper, we investigate the relationship between external debt and economic growth. For this purpose, we collect most available 118 countries debt dataset along with standard control variables and build linear fixed effect as well as dynamic panel models. Our estimation results support the hypothesis that total external debt has a negative effect on economic growth in developing countries.

We estimate non-linear models in order to address the second question of our study. We find that total debt has nonlinear effect on growth.

Third, we estimate threshold level of debt-GDP ratio for all countries along with for different classification (by income level and lending category) of countries. For all countries the threshold level was 50 percent but it varies from classification to classification. The level was 30 percent for IDA and Blend lending categories countries when it was 90 percent for upper-middle income countries. Those results support our third hypothesis.

These empirical results imply that debt does not impede economic growth when appropriate threshold level is maintained. And authority should take care of this fact to retain economic growth.

REFERENCES

- [1] Adjasi, C., & Biekpe, N. (2006). Stock Market Development and Economic Growth: The Case of Selected African Countries. *African Development Review*, Vol. 18, Issue 1, 144-161.
- [2] Agenor, P.-R., & Montiel, P. (1996). *Development Macroeconomics*. Princeton, New Jersey: Princeton University Press.
- [3] Arellano, M., & Bover, O. (1995). Another Look at the Instrumental Variable Estimation of Error-Components Models. *Journal of Econometrics*, Vol. 68, 29-51.
- [4] Arestis, P., & Demetriades, P. (1997). Financial Development and Economic Growth: Assessing the Evidence. *The Economic Journal*, Vol. 107, No. 442, 783-799.

- [5] Atje, R., & Jovanovic, B. (1993). Stock Markets and Development. *European Economic Review*, Vol. 37, 632-640.
- [6] Beck, T., & Levine, R. (2002). Stock Markets, Banks, and Growth: Panel Evidence. NBER Working Paper Series 9082.
- [7] Beck, T., Demircuc-Kunt, A., & Levine, R. (1999). A New Database on Financial Development and Structure. World Bank - Financial Sector Discussion Paper, No.2.
- [8] Blundell, R., & Bond, S. (1998). Initial Conditions and Moment Restrictions in Dynamic Panel Data Models. *Journal of Econometrics*, Vol. 87, 115-143.
- [9] Boldbaatar, M., & Lee, C. (2015). Financial Accessibility and Economic Growth. *Journal of East Asian Integration*, Vol. 19, No. 2, 143-166.
- [10] Bordo, M., Meissner, C., & Stuckler, D. (2009). Foreign Currency Debt, Financial Crises and Economic Growth: A Long Run View. NBER Working Paper, No. 15534.
- [11] Brooks, R., Cortes, M., Fornasari, F., Benoit, K., Metzgen, Y., Powell, R., . . . Ross, K. (1998). External Debt Histories of Ten Low-Income Developing Countries: Lessons From Their Experience. IMF Working Paper, 98/72.
- [12] Caballero, R., & Krishnamurthy, A. (2003). Excessive Dollar Debt: Financial Development and Underinsurance. *The Journal of Finance*, Vol. 58, No. 2, 867-893.
- [13] Cas, S., & Ota, R. (2008). Big Government, High Debt, and Fiscal Adjustment in Small States. IMF Working Paper, WP/08/39.
- [14] Chinn, M., & Ito, H. (2006). What Matters for Financial Development? Capital Controls, Institutions, and Interactions. *Journal of Development Economics*, Vol. 81, Issue 1, 163-192.
- [15] Cho, J. (1995). External Debt and Policy Controversy in Korea. *Southern Economic Journal*, Vol. 62, No. 2, 467-480.
- [16] Choi, I. (2001). Unit Root Tests for Panel Data. *Journal of International Money and Finance*, No. 20, 249-272.
- [17] Clements, B., Bhattacharya, R., & Nguyen, T. (2003). External Debt, Public Investment, and Growth in Low-Income Countries. IMF Working Paper, WP/03/249, 1-24.
- [18] Cline, W. (1983). *International Debt and the Stability of the World Economy*. Washington, D.C.: MIT Press.
- [19] Cohen, D. (1993). Low Investment and Large LDC Debt in the 1980's. *American Economic Review*, Vol. 83, No. 3, 437-449.
- [20] Cull, R., & Efron, L. (2008). World Bank Lending and Financial Sector Development. *The World Bank Economic Review*, Vol. 22, No. 2, 315-343.
- [21] Culpeper, R., & Kappagoda, N. (2016). The new face of developing country debt. *Third World Quarterly*, Vol. 37, Iss.6.
- [22] Dellas, H., & Galor, O. (1992). Growth via External Public Debt and Capital Controls. *International Economic Review*, Vol. 33, No. 2, 269-281.
- [23] Diallo, B. (2007). External Debt and Financing of Economic Development in Guinea. National Directorate of Economic Studies and Forecasting, Ministry of Economy and Finance, Guinea.
- [24] Dijkstra, G., & Hermes, N. (2001). Debt Relief and Economic Recovery in Latin America: Lessons for HIPC's. XXIII International Congress of the Latin American Studies Association (LASA), Washington DC.
- [25] Dogruel, F., & Dogruel, A. (2007, January 4-7). Foreign Debt Dynamics in Middle Income Countries. MEEA Annual Meeting, pp. 1-18.
- [26] Durusu-Ciftci, D., Ispir, M., & Yetkiner, H. (2016). Financial Development and Economic Growth: Some Theory and More Evidence. *Journal of Policy Modeling*.
- [27] Freytag, A., & Pehnelt, G. (2009). Debt Relief and Governance Quality in Developing Countries. *World Development*, Vol. 37, No. 1, 62-80.
- [28] Hajivassiliou, V. (1994). A Simulation Estimation Analysis of the External Debt Crises of Developing Countries. *Journal of Applied Econometrics*, Vol. 9, No. 2, 109-131.
- [29] Hansen, H. (2002). The Impact of Aid and External Debt on Growth and Investment. Credit Research Paper, No. 02/26.
- [30] Hauner, D. (2009). Public Debt and Financial Development. *Journal of Development Economics*, Vol. 88, 171-183.
- [31] Hwang, J.-T., Chung, C.-P., & Wang, C.-H. (2010). Debt Overhang, Financial Sector Development and Economic Growth. *Hitotsubashi Journal of Economics* 51, 13-30.
- [32] IMF. (2002). *Assessing Sustainability*. Policy Development and Review Department, Washington D.C.
- [33] IMF. (2014). *External Debt Statistics: Guide for Compilers and Users*.

- [34] King, R., & Levine, R. (1993). Finance and Growth: Schumpeter Might be Right. *The Quarterly Journal of Economics*, Vol. 108, No. 3, 717-737.
- [35] La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2002). Government Ownership of Banks. *The Journal of Finance*, Vol. LVII, No. 1, 265-301.
- [36] Levine, R. (1997). Financial Development and Economic Growth: Views and Agenda. *Journal of Economic Literature*, 35(2), 688-726.
- [37] Levine, R. (2005). Finance and Growth: Theory and Evidence. In P. A. Durlauf, *Handbook of Economic Growth*, Volume 1A. Elsevier B.V.
- [38] Levine, R., Demirguc-Kunt, A., Cihak, M., & Feyen, E. (2013). Financial Development in 205 Economies, 1960 to 2010. NBER Working Paper Series(18946), 1-54.
- [39] Levine, R., Loayza, N., & Beck, T. (2000). Financial intermediation and growth: Causality and causes. *Journal of Monetary Economics*, 46, 31-77.
- [40] Liang, Q., & Teng, J.-Z. (2006). Financial development and economic growth: Evidence from China. *China Economic Review*, 395-411.
- [41] Masoud, N., & Hardaker, G. (2012). The Impact of Financial Development on Economic Growth. *Studies in Economics and Finance*, Vol. 29, Issue 3, 148-173.
- [42] Mishkin, F. (2006). *The Economics of Money, Banking, and Financial Markets*, 7th edition update. Daryl Fox.
- [43] Moss, T., & Chiang, H. (2003). The Other Costs of High Debt in Poor Countries: Growth, Policy Dynamics, and Institutions. Debt Sustainability Issue Paper, No. 3.
- [44] Nyasha, S., & Odhiambo, N. (2015). Economic Growth and Market-based Financial Systems: a review. *Studies in Economics and Finance*, Vol. 32, Issue 2, 235-255.
- [45] Pattillo, C., Poirson, H., & Ricci, L. (2002). External Debt and Growth. IMF Working Paper, WP/02/69.
- [46] Pattillo, C., Poirson, H., & Ricci, L. (2004). What are the Channels Through Which External Debt Affects Growth? IMF Working Paper, WP/04/15.
- [47] Reinhart, C., & Rogoff, K. (2010). Growth in a Time of Debt. *The American Economic Review*, Vol. 100, No. 2, 573-578.
- [48] Reinhart, C., & Rogoff, K. (2011). From Financial Crash to Debt Crisis. *The American Economic Review*, Vol. 101, No. 5, 1676-1706.
- [49] Roodman, D. (2009). How to Do xtabond2: An Introduction to Difference and System GMM in Stata. *The Stata Journal*, Vol. 9, No. 1, 86-136.
- [50] Sachs, J., & Williamson, J. (1985). External Debt and Macroeconomic Performance in Latin America and East Asia. *Brookings Papers on Economic Activity*, Vol. 1985, No. 2, 523-573.
- [51] Savvides, A. (1992). Investment Slowdown in Developing Countries during the 1980s: Debt Overhang or Foreign Capital Inflows? *Kyklos*, Vol. 45, No. 3, 363-378.
- [52] Schclarek, A. (2004). Debt and Economic Growth in Developing and Industrial Countries.
- [53] Selowsky, M., & Van Der Tak, H. (1986). The Debt Problem and Growth. *World Development*, Vol. 14, Issue 9, 1107-1124.
- [54] Shabbir, S. (2013). Does External Debt Affect Economic Growth: Evidence from Developing Countries. SBP Working Paper Series, No.63.
- [55] Shan, J., & Morris, A. (2002). Does Financial Development 'Lead' Economic Growth? *International Review of Applied Economics*, Vol. 16, No. 2, 153-168.
- [56] Szabo, Z. (2013). The Effect of Sovereign Debt on Economic Growth and Economic Development. *Public Finance Quarterly*, p. 251-270.
- [57] Theodore, C. (2009). *Global Political Economy: Theory and Practice*. Longman.
- [58] United Nations. (2002). Report of the International Conference on Financing for Development. Monterrey, Mexico.
- [59] Uzun, A., Karakoy, C., Kabadayi, B., & Emsen, O. (2012). The Impacts of External Debt on Economic Growth in Transition Economies. *Chinese Business Review*, ISSN 1537-1506, Vol. 11, No. 5, 491-499.
- [60] Woodward, D. (1992). Debt, Adjustment and Poverty in Developing Countries, Volume 1 - National and International Dimensions of Debt and Adjustment in Developing Countries. London: Pinter Publishers.
- [61] World Bank. (2012). *Global Financial Development Report 2013: Rethinking the Role of the State in Finance*. Washington, DC: World Bank.
- [62] World Economic Forum. (2008). *The Financial Development Report*. New York: World Economic Forum USA Inc.

APPENDIX

Appendix 1. Classification of countries

| Low income countries (27) | Lower-middle income countries (46) | Upper-middle income countries (45) |
|---------------------------|---|--|
| IDA (52) | Bangladesh; Bhutan; Cambodia; Cote d'Ivoire; Djibouti; Ghana; Honduras; Kenya; Kosovo; Kyrgyz Republic; Lao PDR; Lesotho; Mauritania; Myanmar; Nicaragua; Samoa; Solomon Islands; Sudan; Syrian Arab Republic; Tajikistan; Tonga; Vanuatu; Yemen, Rcp.; Zambia (24) | Guyana; Maldives (2) |
| Blend (16) | Bolivia; Cabo Verde; Cameroon; Congo, Rep.; Moldova; Mongolia; Nigeria; Pakistan; Papua New Guinea; Sri Lanka; Vietnam (11) | Dominica; Grenada; St. Lucia; St. Vincent and the Grenadines (4) |
| IBRD (50) | Armenia; Egypt, Arab Rep.; El Salvador; Guatemala; India; Indonesia; Morocco; Philippines; Swaziland; Tunisia; Ukraine (11) | Albania; Algeria; Angola; Argentina; Azerbaijan; Belarus; Belize; Bosnia and Herzegovina; Botswana; Brazil; Bulgaria; China; Colombia; Costa Rica; Dominican Republic; Ecuador; Fiji; Gabon; Georgia; Iran, Islamic Rep.; Jamaica; Jordan; Kazakhstan; Lebanon; Macedonia, FYR; Malaysia; Mauritius; Mexico; Montenegro; Panama; Paraguay; Peru; Romania; Russian Federation; Serbia; South Africa; Thailand; Turkey; Venezuela, RB (39) |

Note. The number in the parenthesis indicates the number of countries that belong to that classification.