

# **Does External Debt Affect Economic Growth: Evidence from Developing Countries**

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## **Abstract**

By taking a dataset from 24 developing countries over the period of 1976-2003, this paper attempts to explore the relationship between external debt and economic growth, focusing on whether external debt stock and the external debt servicing leads to crowding out. Our findings are consistent with both the debt overhang theory and the liquidity constraint hypothesis suggesting that external debt stock adversely affects economic growth and higher level of external debt stock leads to crowding out.

*JEL classification:* F34; F43; O47

*Keywords:* External debt; Growth; Economic Growth

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## **I. INTRODUCTION**

Sustainable economic growth is of predominant concern for all economies, especially for the developing economies which commonly face burgeoning fiscal deficits mainly driven by higher levels of debt servicing, particularly external debt servicing and widening current account deficits. Economists have, therefore, focused to explore the channels through which external debt can possibly hamper economic growth, and came up with two competing hypothesis, i.e. debt overhang theory and liquidity constraint hypothesis. Over the time, various studies tried to explore the validity of these hypotheses, using different data sets and different methodologies. Some of these studies confirmed these hypotheses, while others could not. This paper is also an attempt to explore whether external debt has any direct effect on economic growth, and, does the external debt stock in developing countries affect the level of private investment. In addition this paper investigates the effectiveness of private investment for the economic growth.

Since developing countries are striving for sustainable economic growth, they need to control their escalating fiscal deficit. In order to bring it down, these countries are confronted with the challenges of increasing revenues, curtailing unessential public expenditures and expanding avenues for new investment that can derive these economies to higher growth trajectory path while limiting the current account deficit to sustainable levels. Apart from that, as majority of these economies heavily rely on foreign borrowings, the international donor agencies commonly demand fiscal prudence,

economic and political stability, sound banking system, lower cost of doing business, and an environment conducive for investment to ensure further assistance. To address these internal and external concerns, countries often take counterproductive measures by slashing essential capital expenditures that have a large damaging impact on long-run economic growth. Therefore, it is imperative for such economies to provide investment opportunities for the private sector while reducing the cost of doing business that can help them to progress and achieve a higher level of income with improved living standards.

Heavy external debt does not necessarily imply a slow economic growth. It is a country's inability to meet its debt obligations compounded by the lack of information on the nature, structure and magnitude of the external debt (Were 2001). Countries may have heavy external debt along with relatively higher level of exports that can help them to sustain their level of external debt. But external debt, if not sustainable, imposes higher risk to the economic prosperity, as its servicing which is also an indicator of higher current account deficit, may lead to debt overhang in a country. For any economy, debt either public or publically guaranteed, which also includes the contingent liabilities, plays a crucial role towards overall economic progress. Developing economies typically have limited sources to fetch revenues. If they fail to utilize their debt productively, mobilize investment and create new employment opportunities; they will eventually get stuck up with the dilemma of lower revenue base which will affect their spending capacity, thereby leading to higher debt servicing. Inability to service debt on time not only makes it harder for the developing countries to get aid at concessional rates with less conditionalities from the donor agencies but it also increases the country risk. That not only reduces the overall level of foreign direct investment but forces a country to rely on

domestic borrowing. This higher domestic borrowing increase the domestic interest rate which leads to crowding out that further slows down the economic growth.

Traditionally, while assessing the external debt vulnerabilities and risk factors that can hamper economic growth, economists' give emphasis on two types of indicators, namely external debt indicators and macroeconomic indicators<sup>1</sup>. External debt indicators include the assessment of external debt to GDP ratio, external debt to exports ratio that helps in analyzing the burden of debt services, and short-term debt to total debt ratio, that gauges the liquidity problems associated with external debt. In case of macroeconomic indicators, focus lies on a number of variables mainly comprising the level of net international reserves, real effective exchange rate, level of inflation, GDP, openness of trade, lending and borrowing rates, domestic credit, level of investment and fiscal deficit. Following the basic pattern of conventional studies, this paper analyzes a relatively small sample of 24 developing countries<sup>2</sup> over a period of 1976-2003, employing all the leading variables of external debt indicators and macroeconomic indicators. Furthermore, apart from the abovementioned economic variables, this paper attempts to evaluate the affect of private investment on economic growth, and also endeavors to determine the factors that affect the overall level of private investment in developing economies. The results of the paper are consistent with both the theories of debt overhang and the liquidity constraint hypothesis, and therefore, conclude that external debt does hamper economic growth, and affects through the channel of private investment.

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<sup>1</sup> Loser (2004)

<sup>2</sup> The list of countries is provided in Appendix A.

After reviewing the relevant and recent research literature on the topic in Section II, the paper presents a brief description of data in Section III. The empirical analysis relating to the linear panel data techniques employed in this paper is comprehensively dealt in Section IV, while the subsequent section concludes the paper with policy recommendations on the topic.

## **II. LITERATURE REVIEW<sup>3</sup>**

Many empirical studies have investigated the effect of external debt on economic growth, some end up finding a negative impact on economic growth while others do not find any significant relationship between economic growth and external debt. Most of these studies have used real GDP and GDP growth rate as dependent variables and tried to explore the direct impact of external debt servicing on GDP growth rate. However, a few studies focused on assessing the impact of external debt on per capita GDP, long term consumption pattern and capital formation. Nevertheless, the findings of these studies are mixed; therefore, in this scenario it is hard to say whether external debt has positive, negative or any significant impact on economic growth.

The initial studies on this topic confined themselves to a relatively smaller dataset and focused on time series analysis, but later, many studies used panel data and sophisticated econometric techniques to deal with various data management and empirical issues. Among those pioneering studies, Geiger (1990) used the lag distributional model to assess the impact of external debt on economic growth for 9 South American countries

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<sup>3</sup> Findings of previous empirical studies are summarized in Appendix B

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 debt has any negative effect on economic growth or it may have depressed investment in those developing countries. Cohen (1993) used a larger data set of 81 developing countries over a period of 1965- 87 and did not find any evidence in favor 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 1970-88. He found that both-public and private external debt, have a relatively very small 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 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. Furthermore, lyoha (1999) used 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.

Focusing on one of the HIPC countries, Were (2001) analyzed the debt overhang problem in Kenya and tried to find evidence for its impact on economic growth. Using time series data from 1970-1995, this study did not find any adverse impact of debt servicing on economic growth; however, it confirmed some crowding-out effects on private investment. Furthermore, employing data from 59 developing and 24 industrial countries over a period of 1970-2002, Schclarek (2004) could not find any evidence that external debt may affect total factor productivity. However, he found that in case of developing countries higher growth rate is associated with a relatively lower external debt levels and this negative relationship is mainly driven by public external debt rather than private external debt. While, in case of industrial countries, he could not find any evidence for the existence of such relationship between public external debt and economic growth.

Similarly, to investigate the impact of external indebtedness on economic growth for Sudan, Mohamed (2005) used a time series data from 1978–2002. He used growth rate of real export earnings to capture the impact of export promotion strategy, while inflation to capture the impact of macroeconomic policy. He concluded that external debt and inflation deter economic growth, while, real exports have positive and significant impact on economic growth. Villanueva et al. (2006) used standard neo-classical growth model to explore the dynamics of capital accumulation, external debt and economic growth for Philippines over a period of 2000-2003. They used goal seek technique to estimate the steady state ratio of external debt to GDP, associated with doubling the per capita income. Additionally, he also tried to estimate the optimal savings rate that is

“consistent with maximum real consumption per unit of effective labor in the long run”<sup>4</sup>. He concluded that higher ratio of change in interest rate spread to change in debt-to-GDP lowers welfare in long run.

Adepoju et al. (2007) analyzed the time series data for Nigeria over a period from 1962 to 2006. Exploring time to time behavior of donor agencies as an outcome of various bilateral and multilateral arrangements, they concluded that accumulation of external debt hampered economic growth in Nigeria. Furthermore Jayaraman et al. (2008) focused on the flow of foreign aid in 6 Pacific Island countries over the period of 1988-2004. These countries had been among the top recipients of foreign aid till early 80s, but later on could not maintain the level of higher aid inflows due to change in political situation thereby subsequently fell into the trap of twin deficits. While assessing whether the higher flow of foreign aid and external debt had ever contributed to economic growth in these countries, the study concluded a significantly positive relationship between external debt and real GDP; and an inverse relationship between higher fiscal deficit and GDP growth.

Hameed et al. (2008) explored the dynamic effect of external debt servicing, capital stock and labor force on the economic growth for Pakistan for a period of 1970-2003. They found an adverse effect of external debt servicing on labor and capital productivity which ultimately hampers economic growth. Butts (2009) investigated the causal relationship between short term external debt and GDP growth rate for 27 Latin American and Caribbean countries over a period of 1970-2003 and found an evidence of granger causality in 13 countries.

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<sup>4</sup> Villanueva et al. (2006)

To sum up, the prime objective of these studies reviewed here is to explore the empirical evidence regarding the dynamic relationship between external debt and economic growth. Most of the research done in this area used a broader data set defined over a longer time series than others, with only a few studies focused on country specific analysis. Overall, majority of the studies came up with a conclusion that higher level of external debt is associated with a relatively lower level of economic growth; with only few studies that found no conclusive evidence supporting these hypotheses.

### **III. DATA DESCRIPTION**

Due to data availability issues, this study analyzes a relatively small sample of 24 developing countries over a period of 1976-2003. the prime source of data for basic variables, like growth rate GDP per capita, total external debt to GDP, total debt services to export ratio, terms of trade, inflation, official exchange rate, openness, public and publicly guaranteed debt as percent of GNI and interest rate spread is “World Development Indicators 2007” (WDI 2007) of World Bank. The data for the total investment, public investment and private investment is taken from “International Finance Corporation” (IFC) and World Bank (Everhart *et al.* 2001). The summary statistics of the variables are defined in table 1.

#### IV. EMPIRICAL ANALYSIS

The dataset for 24 countries is used for analysis purposes defined over twenty eight years (1976- 2003). The basic estimation technique of random effect and fixed effect is applied with linear panel data model. The baseline model for GDP growth rate is based on the set of two parameters i.e. E and M, where E is the set of external debt indicators, and M is the set of macroeconomic indicators. E includes total external debt to GDP, total debt services to export ratio, public and publicly guaranteed debt as percent of GNI, while M incorporates terms of trade, inflation, official exchange rate, openness, total investment to GDP ratio, public investment and private investment to GDP ratio. To capture the linkage between external debt and level of private investment that ultimately affect economic growth, another set of equation is defined for private investment. Private investment equation is also characterized with the set of variables E and M. In investment equation, E incorporates the set of external debt indicators, total external debt to GDP, total debt services to export ratio, public and publicly guaranteed debt as percent of GNI, while M is the set of macroeconomic indicators that usually affect private investment behavior in a country. These include terms of trade, inflation, official exchange rate, openness and interest rate spread. Given these set of variables, the linear panel data with random effect is specified as

$$Y_{it} = \alpha + E_{it}\beta + M_{it}\gamma + u_i + \varepsilon_{it} \quad (1)$$

Where  $Y_{it}$  is a the GDP growth rate in a country  $i$  during period  $t$ ,  $E_{it}$  is set of external debt variables, and the vectors  $M_{it}$  includes the macroeconomic variables as defined

above and  $u_i$  is random effect. To capture the effect of individual heterogeneity across the sample, fixed effect technique is used in this linear panel data model. The model is, therefore, specified as

$$Y_{it} = \alpha_i + E_{it}\beta + M_{it}\gamma + \varepsilon_{it} \quad (2)$$

Where  $\alpha_i$  captures country fixed effect.

### **A. Effect of External Debt on Growth<sup>5</sup>**

The results from the random effect estimation for growth equation are reported in table 2, while the fixed effect estimation is reported in table 3. These results are consistent with the debt overhang hypothesis which states that current stock of external debt will slow down the economic growth. The coefficients are highly significant at 1 percent and depict an inverse relationship between external debt to GDP and the GDP growth rate for the developing countries. Estimates predict that an overall rise of 10 percent in external debt to GDP will lead to 0.2 percent fall in economic growth. However, we could not find any evidence favoring the hypothesis that external debt servicing to export earnings does reduce economic growth, as most of the estimates from random effect estimation are insignificant for external debt to export earnings, public and publicly guaranteed debt to GNI and public and publicly guaranteed debt to export earnings.

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<sup>5</sup> The results for Hausman tests suggest the use of Random effect estimation, as Prob>chi2 = 0.53, however, result obtained from both estimations are reported in table 2 and table 3 respectively.

Total investment to GDP is significant at 1 percent, and the estimates suggest a positive relationship between economic growth and total investment. These results are further supported when the effects of both the public and private investment are analyzed separately. This depicts that, private investment has greater impact on economic growth as compared to the public investment. Further evaluation done by taking lagged values of both public and private investment, shows that the results remain significant at 1 percent for public investment and at 5 percent for private investment. They predict that a 10 percent increase in public investment over a lag of one year will lead to 1.7 percent increase in economic growth while the contribution of private investment during the same period will be 1.1 percent.

While analyzing the macroeconomic indicators, terms of trade does not exhibit any significant impact on economic growth. One possible reason can be that these developing countries are small open economies, having political and economic stability issues. Therefore, countries that are stuck up with higher external debt may not necessarily reap the full benefits of trade. However, we do find evidence that inflation have a negative impact on economic growth, but the degree of impact is minimal. The estimates are significant at 5 percent level, and depict that on average 10 percent increase in inflation may be likely to hit the GDP growth by 0.01 percent.

Thus we can say that results obtained from both the external debt indicators and macroeconomic indicators are aligned with the theory and prove the hypothesis that external debt does hamper economic growth.

## **B. External Debt and Private Investment<sup>6</sup>**

According to debt overhang theory, when countries have higher external debt to GDP ratio, they may find relatively less funds available to provide an environment conducive for business and promote investment, which further deteriorate the current level of economic growth. “The liquidity constraint hypothesis” also imposes the same constraint emphasizing on crowding out impact. It states that an increase in external debt servicing leaves less avenues for developing countries to service their debt, that, therefore, affect their ability to borrow further from external resources, putting pressure on domestic borrowing and leading to crowding out. Therefore, a reduction in current debt service should lead to an increase in current investment for any given level of future indebtedness (Cohen 1993). Our results are consistent with the liquidity constraint hypothesis, and exhibit a negative impact of total debt servicing to exports on the level of private investment, as well as a negative impact of public and publicly guaranteed debt to GNI.

The set of investment equations estimated in table 4 reveals the fact that a higher GDP growth rate encourages private investment. The results are significant at 1 percent; depicting a 1 percent increase in GDP growth rate will, on average, encourage private investment by 2.7 percent. On the other hand, terms of trade that captures the external shocks is highly significant, stating that vulnerability of terms of trade adversely affects the level of private investment in developing countries; however, trade openness promotes private investment. The estimates suggest that on average 10 percent increase in openness (the ratio of exports plus imports to GDP) will lead to 0.2 percent increase in private investment.

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<sup>6</sup> The results for Hausman tests suggest the use of Fixed effect estimation, as  $\text{Prob} > \chi^2 = 0.17$ , however, result obtained from both estimations are reported in table 4 and table 5 respectively

Claessens *et al.* (1996) believed that *“if debt will exceed the country’s repayment ability with some probability in the future, expected debt service is likely to be an increasing function of the country’s output level. Thus some of the returns from investing in the domestic economy are effectively ‘taxed’ away by existing foreign creditors and investment by domestic and new foreign investors, is discouraged.”* Our results support this hypothesis, proving that the stock of previous external debt is likely to deteriorate private investment and will lead to crowding out. The estimates suggests that on average 10 percent increase in external debt to GDP ratio will decrease private investment by 0.1 percent. The results are highly consistent with the liquidity constraint hypothesis, and predict that a 10 percent increase in public and publicly guaranteed debt to GNI ratio will decrease the level of private investment to GDP by 2 percent. This impact is huge and therefore, cannot be ignored. The estimates also depicts that level of current public investment and the public investment in the previous period also help promoting the private investment, and can serve as a good indicator to attract foreign investment in the country.

## **V. CONCLUSION AND POLICY RECOMMENDATIONS**

This paper attempts to evaluate how external debt is possibly hitting economic growth in the developing countries. The study tries to explore the linkage between economic growth and external debt by using the set of major macroeconomic and external debt indicators. The findings of the paper are consistent with both the competing hypothesis, i.e debt overhang hypothesis and liquidity constraint hypothesis.

The results suggest an inverse relationship between the stock of external debt to GDP ratio and the GDP growth rate in developing countries. Macroeconomic variables behave nicely and are aligned with the theory. Higher level of inflation does hamper economic growth, while investment contributes to economic well being. In our model investment does play key role, total investment to GDP, as well as both the public and private investment to GDP contributes towards the economic prosperity. The estimates for total investment to GDP, as well as, both the public and private investment to GDP are highly significant and hold a positive relationship with GDP growth rate.

Further, focusing on the perspective of mobilization of private investment in developing countries, our model suggests that higher GDP growth rate attracts private investment and helps in mobilizing resources towards investment. However, external debt stock to GDP is inversely related to the level of private investment to GDP in developing economies. Debt servicing to GDP does hamper economic growth, and may leave less funds available to finance private investment in these countries leading to crowding out. Contribution of openness is positive towards investment, but these countries are vulnerable to negative terms of trade shocks, that may lead to crowding out. The estimates for inflation are significant but the degree of effect is relatively lower.

Findings of this paper suggests that developing countries need to mobilize enough resources so that they can, not only meet their debt service obligations on time and have an access to tap the external resources, but also have resources to mobilize their private investment. External debt, if not sustainable, may adversely affect the economic growth. It has an adverse effect on the behavior of private investment, and leads to crowding out. Developing economies, therefore, need to channelize their external resources in a way

that it can help in creating new opportunities for investment and attract more investors to their countries. Openness, affects positively to the level of investment suggesting that higher level of exports will not only decrease the public and publicly guaranteed debt to exports earnings ratio but will also help in promoting the private investment in these countries.

**Table 1: Summary of the Variables**

Variable	Source	Observations	Percent Available	Mean	Std. Dev.	Min	Max
Growth rate of GDP	WDI	667	99	4.0	4.4	(13.1)	16.7
Total External Debt to GDP	WDI	663	99	52.8	30.3	3.0	175.6
Total Debt Services to Export ratio	WDI	652	97	21.8	12.0	0.8	78.4
Total Investment as percent of GDP	World Bank IFC &	548	82	21.3	6.6	8.5	44.3
Private Investment as percent of GDP	World Bank IFC &	548	82	13.2	5.2	2.2	34.4
Public Investment as Percent of GDP	World Bank	548	82	8.1	4.0	0.2	22.8
Terms of Trade	WDI	538	80	108.3	29.4	51.0	245.6
Inflation	WDI	637	95	35.2	326.5	(7.6)	7481.7
Official Exchange Rate	WDI	650	97	432.9	2222.2	0.1	25000.0
OPPENESS	WDI	671	100	59.0	31.7	9.0	228.9
Public and Publicly Guaranteed Debt as percent of GNI	WDI	662	99	4.3	2.7	0.3	16.7
Public and Publicly Guaranteed Debt as percent of Export Earnings	WDI	652	97	16.2	9.4	0.8	51.9
Interest rate spread	WDI	496	74	13.6	109.3	(34.7)	2335.0

**Table 2: Effect of external debt on Economic Growth (Estimation with Random Effects)**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Total External Debt to GDP	-0.021*** (0.007)	-0.028*** (0.007)	-0.032*** (0.007)	-0.017** (0.007)	-0.029*** (0.007)	-0.025*** (0.007)	-0.031*** (0.007)	-0.034*** (0.007)	-0.021*** (0.007)	-0.025*** (0.007)	-0.032*** (0.007)	-0.035*** (0.007)	-0.022*** (0.007)
Terms of Trade	0.008 (0.007)	0.010 (0.007)	0.013* (0.008)	0.009 (0.007)	0.009 (0.007)	0.007 (0.007)	0.008 (0.007)	0.011 (0.007)	0.008 (0.006)	0.006 (0.007)	0.007 (0.007)	0.011 (0.007)	0.007 (0.006)
Inflation	-0.001** (0.000)	-0.001** (0.001)	-0.001** (0.001)	-0.001** (0.000)	-0.001** (0.001)	-0.001** (0.000)	-0.001** (0.001)	-0.001** (0.001)	-0.001** (0.001)	-0.001** (0.001)	-0.001** (0.001)	-0.001** (0.001)	-0.001** (0.001)
Total debt service to exports	-0.031 (0.020)	-0.032 (0.020)	-0.030 (0.020)	-0.033* (0.019)	-0.031 (0.020)								
Openness	-0.012 (0.008)	-0.004 (0.008)	0.003 (0.007)	-0.014* (0.008)	-0.003 (0.008)	-0.008 (0.007)	-0.001 (0.007)	0.006 (0.007)	-0.009 (0.007)	-0.007 (0.008)	0.001 (0.007)	0.006 (0.007)	-0.009 (0.007)
Exchange Rate	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.001* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.001* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.001* (0.000)
Total Investment	0.230*** (0.034)					0.236*** (0.032)				0.235*** (0.033)			
Total Investment (lag 1)		0.131*** (0.034)					0.149*** (0.032)				0.144*** (0.033)		
Total Investment (lag 2)			0.072** (0.034)					0.098*** (0.032)				0.0901*** (0.033)	
Private Investment				0.273*** (0.043)					0.265*** (0.041)				0.266*** (0.041)
Public Investment				0.167*** (0.053)					0.197*** (0.049)				0.193*** (0.050)
Private Investment (lag 1)					0.108** (0.044)								
Public Investment (lag 1)					0.174*** (0.053)								
Public and Publicly Guaranteed Debt as percent of GNI						0.023 (0.080)	0.026 (0.081)	-0.006 (0.080)	0.012 (0.078)				
Public and Publicly Guaranteed Debt as percent of Export Earnings										0.006 (0.024)	0.007 (0.024)	0.000 (0.024)	0.003 (0.024)
Constant	1.072 (1.129)	2.859** (1.143)	3.417*** (1.125)	0.874 (1.110)	2.810** (1.130)	0.267 (1.038)	1.846* (1.055)	2.338** (1.044)	0.044 (1.002)	0.283 (1.137)	1.931* (1.149)	2.554** (1.134)	0.064 (1.095)
Observations	420	439	457	420	439	420	439	457	420	420	439	457	420
Number of id	23	23	23	23	23	23	23	23	23	23	23	23	23

Note: Standard errors in parenthesis. \*\*\* Significant at 1%; \*\* Significant at 5%; \* Significant at 10%

**Table 3: Effect of external debt on Economic Growth (Estimation with Fixed Effects)**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Total External Debt to GDP	-0.034*** (0.011)	-0.039*** (0.011)	-0.037*** (0.011)	-0.02* (0.011)	-0.035*** (0.011)	-0.051*** (0.011)	-0.055*** (0.011)	-0.049*** (0.011)	-0.036*** (0.012)	-0.047*** (0.011)	-0.053*** (0.010)	-0.051*** (0.010)	-0.032*** (0.011)
Terms of Trade	0.002 (0.008)	0.005 (0.009)	0.010 (0.009)	0.009 (0.008)	0.007 (0.009)	-0.003 (0.008)	-0.001 (0.008)	0.003 (0.009)	0.004 (0.008)	-0.004 (0.008)	-0.002 (0.008)	0.002 (0.009)	0.004 (0.008)
Inflation	-0.001** (0.001)	-0.001** (0.001)	-0.001** (0.001)	-0.001** (0.001)	-0.001** (0.001)	-0.001 (0.001)	-0.0009* (0.001)	-0.001** (0.001)	-0.001* (0.001)	-0.001 (0.001)	-0.001* (0.001)	-0.001* (0.001)	-0.001* (0.001)
Total debt service to exports	-0.034 (0.024)	-0.04* (0.024)	-0.046* (0.024)	-0.036 (0.024)	-0.04* (0.024)								
Openness	-0.018 (0.016)	-0.014 (0.015)	-0.009 (0.014)	-0.028* (0.016)	-0.017 (0.015)	-0.002 (0.015)	0.000 (0.014)	0.004 (0.013)	-0.013 (0.015)	0.001 (0.015)	0.005 (0.015)	0.009 (0.014)	-0.010 (0.015)
Exchange Rate	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.001** (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.001** (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.001** (0.000)
Total Investment	0.202*** (0.052)					0.225*** (0.052)				0.209*** (0.052)			
Total Investment (lag 1)		-0.012 (0.051)					0.012 (0.051)				0.003 (0.051)		
Total Investment (lag 2)			-0.182*** (0.049)					-0.166*** (0.050)				-0.167*** (0.049)	
Private Investment				0.337*** (0.061)					0.347*** (0.060)				0.339*** (0.060)
Public Investment				-0.115 (0.092)					-0.077 (0.094)				-0.096 (0.092)
Private Investment (lag 1)					0.022 (0.062)								
Public Investment (lag 1)					-0.088 (0.092)								
Public and Publicly Guaranteed Debt as percent of GNI						0.238** (0.111)	0.182 (0.111)	0.083 (0.109)	0.183* (0.110)				
Public and Publicly Guaranteed Debt as percent of Export Earnings										0.0512* (0.030)	0.0509* (0.030)	0.041 (0.030)	0.041 (0.030)
Constant	3.538** (1.691)	7.866*** (1.667)	10.52*** (1.607)	3.293** (1.658)	7.778*** (1.670)	1.751 (1.673)	6.244*** (1.663)	9.399*** (1.604)	1.728 (1.644)	1.853 (1.700)	6.093*** (1.687)	9.004*** (1.633)	1.771 (1.669)
Observations	420	439	457	420	439	420	439	457	420	420	439	457	420
R-squared	0.11	0.077	0.101	0.148	0.079	0.117	0.077	0.094	0.149	0.113	0.077	0.097	0.147
Number of id	23	23	23	23	23	23	23	23	23	23	23	23	23

Note: Standard errors in parenthesis. \*\*\* Significant at 1%; \*\* Significant at 5%; \* Significant at 10%

**Table 4: Private Investment, External Debt and Growth (Estimation with Random Effects)**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
GDP growth rate	0.272*** (0.050)	0.281*** (0.049)	0.295*** (0.049)	0.287*** (0.049)	0.295*** (0.049)	0.307*** (0.049)	0.283*** (0.050)	0.291*** (0.049)	0.304*** (0.049)
Total External Debt to GDP	0.012 (0.017)	0.012 (0.016)	0.014 (0.016)	0.011 (0.017)	0.011 (0.016)	0.013 (0.016)	0.008 (0.017)	0.008 (0.016)	0.010 (0.016)
Total External Debt to GDP(lag1)	-0.0501*** (0.015)	-0.0527*** (0.015)	-0.0557*** (0.015)	-0.0479*** (0.015)	-0.0503*** (0.015)	-0.0532*** (0.015)	-0.0506*** (0.015)	-0.0531*** (0.015)	-0.0562*** (0.015)
Terms of Trade	-0.0168** (0.008)	-0.0183** (0.008)	-0.0224*** (0.008)	-0.0191** (0.008)	-0.0207*** (0.008)	-0.0247*** (0.008)	-0.0200*** (0.008)	-0.0217*** (0.008)	-0.0257*** (0.008)
Inflation	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)
openness	0.0498*** (0.014)	0.0498*** (0.013)	0.0521*** (0.013)	0.0555*** (0.012)	0.0554*** (0.012)	0.0566*** (0.012)	0.0569*** (0.013)	0.0564*** (0.013)	0.0581*** (0.013)
Interest rate spread	-0.004 (0.007)	-0.003 (0.007)	-0.003 (0.007)	-0.004 (0.007)	-0.003 (0.007)	-0.003 (0.007)	-0.003 (0.007)	-0.002 (0.007)	-0.002 (0.007)
Total debt service to exports	-0.0405* (0.023)	-0.0398* (0.023)	-0.037 (0.023)						
Public Investment	0.027 (0.081)			0.020 (0.081)			0.030 (0.081)		
Public Investment (lag 1)		0.149* (0.080)			0.142* (0.080)			0.155* (0.080)	
Public Investment (lag 2)			0.153** (0.074)			0.154** (0.074)			0.157** (0.075)
Public and Publicly Guaranteed Debt as percent of GNI				-0.189* (0.103)	-0.181* (0.103)	-0.185* (0.102)			
Public and Publicly Guaranteed Debt as percent of Export Earnings							-0.019 (0.029)	-0.021 (0.029)	-0.020 (0.029)
Constant	14.06*** (1.530)	13.35*** (1.556)	13.52*** (1.577)	13.83*** (1.481)	13.13*** (1.509)	13.36*** (1.529)	13.58*** (1.555)	12.93*** (1.578)	13.17*** (1.597)
Observations	346	344	342	346	344	342	346	344	342
Number of id	22	22	22	22	22	22	22	22	22

Note: Standard errors in parenthesis. \*\*\* Significant at 1%; \*\* Significant at 5%; \* Significant at 10%

**Table 5: Private Investment, External Debt and Growth (Estimation with Fixed Effects)**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
GDP growth rate	0.260*** (0.050)	0.273*** (0.049)	0.290*** (0.050)	0.277*** (0.049)	0.288*** (0.049)	0.304*** (0.050)	0.273*** (0.050)	0.285*** (0.049)	0.301*** (0.050)
Total External Debt to GDP	0.012 (0.017)	0.011 (0.016)	0.013 (0.016)	0.011 (0.017)	0.010 (0.016)	0.013 (0.016)	0.006 (0.017)	0.006 (0.016)	0.009 (0.016)
Total External Debt to GDP(lag1)	-0.048*** (0.015)	-0.052*** (0.015)	-0.056*** (0.015)	-0.046*** (0.015)	-0.049*** (0.015)	-0.053*** (0.015)	-0.049*** (0.015)	-0.052*** (0.015)	-0.056*** (0.015)
Terms of Trade	-0.0174** (0.008)	-0.0198** (0.008)	-0.0243*** (0.009)	-0.0204*** (0.008)	-0.0228*** (0.008)	-0.0273*** (0.008)	-0.0216*** (0.008)	-0.0240*** (0.008)	-0.0285*** (0.008)
Inflation	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.002 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)
Openness	0.0421*** (0.016)	0.0440*** (0.016)	0.0479*** (0.016)	0.0485*** (0.015)	0.0504*** (0.014)	0.0528*** (0.014)	0.0533*** (0.016)	0.0542*** (0.015)	0.0571*** (0.015)
Interest rate spread	-0.005 (0.007)	-0.004 (0.007)	-0.004 (0.007)	-0.005 (0.007)	-0.004 (0.007)	-0.005 (0.007)	-0.004 (0.007)	-0.003 (0.007)	-0.003 (0.007)
Total debt service to exports	-0.0498** (0.024)	-0.0472** (0.024)	-0.0433* (0.024)						
Public Investment	0.050 (0.087)			0.038 (0.087)			0.053 (0.088)		
Public Investment (lag 1)		0.189** (0.086)			0.179** (0.087)			0.198** (0.087)	
Public Investment (lag 2)			0.192** (0.080)			0.192** (0.080)			0.200** (0.080)
Public and Publicly Guaranteed Debt as percent of GNI				-0.219** (0.110)	-0.198* (0.109)	-0.201* (0.109)			
Public and Publicly Guaranteed Debt as percent of Export Earnings							-0.022 (0.030)	-0.022 (0.030)	-0.021 (0.030)
Constant	14.61*** (1.432)	13.82*** (1.445)	13.96*** (1.470)	14.33*** (1.391)	13.53*** (1.407)	13.76*** (1.432)	13.90*** (1.458)	13.19*** (1.467)	13.42*** (1.489)
Observations	346	344	342	346	344	342	346	344	342
R-squared	0.219	0.235	0.242	0.219	0.233	0.243	0.21	0.226	0.236
Number of id	22	22	22	22	22	22	22	22	22

Note: Standard errors in parenthesis. \*\*\* Significant at 1%; \*\* Significant at 5%; \* Significant at 10%

## **Appendix A**

### **List of Countries**

Bangladesh  
Chile  
China  
Colombia  
Costa Rica  
Ecuador  
Egypt, Arab  
Rep.  
El Salvador  
Guatemala  
India  
Indonesia  
Kenya  
Madagascar  
Malawi  
Malaysia  
Mauritius  
Morocco  
Peru  
Philippines  
Thailand  
Trinidad and  
Tobago  
Tunisia  
Uruguay  
Venezuela, RB

## Appendix B

Author	Dependent Variable	Significant Explanatory Variables (Sign)	Countries Covered	Time Period
Khorsheed Chowdhury (1994)	GDP Capital Debt	Capital (+), K-square (-) GDP (+), Debt payment(-), Debt(+),inflation (-)Interest(-) GDP(+), Debt-1(+), Interest (+), Agri-labor(-)	Asian and Pacific Countries	1970-88
Gerald Scott (1994)	Log percapita GNP Log per capita consumption	Log Exports (+), Log Domestic Capital (+), Technology(-) Log capita imports (+), Log Exp(+),	31 sub-Saharan African countries	1980-87
Milton A. Iyoha (1999)	Log of GDP per capita gross domestic investment	Log Labor (+), Per capita Income (+) debt-income ratio and debt service ratio (+), Bedt overhang (-), crowding out (-)	sub-Saharan African countries	1970-1994
Maureen Were (2001)	GDP growth Rate Private Investment	Inflation (-), Inflation t-1 (+),Real public investment as a ratio of GDP (+),Real public investment as a ratio of GDP t-1(-), Private Investment (+), Fiscal deficit/GDP (-), Human Capital Development (+), Debt/GDP(-), Debt/GDPt-1(-),Debt Svc to exp (+), Debt/Tot(+) Inflation (-), Debt/GDP (+),lag(-), interest(-),debt svc to expt-1 (-)	Keyna	1970-1995
Alfredo Schclarek (2004)	growth rate of GDP per capita, the TFP growth rate, the capital, accumulation growth rate per capita, and the private savings rate	total external debt (-), Public external debt (-)	59 developing countries and 24 industrial countries	1970 -2002
Mutasim Ahmed Abdelmawla Mohamed (2005)	real GDP annual growth rate	Inflation(-), Annual Growth rate of External Debt/GDP(-), Annual Growth rate of real exports (+)	Sudan	1978- – 2001
Roberto S. Mariano, Delano Villanueva (2006)	Change in Spread/Change in Debt-to-GDP	Optimal saving rate, Gross external Debt/GDP, Net External Debt/GDP, Per capita GDP growth, Yrs to double PCI	Phillipines (used GoalSeek)	2000 – 2003
Adepoju, Adenike Adebisola, Salau, Adekunle Sheu , Obayelu, Abiodun Elijah (2007)	Data analysis	raw data analysis only	Nigeria	1962-2006
T.K. Jayaraman, Evan Lau (2008)	Real GDP	External Debt (+), Exports (+), Budget Deficit (-) {significant at 3rd lag}	14 Pacific Island Countries	1988–2004
Abid Hameed,Hammad Ashraf, Muhammed Ali Chaudhary (2008)	% change in GDP	Debt svc	Pakistan	1970-2003
Hector C. Butts (2009)	Short term external Debt, GDP	Found granger causality in 13 countries	27 Latin American and Caribbean countries	1970–2003
ERDAL KARAGOL	debt service, long-term capital inflows and economic growth	debt service (-), lag of Debt service (-), Exchange rate (-), exports (+)	Turkey	1959-1996

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