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The relationship between government debt and economic growth: A multi country study through a Credit Rating Agency perspective (1998-2018)

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ABSTRACT

This study investigates if there is fiscal space in emerging and developing market economies. We use an IS growth equation which is augmented with a non-linear debt term to estimate the turning point below which debt is positively related to growth and above which debt is negatively related to growth. We find that this turning point is on average 62.2% of sovereign debt to GDP. The implication of this is that policy makers should use such a turning point in assessing the fiscal financial sustainability of their economies. This turning point methodology should be used by policy makers to complement other existing methodologies in their fiscal sustainability assessment.

Key Words: IS curve; sovereign debt, economic growth, debt sustainability threshold

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-Kuni ziTwalandwe, sithi Aluta Continua! –

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CHAPTER 1

1. Introduction

1.1 Background of the Study

The last century represents the largest income generating capacity and improvement in the condition of society in recorded history. Evidenced in that GDP per capital in England has seen a more than 29-fold increase (IMF,2019) in the period. It has been the advent of economic growth that has propelled this income generation, with prosperity being the greatest differentiator of the last 20 generations to its ancestors (Roser,2019). Over the last two millennia global output has reached the $100 trillion mark with increases in productivity; introduction of technology; urbanization and access to financial services having been some of the contributors to the sustained economic growth (Roser,2019).

One of the propellants behind global prosperity appears be an unprecedent increase in global debt levels which have reached $258 trillion, a record 331% global debt/GDP in Q12020, with more than 60% accruing to governments (Shalal,2020). Debt levels to GDP for developed countries was 380% in 2019 and 230% for developing countries respectively, implying that debt levels are more than 3 times the size of the productive economy, of interest is that 92% of this debt is deemed investment grade by credit rating agencies(Shalal,2020). The post 2008-financial-crisis world to 2017, has seen hyperactivity in the debt markets with global debt levels increasing by 74%, majority to governments followed by nonfinancial corporate debt (McKinsey, 2018). The same period saw global GDP increase by 3.38%(IMF,2020). There appears to be a disjuncture between debt accumulation and its translation to stimulating growth, more so determining at which point does debt desist from having a stimulatory effect on economic growth, becomes a vital input in debt sustainability analysis in warding off sovereign default risk.

Assessing the post-World-War II global economy Reinhart and Rogoff (2012), suggests that there is a non-linear relationship between government debt and economic growth. Debt at relatively low levels positively correlates with growth and as debt begins to reach higher levels, it diverges from the growth trend. Despite the unanimous acceptance of this non-linearity, Wesphal and Rother (2012) note that there is no consensus about the exact point where the nonlinearity is observed (Egert, 2014; Polin and Ash, 2013). The turning point is important for the assessment of the fiscal financial sustainability of an economy.

1.2 Research Problem

This study has identified the nonlinear relationship between debt and growth and the determination of the maximum threshold or debt ceiling, post which debt becomes divergent from the growth trend and presents with sovereign default risk, as its focal point. The study is biased toward developing and emerging economies.

1.3 Research Objectives

The study uses the IS growth curve with augmentation for sovereign debt nonlinearity on the debt term to determine the turning point or maximum debt threshold by country, region and the average for the sample of developing and emerging countries. The study identifies countries that still have fiscal space to add more debt and those near and pass their maximum threshold, who present with fiscal sustainability concerns.

1.4 Significance of the study

The significance of the relationship between sovereign debt and economic growth is that Credit Rating Agencies (CRA's) rely on their correlation in their determination of sovereign default risk (Moody's, 2019; Fitch, 2017 and S&P,2015). Institutions such as the IMF and the World Bank also rely on the relationship to set country debt thresholds (IMF,2017). This determination of sovereign risk and debt thresholds affects the access of countries to development funding and the cost of funding (IMF,2017; Moodys,2016; S&P,2015; Fitch, 2017). The reports from these agencies are then used by the investor community to determine asset allocation and risk prudent investment jurisdictions according to BNP (2015) and Sinclair (2014). Furthermore Toyana (2018) notes that these models can trigger a capital flight and bring about financial instability in the countries concerned. Therefore, this study aims at directly contributing to the quantitative models of the credit rating agencies and the IMF and World Banks' Debt Sustainability Threshold Framework and investor community risk adjusted asset allocation models.

This study contributes to the literature on the relationship between sovereign debt and economic growth in emerging and developing market economies as set out by Karadam (2018) and Clements et al. (2003) on the nonlinearity of the relationship. Furthermore, as observed by Ratha et al., (2011) that CRA's; IMF and World Bank models appear adequate for developed economies but need to take account of the peculiarities of developing economies, the study aims at contributing to the knowledge gap.

Lastly on policy, the study aims at contributing to country specific fiscal management strategies by determining individual country maximum debt threshold limits so identifying those countries that still have the fiscal space for additional debt accumulation to support economic growth, and those countries who are near and have passed their maximum threshold with the objective of triggering a debt sustainability policy review and fiscal reprioritization where necessary.

1.5 Study Outline

The outline of the study is such that chapter 1 is followed by chapter 2 which is the literature review, focussed on the relationship between growth and debt in developed and developing countries. Chapter 3 focuses on the methodology employed in the study, leading to chapter 4 which is empirical analysis. Chapter 5 concludes the study findings making policy recommendations and identifying research gaps.

CHAPTER 2

2. Literature Review

According to Manmohan and Woo (2010), an increase in public debt has short and long-term implications on growth, in that as debt accumulates in the short-run it stimulates aggregate demand and production and in the long runs crowds-out private capital and ultimately reduces output. It is argued that high public debt reduces capital accumulation through higher interest rates; inflation; policy uncertainty and distorts future taxation and in more extreme cases it may cause banking or currency crisis (Manmohan and Woo, 2010). Furthermore, high debt levels limit the scope of countercyclical fiscal policy which results in lower growth (Woo,2009). It is further argued that within growth, it is labour productivity that is most negatively affected, due to reduced investment and slower growth of capital stock**.**

The theoretical transmission occurs through an inverted U-shaped nonlinear relationship which is deemed to exist between the variables in a steady state in an endogenous growth model of 2 goods, tradable and non-tradable. Whose initial positive effects can be explained as when debt increases, the price of non-tradable goods decrease, so tradable sector attracts resources and later technology, thereby stimulating growth, whilst the negative effect is when the country risk premium increases leading to interest payment increase; containing disposable income and savings as explained by Casares (2015).

It is Irons and Bivens (2010) who make a clear distinction between a deficit and debt, in that debt is the stock of government securities that are issued to finance past deficits, with deficit being a fiscal gap in a given year. They argue that it is the fiscal deficit that causes competition between public and private sectors for the supply of savings, leading to a crowding out effect thus increasing interest rates and containing growth. They further conclude that if savings are not utilised for government borrowing, the crowding out effect does not happen (Irons and Bivens,2010).

High debt also presents its limiting effect through the debt overhang hypothesis, wherein the debt servicing is so large that majority of output accrues to foreign lenders and consequently disincentivise investment, further limiting growth (Krugman, 1988). This appears to coincide with Moody's (2016) methodology of the role of debt affordability in determining sovereign default risk. This further aligns with the Laffer Curve illustration of debt overhang, which is defined as the debt being greater than the present value of future transfers to creditors, raising the risk of increased interest rates and growth to contract according to Krugman (1988). This further aligns with the deficit over debt stock hypothesis of Irons and Bivens (2010).

In developed countries it is presented that there exists an optimal level of debt to spurs on growth, post which it is detrimental. Between 1960 and 1991, an optimal debt threshold was defined as 48.9% for total debt and 38.4% for public debt as stated by Smyth and Hsing (1995) this is the oldest literature this study could find. More recent seminal literature by Reinhart and Rogoff (2010) alludes to 90% for developed countries, when re-estimating the study, the authors affirmed their findings that advanced countries with a debt/GDP above 90%, have realised one percent lower growth in the period (Reinhart, Reinhart and Rogoff, 2012). Other studies stating for the EURO zone the threshold can be reached at 70% (Westphal and Rother, 2012), whilst Puig and Rivero (2015) found a range from 56% to 103% for the EMU economies. It is Afonso and Alves (2014) who argue for a debt threshold of 75% for European countries, at which point a negative relationship is affirmed with 0.5% reduction in GDP per capita for every 1% of public debt increased. Puig and Rivero (2015) argue that there are stylised features

through structural breaks that should be measured more so the effect of time and finds that the impact of public debt on growth changes across countries and changes over time.

Despite wide spread acceptance of the debt and growth nonlinearity, there has been decent and dispute of findings from Pollin and Ash (2013) wherein using the same dataset as Reinhart and Rogoff (2010), found that countries with debt/GDP ratio above 90% presented growth of 2.2% and not a contractionary effect as stated, due to statistical errors in the dataset. They also found that between 2000 and 2009 growth for countries with debt above 90% was comparable to those between 30% and 90%. In fact, Minea and Parent (2012) found that a reversal surfaces at above 115% debt to GDP, the relationship becomes positive, confirming the complex nonlinearity of the relationship.

There are more technical reviews and critiques for developed countries, in OECD countries wherein the negative correlation is noted, but when endogeneity is corrected for in the data, the link between debt and growth virtually disappears as observed by Panizza and Presbitero (2014), it was further found that no causal effect between the variables could be found, using the instrumental variable approach(Panizza and Presbitero,2013).Furthermore, using the VAR panel data on 20 developed countries, no evidence of the effect of debt on growth even at higher levels of debt, and no significant reverse effect of growth on debt as found by Lof and Malinen, (2014). In addition, specifically for the USA dataset, findings of the 90% threshold are disputed due to theoretical and empirical flaws(Iron and Biven, 2010) further casting doubt on the universal application of the 90% debt threshold for developed countries, but a non-linear relationship in the USA is confirmed but is State dependant and not nationally according to Yang and Su (2018).

Egert (2014), using the same dataset and utilising Bayesian models; multivariate growth and bivariate models using nonlinear threshold formations, found that the nonlinear negative relationship is difficult to find and sensitive to modelling choices and data. In very rare cases nonlinearity can be observed but at low levels of between 20% and 60% of GDP for developed countries (Egert, 2014). Similar statistical weights and miscalculations are noted for the 20 advanced countries (Herndon, Ash and Pollin, 2014). Furthermore, in developed countries it was found that no significant inverted U relationship could be found between gross government debt and growth according to Schclarek (2004).

These studies appear to be agreeable with Eberhardt and Presbitero (2015), that despite a negative relationship, no evidence can be found for a similar let alone common debt threshold, applicable for all countries or bucket of countries. It appears that there is no consensus in literature as to the exact threshold that should be adopted by country or by grouping, rather that thresholds should be adopted at an individual country level, considering country specific characteristics. This starts to defuse the necessity of the debt sustainability framework implemented by the World Bank and IMF entirety.

In developing countries it is Reinhart and Rogoff (2010), who affirm the presence of a non-linear relationship between debt and economic growth, which expresses the turning point at 60%, at which point growth begins to contract as debt rises above which point, growth contracts by 2%. In developing countries, a nonlinear relationship is observed when utilising the Panel Smooth Transition Regression framework, which is dependent on debt structure rather that gross debt itself, it is found that low debt thresholds hurt growth in developing countries as found by Karadam (2018). On the contrary, for 92 developing countries it was found that debt/GDP begins to have a negative effect on growth at 30%-40%/GDP as studied by Pattillo, Poirson and Ricci (2002). Whilst Clements et al. (2003) when assessing 55 low income countries concludes a debt threshold of 20-25% should be imposed on developing countries.

In Sub-Saharan Africa under debt reduction scenarios, it was found that a 20% reduction in debt increases economic growth by 1%, thereby supporting debt forgiveness and fiscal consolidation (Iyoha,1999). Furthermore, according to Babu et al. (2014) in the East African Community using the Levin-Lin-Chu test affirmed a negative significant relationship of external debt and GDP per capital growth rate. Additionally, in Sub Saharan Africa, it is found that growth would have been 50% higher without the external debt burden as observed by Fosu (1999). In the case of the SADC region using granger causality for heavily indebted poor countries, an inverse relationship is affirmed between external debt and growth (Sichula, 2012).

In Nigeria it was found that the debt overhang theory is affirmed revealing that external debt has a positive relationship on growth up to a certain point at which it begins crowding-out investment as observed by Adegbite, Ayidi and Ayidi (2008), affirming the nonlinear relationship. Utilising the OLS and GLS models in South Africa and Nigeria, a negative relation is observed, and affirms the non-linearity effect as per Ayidi (2008).

There appears to be unanimity about the nonlinear relationship barring a few technical matters, but the point of exact tolerance appears to be in contention. Nonlinearity does appear at low levels of debt whose effects can be reversed later, therefore if fiscal consolidation is introduced too early it could further hurt the economy, leading to recessions and unemployment as affirmed by Pollin and Ash (2013).

Established literature from developed and developing countries affirm nonlinearity between growth and debt, in that in the long term there exists an adverse and contractionary effect on growth caused by excessive public debt accumulation. Despite this, there appears to be a knowledge gap and a lack of consensus in literature in the identification of the precise point when this adversity begins to be realised. Most of the literature relies on linear models and correlation effects more so in developing and emerging countries in accessing the relationship between the variables. This study will contribute to literature by identifying the turning point or apex point wherein the maximum debt stimulating effect is realised, for the identified sample. On policy, the literature contribution of this study is through the debt sustainability threshold framework utilized by the World Bank, IMF and Rating Agencies in measuring sovereign risk and debt extension programmes, which if the thresholds are too punitive may be harmful to developing countries. Lastly at a specific country level, the study contributes to fiscal policy by assessing if there is any fiscal space remaining for additional debt accumulation to spur on economic growth, inversely the study also contributes by alerting countries that are near or pass their turning point for the need of a public debt management response due to heightening fiscal and therefore sovereign default risk.

CHAPTER 3

3. Methodology

The study uses the backward looking IS growth curve following on Goodhart and Hofmann (2005), specifically the extended IS curve which resolves the IS puzzle as argued by Nelson (2001). Goodhart and Hoffman (2005) express the growth rate to be a function of real interest rates; exchange rate, foreign growth and government spending (Paradiso et. al, 2011), all lagged once. We take from Irons and Bivens (2010) in that government spending should be represented by the government deficit.

Following on the above, we hereby introduce the estimation equation as below considering the argumentations explained above:

$$g_t^* = \sigma_0 + \sigma_1\, g_{t-1}^f + \sigma_2 e_{t-1} - \sigma_3 r_{t-1} + \sigma_4 d_{t-1} \quad (1)$$

Where g_t^* being the equilibrium growth rate as a function of foreign growth; the exchange rate; interest rates and government budget balance expressed as, g_t^f; e_t ; r_t; d_t respectively, these are the factors that have explanatory power on growth. Foreign growth, budget balance and exchange rate are expressed as having a positive impact on growth, whilst interest rates express a negative effect as explained by Paradiso et al. (2011) and Goodhart and Hoffmann (2005).

The assertion of this study is that high levels of debt are reflected in sovereign default risk determination and are realised through higher interest rates which contract growth as already explained by Casares (2015), we look to the uncovered interest parity (UIP) to examine this effect. Chaboud and Wright (2005) indicate that the UIP is when the interest rate differential between two countries is equal to the expected exchange rate, therefore the forward profits are zero (Cumby, 1988). According to Tse and Wald (2013) the UIP hypothesis does not hold and in fact, literature has not reached consensus as to the reason for the UIP failure as stated by Li et.al, (2012). Engel (1992) introduces the concept of risk premium, that could explain the rejection of the UIP hypothesis.

Li, Ghoshray and Morley (2012) finds that the risk premium variable is statistically significant in modelling exchange rates and that interest rates deviation is likely to be larger for emerging and developing economies as opposed to developed. This is evidenced by Adewuyi and Ogebe (2019) in that in Africa, the UIP fails due to currency risk and capital mobility risk. In fact, Tse and Wald (2013) explain that excess returns amass due to investors borrowing in low interest currencies and investing in high interest currencies, affirming this violation.

Tse and Wald (2013) further state that the risk differential is explained by differences in risk and creditworthiness of different countries. It is Brunnermesier et.al, (2008) who argues that trading returns are subject to currency crash risk and liquidity risk, which are country specific. It is therefore clear that risk has components of systematic risk and unsystematic risk aspects, which be expressed as below:

$$r_t = r_t^f + \rho_t \quad (2)$$

Wherein r_t^f is the risk-free or systematic risk component, representing the T-bill rate as expressed by Prat and Uctum (2019) and the ρ_t is the associated country specific risk premium.

Based on the hypothesis of this study, the risk premium is determined by elevated sovereign risk as determined by the CRA's; World Bank and IMF, through sovereigns amassing debt beyond sustainable

levels (IMF,2017; Moody's 2016). Therefore, the variable ρ_t is the sovereigns debt/GDP level denoted in linear format as b_t, which presents with a positive effect on growth as supported by Miller (2000). We further include non-linearity, which is the focus of this study by presenting the quadratic government debt variable of b_t^2, in assessing the inverted U relationship between debt and growth, as expressed in eq.(3), as stated by Reinhart and Rogoff, (2012) and Wesphal and Rother (2012).

$$\rho_t = \rho_0 + \rho_1 b_t - \rho_2 b_t^2 \quad (3)$$

We therefore substitute, eq. (3) into eq. (1) to form eq. (4) as follows,

$$g_t^* = \sigma_0 + \sigma_1 g_{t-1}^f + \sigma_2 e_{t-1} - \sigma_3 r_{t-1}^f + \sigma_4 \rho_0 + \sigma_5 \rho_1 b_{t-1} - \sigma_6 \rho_2 b_{t-1}^2 + \sigma_7 d_{t-1} \quad (4)$$

We lastly present the growth model for this study as below in eq. (5), as follows,

$$g_t = \gamma_0 + \gamma_1 g_{t-1} + \gamma_2 g_{t-1}^f + \gamma_3 e_{t-1} - \gamma_4 r_{t-1}^f + \gamma_5 b_{t-1} - \gamma_6 b_{t-1}^2 + \gamma_7 d_{t-1} + \varepsilon_{t-1} \quad (5)$$

CHAPTER 4

4. Empirical Analysis

4.1 Data Sample and Source

This study is a 17-country study of emerging and developing countries globally, with the requisite continental representation. Brazil; Chile; Mexico; Peru representing South America. Malaysia; India; Singapore; South Korea representing Asia with Poland; Turkey; Slovenia; Russia and Czechoslovakia Republic representing Eastern Europe. South Africa; Senegal; Namibia and Nigeria representing Africa.

The data is sourced for 20 years from 1998 to 2018 as an annual time series, agreeable with the DSF(IMF,2017). The data is be sourced from the following data source, National Statistical Authorities; Central Bank Authorities; World Bank; IMF; Reuters; and Bloomberg. The university has data subscriptions for the data sources and data is confirmed as available and downloadable.

The data is be prepared as percentage with the following datapoints: real gross domestic product; USA real GDP; exchange rate; USA bond yields which is the risk-free rate; Debt/GDP and the budget balance/GDP.

4.2 Estimation Procedure

The study is carried out with the aid of the Ordinary Least Squares (OLS) method with a HAC function, which controls for heteroscedasticity and autocorrelation. In order to prevent spurious outputs, the Augmented Dickey Fuller Test is employed to ensure stationarity of the data, whose results will determine in which format the data should be used in the estimation. To ensure robustness of the study, the IS curve outcome is preceded by 2 simple regressions between debt and growth. The IS output will include the control variables as stated in eq. (5). Once the outcomes are produced utilizing the quadratic equation, the turning point for each of the countries is determined, and compared to the last observation of debt/GDP to ascertain if the respective countries have fiscal space left or have exceeded the turning point, and recommendations then follow accordingly.

4.3 Empirical Results

Preliminary analysis is performed on the sample of countries through a debt overhang review of the 17 countries as depicted in annexure 1. Debt overhang is the presence of 5 consecutive years of debt/DGP of more than 90%., data for debt/GDP; external Debt/GDP and real growth are depicted. The sample indicates that there is no dominant presence of debt overhang in the dataset except for Singapore and Slovenia. Inference can be drawn that in most of countries as debt increases, economic growth does contract, and that total public debt and external debt correlate in their relationship and magnitude. This affirms the linear relationship but as depicted in literature, nonlinearity is a feature of this relationship worthy of analysis, as analysed below.

Table 1 reports on the estimation output with growth and the explanatory variable of debt as per the below equation:

$$g_t = c + b_t - b_t^2 + \varepsilon_t \quad (6)$$

Eq. (6) depicts the equilibrium growth rate g_t as a function of linear and non-linearized exogenous debt variable, b_t and b_t^2 respectively following on eq. (3). The linear growth is stated a having a positive effect on growth and the non-linear a negative, in support of the findings of Reinhart and Rogoff, (2012) and Wesphal and Rother (2012) on the relationship between growth and debt and the presence

of nonlinearity. The purpose of this estimation is to evaluate the relationship between growth and debt without any additional control variables.

The results as shown in table 1 present the coefficient and associated p-value by country. The quadratic equation is used to determine the turning point, which is the recommended maximum debt level that each country can amass. The turning point is compared to the 2018 debt/GDP level. Equally the R^2 which determines the explanatory power of the model.

Table 1: OLS Estimation Results for Growth and Debt

	C	b_t	b_t^2	R^2	TURNING POINT	2018 DEBT/GDP
Brazil	2,23	-0,12	0,00	0,00	62,0	81,87
	0,01**	0,49	0,38			
Chile	3,89	-0,08	-0,00	0,05	10,1	27,72
	0,00*	0,90	0,80			
Mexico	2,69	-1,52	0,02	0,54	43,2	46,81
	0,00*	0,00*	0,00*			
Peru	4,41	-2,11	0,02	0,52	46,7	25,78
	0,00*	0,01**	0,03**			
Malaysia	4,43	0,56	-0,00	0,04	64,8	70,54
	0,00*	0,69	0,68			
India	-26,34	0,97	-0,01	0,20	69,7	77,45
	0,02**	0,00*	0,00*			
Singapore	5,83	-0,35	-0,00	0,65	189,8	107,88
	0,00*	0,58	0,81			
South Korea	3,83	0,67	-0,02	0,07	21,3	42,07
	0,00*	0,30	0,17			
Poland	3,97	-1,09	0,01	0,21	58,8	51,30
	0,00*	0,02**	0,06***			
Turkey	4,49	-0,18	-0,00	0,38	191,2	33,34
	0,00*	0,25	0,67			
Slovenia	3,65	-1,05	0,01	0,57	80,9	72,28
	0,00*	0,00*	0,00*			
Russia	1,74	-1,05	0,01	0,58	97,2	14,6
	0,03**	0,00*	0,00*			
Czechoslovakia	0,21	-0,14	0,00	0,00	47,3	32,66
	0,69	0,61	0,74			
South Africa	-0,47	0,34	-0,00	0,06	43,9	59,23
	0,89	0,35	0,31			
Senegal	4,87	-0,11	0,00	0,12	103,5	68,19
	0,00*	0,52	0,83			
Nigeria	-0,16	0,02	-0,00	0,12	26,1	27,19
	0,71	0,92	0,82			
Namibia	3,99	0,17	-0,00	0,04	34,3	60,42
	0,0*	0,47	0,43			
			*Note: indicates significance level of * 1%, ** 5%*			
AVERAGE					**70,0%**	**53,9%**

Reviewing the simple regression indicates that Mexico; India; Slovenia and Russia are statistically significant at 1% with Peru and Poland statistically significant at 5% levels, respectively. Apart from India, all the countries have a negative significant relationship as supportive of Clements et al. (2003); Safdari and Mehrizi, (2011) and Malik et al. (2010), in that there is a negative linear relationship between growth and debt. The coefficients of 64% of the sample are deemed statistically insignificant. For the whole sample, 70% is the average turning point implying that there is 16% additional debt that these countries may assume. The rate of statistical insignificance means that there is a risk the results may be spurious, evident in that the R^2 for Brazil, Chile, Malaysia, South Korea, Czechoslovakia, South Africa, and Namibia are below 10%, with the debt having limited explanatory power over growth. It is found though, that for the countries that are statistically significant, the explanatory power is relatively higher between 40% and 50% in Russia, Slovenia, Peru and Mexico, with India and Poland as the only exceptions at 20%.

Eq. (7) depicts the estimation equation in assessing the relationship between growth and debt on growth. The equilibrium growth rate g_t is stated as a function of growth, linear and non-linearized exogenous debt variable, b_t and b_t^2 respectively following on eq. (3). As guided by Goodhart and Hoffman (2005), the lag is aimed at accounting for the lagged effect and strengthening the causal effects.

$$g_t = c + g_{t-1} + b_{t-1} - b_{t-1}^2 + \varepsilon_t \quad (7)$$

Table 2 presents the results as below:

Table 2: OLS Estimation Results for Lagged Growth and Debt

	C	g_{t-1}	b_{t-1}	b_{t-1}^2	R^2	TURNING POINT	2018 DEBT/GDP
Brazil	1,76	0,36	-0,08	-0,00	0,46	113,6	81,87
	0,08*	0,08***	0,82	0,88			
Chile	3,78	0,04	-0,33	-0,00	0,18	34,4	27,72
	0,00*	0,84	0,74	0,89			
Mexico	2,54	-0,17	-0,60	0,01	0,05	31,4	46,81
	0,00*	0,56	0,48	0,42			
Peru	5,14	-0,14	-0,93	0,01	0,18	68,8	25,78
	0,03*	0,75	0,42	0,64			
Malaysia	5, 83	-0,17	0,13	-0,00	0,08	89,7	70,54
	0,00	0,02**	0,72	0,80			
India	0,31	0,12	0,13	-0,00	0,05	92,7	77,45
	0,99	0,61	0,83	0,87			
Singapore	4,06	0,17	-0,65	0,00	0,05	72,1	107,88
	0,01*	0,40	0,64	0,57			
South Korea	2,21	-0,05	1,64	-0,01	0,73	82,5	42,07
	0,01*	0,71	0,04**	0,47			
Poland	1,75	0,53	1,04	-0,01	0,23	56,0	51,30
	0,02	0,00*	0,13	0,16			
Turkey	4,65	0,01	0,13	-0,00	0,01	58,0	33,34
	0,0*	0,94	0,75	0,69			
Slovenia	2,72	0,11	-0,38	0,00	0,15	87,7	72,28

	0,00*	0,75	0,26	0,30			
Russia	2,22	-0,23	-1,21	0,01			
	0,03*	0,45	0,00*	0,00*	0,44	88,5	14,6
Czechoslovakia	0,46	-0,23	0,53	0,01			32,66
	0,48	0,20	0,59	0,64	0,08	42,4	
South Africa	0,00	-0,29	0,03	-0,00			
	1,00	0,11	0,93	0,96	0,09	78,6	59,23
Senegal	4,56	-0,05	0,28	-0,00			
	0,00*	0,87	0,21	0,33	0,19	41,6	68,19
Nigeria	-0,19	-0,14	-0,01	0,00			
	0,71	0,47	0,87	0,57	0,10	12,5	27,19
Namibia	3,29	0,16	0,12	-0,00			
	0,06*	0,56	0,64	0,66	0,03	41,8	60,42
*Note: indicates significance level of * 1%, ** 5%*							
AVERAGE						**64,3**	**52,9**

The sample presents with statistical insignificance despite lagging the series, with the aim of increasing relationship, similarly, the explanatory power of the models is very weak for all the countries with exception for Russia, Brazil and South Korea. There does appear to be a more realistic adjustment of the average from 70% in table 1 to 64% in table 2.

There is a mix bag of results pertaining to the direction of the relationship, with some countries presenting with positive and others a negative association, which was also evidenced by Puig and Rivero (2015). It is vital to note that table 1 and 2 are simple regressions that aid in our overall understand but are secondary to this study, the following section are the outcomes of the IS curve, which is the focus of the study.

The IS curve model whose results are presented in table 3 as depicted in Eq. (6), suffers from statistical insignificance with no country presenting with all the variables being significant, this is closely relatable to the findings of Schclarek (2004). Compared to tables 1 and 2, the R^2 are visibly higher in table 3, affirming the explanatory power of the model in changes to growth.

The study's primary finding in the sample of emerging and developing market economies is that 62,2% is the maximum debt sustainable level that should be used to guide debt burden accumulation and country limits. This is agreeable to Reinhart and Rogoff (2010) who affirm 60% as the desirable maximum level of debt for emerging and developing countries.

The study categories 3 types of countries, those above, below and those slightly over the country specific debt sustainability level. The study finds that Brazil, Chile, Peru; South Korea, Turkey, Russia and Nigeria still have fiscal space to increase their debt levels. It is notably that with the exception of Brazil, all the country with fiscal space have debt levels below the 62% threshold for emerging economies, which may imply that the fiscal space is due to prudent fiscal management aimed at reducing the debt burden, as recommended by Reinhart and Rogoff (2010). The study also finds that Namibia; Senegal and Singapore have exceeded their respective country limits, and may have breached sustainability levels, such that sovereign credit risk may be realised. The study finds that the remainder of countries which are Mexico, Malaysia, India, Slovenia Czech Republic and South Africa are slightly over their country limits within the 10% band, these countries may have not reached

unsustainable levels yet as they are measured against a spot observation, implying they can contain their debt burden if they act fast.

As forms of recommendation, the first batch of countries should be encouraged to increase their debt as there is still an unrealised positive effect on growth, with the second batch advised to implement debt review measures as debt is no longer sustainable nor having a positive impact on growth. The 3rd batch is advised to implement stronger fiscal management and review fiscal priorities in the near term.

The study observes that there appears to be no clear single emerging market limit that may be imposed, and that each country does appear to have its own debt sustainability limit, this is supported by Westphal and Rother (2012); Reinhart and Rogoff (2012); Egert (2014); Polin and Ash (2013).

A secondary observation is that Asian countries in the sample, have the highest max turning point at 70.7% and in 2018 on average had the highest debt levels at 74.5%. This may imply that countries that have relatively stronger institutional strength and political stability can accommodate more debt than those with weaker state of affairs, which should be considered by countries who aspire to increase their maximum debt thresholds.

Some challenges are worth noting in the IS curve presented. Data had to be annual instead of quarterly data meaning the study only had 20 observations, a longer timeseries would been more reliable, also data availability across the sample was an issue, which affects the length of the sample period.

Table 3: IS Curve Results

	C	g_{t-1}	g^f_{t-1}	e_{t-1}	r^f_{t-1}	b_{t-1}	b^2_{t-1}	d_{t-1}	R^2	TURNING POINT	2018 DEBT/GDP	FISCAL SPACE LEFT
Brazil	1,37	0,60	-0,43	0,03	1,12	-0,30	0,00	-0,01	0,69	113,7	81,87	**31,9**
	0,01*	0,00*	0,00*	0,48	0,28	0,29	0,46	0,47				
Chile	4,00	0,00	0,67	0,06	0,20	-0,50	-0,00	-0,00	0,64	50,3	27,72	**22,6**
	0,00*	1,00	0,00*	0,07**	0,83	0,05**	0,46	0,15				
Mexico	2,30	-0,03	0,63	-0,00	0,96	-1,01	0,01	0,00	0,66	37,6	46,81	**-9,2**
	0,01	0,93	0,13	0,95	0,02*	0,25	0,20	0,08**				
Peru	5,13	-0,08	0,24	0,10	1,01	-1,01	0,01	-0,00	0,43	68,1	25,78	**42,3**
	0,00*	0,78	0,28	0,26	0,25	0,45	0,64	0,86				
Malaysia	5,42	0,05	0,07	-0,07	1,74	0,17	-0,00	-0,02	0,72	61,5	70,54	**-9,1**
	0,00*	0,83	0,83	0,00	0,01*	0,47	0,52	0,08**				
India	-39,98	0,72	0,29	0,23	-0,75	1,11	-0,01	0,02	0,45	74,6	77,45	**-2,9**
	0,08**	0,11	0,48	0,03*	0,35	0,09**	0,11	0,03*				
Singapore	4,13	0,24	0,20	0,07	2,54	-0,70	0,00	-0,00	0,55	77,4	107,88	**-30,5**
	0,14	0,59	0,76	0,64	0,01	0,56	0,51	0,83				
South Korea	2,38	0,05	0,04	-0,01	0,81	1,26	-0,01	0,00	0,85	69,2	42,07	**27,2**
	0,00*	0,81	0,86	0,77	0,17	0,33	0,61	0,78				
Poland	2,12	0,49	0,18	-0,06	1,02	0,87	-0,01	-0,00	0,62	53,5	51,30	**2,2**
	0,02	0,02	0,17	0,01	0,00	0,35	0,39	0,74				
Turkey	8,32	-0,43	0,90	-0,06	2,25	-0,63	0,00	-0,03	0,65	68,1	33,34	**34,8**
	0,00*	0,14	0,05**	0,26	0,14	0,85	0,06***	0,03*				
Slovenia	0,97	0,83	0,04	0,02	2,89	-0,16	0,00	-0,00	0,94	63,2	72,28	**-9,1**
	0,20	0,00*	0,85	0,44	0,00*	0,50	0,38	0,00*				
Russia	1,92	0,25	0,56	0,05	2,70	-0,89	0,01	-0,01	0,72	82,9	14,6	**68,3**
	0,14	0,60	0,12	0,43	0,22	0,02**	0,01**	0,02**				

Czechoslovakia	0,75 0,29	-0,31 0,33	0,58 0,30	0,07 0,38	2,12 0,03	-0,56 0,51	0,01 0,40	-0,00 0,93	0,59	27,6	32,66	**-5,0**
South Africa	0,31 0,34	-0,19 0,34	0,10 0,69	-0,03 0,32	1,20 0,02*	0,16 0,48	-0,00 0,53	0,00 0,01	0,72	49,1	59,23	**-10,1**
Senegal	4,64 0,01	0,00 0,99	0,17 0,71	-0,10 0,41	0,04 0,95	0,27 0,18	-0,00 0,30	-0,00 0,24	0,31	44,0	68,19	**-24,2**
Nigeria	-1,16 0,15	-0,21 0,45	-0,61 0,036*	0,04 0,06**	0,11 0,86	-0,08 0,48	-0,00 0,64	-0,00 0,52	0,52	79,1	27,19	**52,0**
Namibia	4,09 0,18	0,12 0,82	-0,17 0,66	-0,09 0,17	0,95 0,15	0,16 0,59	-0,00 0,57	0,00 0,57	0,30	37,2	60,42	**-23,2**
	Note: * indicates significance level of * 1%, ** 5%											
	***Red**-exceeded the maximum turning point; **Orange**: exceeded but within 10% band; **Green**: below the maximum turning point*											
AVERAGE										**62,2**	**52,9**	

Table 4: IS Curve Regional Focus Result

	South America	Asia	Eastern Europe	Africa
Turning Point, average	67,8%	70,7%	59,1%	52,4%
2018 Debt/GDP average	45,5%	74,5%	40,8%	53,8%

Despite the study being a multi-country assessment regionalised generalization or inference can be extracted, in that countries in South America should be encouraged to maximise economic growth by taking on more debt, as the positive relationship has not reached its maximum point. African countries appear to be operating at their max debt sustainable levels and should start cooling off the debt markets and begin reviewing fiscal priorities. Eastern European countries have the most fiscal space to stimulate debt led growth as supported by Westphal and Rother (2012) in that Europe's turning point is between 70% and 80%, and they should be encouraged to accelerate debt in order to accelerate growth and development. Asian countries as the most leveraged, may have surpassed the effectiveness of using debt to drive growth, and may need to review their economic growth approach.

CHAPTER 5

5. Conclusion

This study is tasked with investigating if there is fiscal space to increase debt in emerging and developing countries, by defining the maximum turning point wherein debt accumulation no longer aids in economic growth stimulation, in the 17 countries identified. Using the IS growth curve augmented for nonlinear debt term, the findings are such that for emerging and developing countries, a maximum debt threshold of 62.2% is found, which is in line with the observations of Reinhart and Rogoff (2010). This is the point on average where debt and growth diverge, and should be used by the World Bank, IMF and Credit Rating Agencies in determining debt sustainability thresholds.

The study finds that Brazil, Chile, Peru, South Korea, Turkey, Russia and Nigeria still have fiscal space to increase their debt levels and should be encouraged to do so, as they are not maximising their economic growth potential. On the furthest extreme, Singapore, Senegal and Namibia have surpassed their maximum debt levels to support growth and should consider debt reduction measures. On the moderate range we have Peru, Malaysia, India, Slovenia, Czech Republic and South Africa, having exceeded their max debt level but within the single digits range (up to 10%), should consider a review of fiscal priorities. Despite nonlinearity confirmed for the sample, the countries are a mix bag across all 3 batches of economies, which is agreeable with Westphal and Rother, (2012); Egert, (2014); Polin and Ash,(2013) and Eberhardt and Presbitero, (2015) that no single debt threshold is observable for a group of countries, and that an average cannot be strictly imposed, but country specify characteristics should be taken into account as stated by Rivero and Puig, (2019); Stracca (2010) and Yang and Su, (2018).

The study also makes more generalised observations in that on average, Eastern European and South American countries should be encouraged to increase their debt levels, as they have not maximised their debt led growth potential. This appears to be agreeable with Afonso and Alves (2014) and Reinhart and Rogoff (2012), in that relatively more developed regions can accommodate more debt, evidence in that African economies have the lowest debt thresholds supportive of Clements et. al, (2003) and Pattillo, Poirson and Ricci, (2002). Possibly due to weaker institutional strength as stated by Moody's (2016) and Minea and Parent (2012) in that debt levels alone are an insufficient predicator of sovereign default risk and growth respectively.

Areas of further research may include different estimation techniques supportive of Egert (2014) that model and estimation bias may affect results, including the sample splitting approach as an alternative to determining the optimal threshold levels. A particular focal review may be to compare the backward and forward looking IS curve results as developed countries tend to have forward expectations whilst developing countries the inverse. Equally the deployment of a time series threshold regression model may also be of interest to this field of study. The granular effect of debt on growth, by assessing which economic agents and sectors are most affected by excessive debt. Lastly and quite pivotal is once the debt has been acquired, how should it be used in terms of fiscal priorities to maximise growth.

-End of Report-

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Table 5: Annexure 1

DEBT OVEHANG ANALYSIS															
Latin America															
Entity	Brazil	Brazil	Brazil	Chile	Chile	Chile	Mexico	Mexico	Mexico	Peru	Peru	Peru			
Indicator	Debt/ GDP	EXT debt, %GDP	Real GDP	Debt/ GDI	EXT debt, %(	Real GDP	Debt/ GDP	EXT debt,	Real GDP	Debt/GDP	EXT debt, %(	Real GDP			
2013	56,27	21,36	3,00	12,73	38,04	4,05	36,51	32,63	1,35	19,23	32,52	5,84			
2014	63,53	25,60	0,50	14,96	44,04	1,77	39,74	37,24	2,85	19,41	35,29	2,39			
2015	76,88	35,39	-3,55	17,27	46,50	2,30	43,94	39,55	3,29	23,04	37,59	3,27			
2016	65,18	28,24	-3,28	21,01	42,19	1,71	48,16	43,52	2,63	23,59	35,61	4,05			
2017	76,42	27,28	1,32	23,59	41,74	1,19	46,00	39,83	2,11	24,93	31,36	2,48			
2018	81,14	31,37	1,32	25,55	46,71	3,95	46,04	37,90	2,20	25,15	30,39	3,97			
Asia															
	Malaysia	Malaysia	Malaysia	India	India	India	Singapore	Singapore	Singapore	South Korea	South Korea	outh Korea			
2013	Debt/ GDP	EXT debt, %GDP	Real GDP	Debt/ GD	EXT debt, %(	Real GDP	Debt/ GDP	EXT debt,	Real GDP	Debt/ GDP	EXT debt, %(	Real GDP			
2014	73,15	62,24	4,69	66,99	23,54	6,39	101,36	388,51	5,03	37,06	28,61	2,87			
2015	75,40	63,58	6,01	65,47	23,30	7,41	97,07	388,59	3,96	38,70	28,65	3,31			
2016	76,68	69,58	16,25	70,39	22,92	8,00	99,49	369,46	3,17	40,27	26,74	2,82			
2017	73,48	73,02	4,45	65,83	20,13	8,17	105,41	372,93	3,24	40,84	24,82	2,93			
2018	64,59	64,15	5,74	67,57	19,12	7,17	107,43	358,79	4,21	40,50	22,30	3,06			
	70,51	54,68	4,74	66,13	19,18	6,08	107,88	358,40	3,32	42,07	24,07	2,70			
Eastern Euprope															
	Poland	Poland	Poland	Turkey	Turkey	Turkey	Slovenia	Slovenia	Slovenia	Russia	Russia	Russia	ech Repub	ech Repub	ech Repub
	Debt/ GDP	EXT debt, %GDP	Real GDP	Debt/ GD	EXT debt, %(	Real GDP	Debt/ GDP	EXT debt,	Real GDP	Debt/ GDP	EXT debt, %(	Real GDP	Debt/ GD	EXT debt,	Real GDP
2013	55,69	53,32	1,39	35,23	46,08	8,49	67,35	103,97	-1,03	13,09	25,65	1,79	45,66	49,30	-0,49
2014	50,41	55,07	3,32	30,37	46,10	4,94	89,04	115,95	2,77	16,07	33,00	-0,51	46,40	49,54	2,71
2015	51,28	54,21	3,84	29,44	49,79	6,08	84,14	109,63	2,21	16,38	33,20	-2,31	40,30	51,19	5,38
2016	54,23	57,30	3,06	33,11	55,67	3,32	82,56	101,22	3,12	16,15	26,39	-0,14	38,63	55,33	2,36
2017	50,55	49,70	4,94	29,00	54,96	7,50	69,83	91,80	4,84	15,51	23,15	1,79	31,53	69,01	4,55
2018	48,80	46,89	5,35	32,91	62,37	2,96	72,59	83,13	4,12	14,50	20,85	2,53	33,65	64,91	2,83
Africa															
	South Africa	South Africa	South Africa	Senegal	Senegal	Senegal	Namibia	Namibia	Namibia	Nigeria	Nigeria	Nigeria			
	Debt/ GDP	EXT debt, %GDP	Real GDP	Debt/ GD	EXT debt, %(	Real GDP	Debt/ GDP	EXT debt,	Real GDP	Debt/ GDP	EXT debt, %(	Real GDP			
2013	47,91	41,42	2,77	36,29	26,17	3,86	31,71	43,77	5,62	18,59	4,10	5,39			
2014	50,26	43,19	1,66	42,39	31,13	4,08	29,82	46,81	5,76	17,54	4,76	5,94			
2015	60,21	53,10	1,22	44,49	33,86	6,37	52,99	50,32	4,53	20,33	6,06	2,66			
2016	47,99	45,96	0,38	47,67	37,00	6,37	43,34	47,23	-0,28	23,41	9,29	-1,61			
2017	48,95	47,71	1,41	62,06	40,57	7,14	45,62	34,42	-0,26	25,44	10,82	0,79			
2018	60,77	52,51	0,88	67,51	55,20	6,78	59,73	37,70	0,70	28,48	11,21	1,92			