

External debt and economic growth nexus in a small island developing state: An Autoregressive Distributed Lag Model investigation

Sheereen Fauzel
University of Mauritius
Email: s.fauzel@uom.ac.mu

Fariiha Jugreet
University of Mauritius

Abstract

This study investigates the nature of the relationship between external debt and growth in Mauritius and seeks to explore whether macroeconomic policies affect this nexus. The Autoregressive Distributed Lag Model bound testing approach is employed on the time series data for the period of 1980 to 2016. The findings showed a negative relationship between external debt and growth, confirming the presence of debt overhang. A crowding out effect was also found since debt servicing had a negative effect on growth. On the other hand, when an interactive term of debt and good policy is introduced, the negative effect of external debt on growth is lower, reducing the debt overhang problem and leading to a weak crowding out effect. However, the use of such economic policy has negative consequences on domestic investment and trade.

Keywords: *external debt, economic growth, macroeconomic policy, An Autoregressive Distributed Lag Model*

Introduction

Attaining sustainable growth in real income remains a crucial objective for governments around the world since it will increase the welfare of its residents (Durlauf et al., 1996). According to the neoclassical model of growth, there should be a movement of capital from rich countries to developing countries that have relatively lower capital-to-labour ratios (Prasad et al., 2007). This flow of capital includes foreign direct investment, portfolio investment, external debt and human capital among others. A reasonable level of debt can prove to be beneficial to growth since it increases domestic savings for investment and allows infrastructure development. However, a growing reliance or excessive accumulation of external debt can have negative economic consequences, mainly a debt overhang problem and a crowding out effect.

Although Mauritius has experienced a fall in its external debt over time which stands at 16.0% of GDP at September 2017, the country had increasingly recourse to it to finance its budget deficit. The literature on the debt-growth relationship in Mauritius is scant (see, for an exception, Seetanah et al. 2007). This nexus has been investigated for other low-income countries (Nguyen et al. 2003) for instance such as Nigeria (Adamu & Rasiah 2016). However, little analytic attention has been paid to the impact of good macroeconomic policy on this relationship. Hence, this research seeks to bridge the gap between theory and practice by investigating the relationship between macroeconomic policy, external debt and economic growth. This study also sheds light on the likely repercussions on other economic aspects of the economy and hence is particularly useful to policymakers.

This paper is structured as follows; section 2 provides the theoretical and empirical review; section 3 describes the methodology, a detailed discussion of the findings is provided in section 4 and lastly, section 5 concludes the paper.

Literature Review

Foreign capital represents an inflow of resources, and consequently, the rate of capital formation rises, leading to higher investment. This is advocated by the dual gap theory developed by Chenery and Sprout (1966) which presupposes two gaps, the foreign exchange gap and the domestic savings gap. The first gap relates to the shortage of foreign exchange which is needed to buy essential foreign capital goods. The second gap refers to domestic savings which are insufficient and, thus, unable to provide resources for investment in underdeveloped economies (Hunt, 2007). To fill these gaps, external debt needs to be sought to increase investment, thus, leading to higher growth in developing economies, provided that the funds can yield higher returns than the initial borrowing cost (Were, 2001).

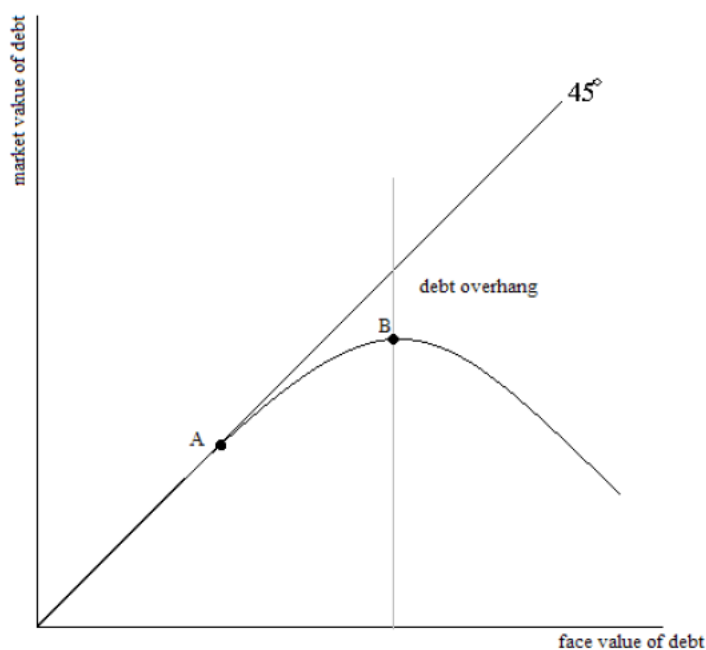
If the foreign capital is invested in imports of capital goods and subsequently, the production of goods meant for export, the export sector will expand. This will lead to more inflow of "foreign exchange needed for petroleum imports, greater integration in the world economy, and servicing of past foreign debts" (Seiber, 1982: 10). By engaging in external borrowing, the country can position itself as a potential market for foreign banks. These banks may set up branches and units in the borrowing country; this is beneficial since it allows exploration of international capital markets which are not accessible to local banks. In addition, there will be an easing of incoming foreign direct investment. Consequently, the financial structure will strengthen and help to achieve higher economic development.

Borrowed capital helps to reduce the foreign exchange gap and can thereby prevent a worsening in terms of trade. Also, debt can be contracted to cater for the balance-of-payments deficit. In addition, foreign capital can be invested in export development to allow expansion in revenue. The advantage of official concessional loans is that capital is available at a cost which is lower than that of the market. These allow the debtor country to engage in projects which would not have been undertaken without the additional capital.

The effect of debt accumulation can be explained through the debt overhang hypothesis. This is defined as “the presence of an existing, inherited debt sufficiently large that creditors do not expect with confidence to be fully repaid” (Krugman, 1988: 2). The debt overhang hypothesis relates to the fact that if there is a likelihood that the future debt burden will exceed the country's repayment capacity, investors will fear that the government will impose higher taxes to be able to finance debt repayments. This will lead to lower returns and, as a result, investors are less motivated to invest. Due to uncertainty, investors prefer short-term projects to long-term, risky investments, thereby slowing down physical capital accumulation (Poirson et al., 2004).

According to Krugman (1988: 5), “a country has a debt overhang problem when the expected present value of potential future resource transfers is less than its debt”. The link between the nominal value and market value of debt can be illustrated in a Laffer curve (Claessens, 1990).

Figure 1: Debt Laffer Curve



Source: Bachvarova (2008)

The above diagram shows that there is a positive link up to a certain point, A. Beyond this point, a rise in face value will lead to a less than proportionate rise in market value. If debt continues to increase beyond the threshold point illustrated by B, this increase in the face value will be matched with a decrease in market value. The country is then said to suffer from a debt overhang problem. According to Nguyen et al. (2003: 4) “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.”

The crowding out effect concept explains the impact of debt servicing on growth. This theory posits that an increase in debt and hence higher debt service will lead to a rise in the demand for savings in a situation where supply stays the same. Consequently, the cost of money will rise, thereby discouraging private investors from borrowing money. Rising debt servicing implies a transfer of wealth from the debtor country to foreign creditors. This outflow of currency can negatively impact the exchange rate and consequently worsen the terms of trade. Also, a rise in external debt will mean more debt servicing which can have negative effects on the structure of government spending by reducing the amount of resources available for infrastructure and human capital (Nguyen et al., 2003).

Moreover, borrowed capital is mostly invested in capital-intensive sectors where the rate of return is high. Thus, industrialisation is encouraged whereas the rural sector is ignored. This can lead to the development of a dualistic economy whereby these two sectors are poles apart in terms of progress and expertise. If external debt is sought recurrently to remedy a rising deficit, it can cause an unsustainable level of debt, high debt service cost and more use of foreign reserves. Consequently, there is a risk of having a debt crisis in the long-run (Beaugrand et al., 2002).

The extent to which external debt can be beneficial to the economy depends on factors such as the combination of policies employed in using external capital and economic/political conditions among others (Seiber, 1982). According to Fischer (1993), sound macroeconomic policy contributes to growth. As recommended by the OECD (2011), to curtail the risks linked to capital inflows, policy reforms should be accompanied by suitable macroeconomic policies, namely, monetary (interest rate) policy, fiscal policy and exchange rate policy.

The inflow of foreign funds will lead to a rise in the money supply and can cause inflationary pressures in the economy. To control the effect of capital inflows, such as external debt, fiscal policy should be tightened by curbing public expenditure (Calvo et al., 1996 cited in Kawai, M. & Lamberte, M., 2010). This will help reducing the risk of an overheating economy and appreciation pressure on domestic currency. In the same vein, tighter monetary policies can reduce the money supply and help to control the inflation level (Ghosh et al., 2017).

An empirical investigation by Ijirshar et al. (2016) showed a significant relationship between external debt and economic growth in Nigeria. However, external debt stock has been found to impact positively while external debt service impacted negatively on the annual growth rate of the Nigerian economy both in the long and the short-run. Moreover, Ejigayehu (2013) shows that external debt affects economic growth through the debt crowding out effect rather than debt overhang for selected African countries. This relationship is examined for the case of Mauritius.

Research Methodology

To investigate the relationship between external debt and growth in Mauritius, following Adamu et al. (2016), the following economic model is formulated: $GDP = f(EDY_t; DSX_t; INV_t; BM_t, POP_t, TO_t)$

To meet the second objective of determining the effect of macroeconomic policy on the debt-growth nexus, a second model is used: $GDP = f(ED*P_t; DSX_t; INV_t; BM_t, POP_t, TO_t)$

Where, $ED*P$ = interactive term of external debt and macroeconomic policy

Both models are transformed into econometric models as follows:

Model 1

$$\text{GDP growth} = \beta_0 + \beta_1 \text{ED} + \beta_2 \text{DSX} + \beta_3 \text{INV} + \beta_4 \text{BM} + \beta_5 \text{POP} + \beta_6 \text{TO} + \varepsilon \text{ - equation (1)}$$

Model 2

$$\text{GDP growth} = \beta_0 + \beta_1 \text{ED}^* \text{P} + \beta_2 \text{DSX} + \beta_3 \text{INV} + \beta_4 \text{BM} + \beta_5 \text{POP} + \beta_6 \text{TO} + \varepsilon \text{ - equation (2)}$$

To ease interpretation of the aforementioned models, equation (1) and (2) are expressed as log-linear regressions¹ as follows:

Model 1

$$\text{GDP growth} = \beta_0 + \beta_1 \log \text{ED} + \beta_2 \log \text{DSX} + \beta_3 \log \text{INV} + \beta_4 \log \text{BM} + \beta_5 \text{POP} + \beta_6 \log \text{TO} + \varepsilon \text{ - equation (3)}$$

Model 2

$$\text{GDP growth} = \beta_0 + \beta_1 \log \text{ED}^* \text{p} + \beta_2 \log \text{DSX} + \beta_3 \log \text{INV} + \beta_4 \log \text{BM} + \beta_5 \text{POP} + \beta_6 \log \text{TO} + \varepsilon \text{ - equation (4)}$$

The measures, proxies and data source for the variables are as follows:

Table 2: Measures, Proxies and Data Source

Variable	Measure	Proxy	Data source
GDP	Economic Growth	Real Gross Domestic Product growth	IMF and CSO
ED	External debt	External debt as a % of GNI	World Bank
DSX	Debt service	The ratio of international reserves to debt service payments	Calculated using World Bank data
POP	Population growth	Population growth (annual%)	World Bank
INV	Domestic investment	Gross capital formation (% of GDP)	World Bank
BM	Financial development	Broad money (% of GDP)	World Bank
TO	Trade openness	Trade as a % of GDP	World Bank
INTEREST	Monetary policy	Lending interest rate (%)	World Bank
GOVTEXP	Fiscal policy	Government expenditure as a share of GDP	World Bank
EXCH	Exchange rate policy	Change in the reserves-to-M2 ratio	Calculated using World Bank data

¹ See Fauzel (2017)

Macroeconomic policy index

Following Ramzan and Ahmad (2014), a policy index is constructed using principal component analysis (PCA) which is a simple dimension reduction method. Therefore, these three policies are employed in the construction of the index as follows:

Table 2: Types of Policies and Related Measures Included in the Policy Index

Policy	Measure
Monetary policy	Interest rate
Fiscal policy	Government expenditure as a share of GDP
Exchange rate policy	Change in the reserves-to-M2-ratio

The equation for the policy index is formulated as follows:

$$\text{Policy Index} = \alpha_1 \text{interest rate} + \alpha_2 \text{government spending} + \alpha_3 \text{exchange rate}$$

Prior to the PCA, Bartlett's test of Sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy have to be performed. Bartlett's test of Sphericity is used to test the null hypothesis that the variables in the sample correlation matrix are uncorrelated. As for the KMO, it measures whether the sample size is large enough to obtain reliable results of correlations among the variables. According to Kaiser (1974), the minimum satisfactory value is 0.50. If the criteria for both tests are met, the policy index can be constructed using the PCA.

The ARDL method is advantageous since it can be applied regardless of whether the variable is I(0), or I(1), (see Fauzel and Keesoonah, 2017). Firstly, the variables should be tested for stationarity using the Phillips-Perron Test. If the variables are I(0) and I(1) and none are ordered I(2), the ARDL methodology can be used. The bounds test is employed to test the long-run relationships among the variables of the models in question. To proceed with the bound test technique, equation (1) and (2) are modelled as conditional ARDL error correction models as follows:

Model 1

$$\Delta \text{Growth}_t = \alpha_0 + \sum_{i=1}^n \alpha_i \Delta \ln \text{ED}_{t-1} + \sum_{i=1}^n \delta_i \Delta \ln \text{DSX}_{t-1} + \sum_{i=1}^n \delta_i \Delta \ln \text{INV}_{t-1} + \sum_{i=1}^n \beta_i \Delta \ln \text{BM}_{t-1} + \sum_{i=1}^n \sigma_i \Delta \text{POPT}_{t-1} + \sum_{i=1}^n \gamma_i \Delta \ln \text{TOT}_{t-1} + \sum_{i=1}^n \eta_1 \text{Growth}_{t-1} + \eta_2 \ln \text{ED}_{t-1} + \eta_3 \ln \text{DSX}_{t-1} + \eta_4 \ln \text{BM}_{t-1} + \eta_5 \text{POPT}_{t-1} + \eta_6 \ln \text{TOT}_{t-1} + \varepsilon_t$$

Model 2

$$\Delta \text{Growth}_t = \alpha_0 + \sum_{i=1}^n \alpha_i \Delta \text{EDP}_{t-1} + \sum_{i=1}^n \delta_i \Delta \ln \text{DSX}_{t-1} + \sum_{i=1}^n \delta_i \Delta \ln \text{INV}_{t-1} + \sum_{i=1}^n \beta_i \Delta \ln \text{BM}_{t-1} + \sum_{i=1}^n \sigma_i \Delta \text{POP}_{t-1} + \sum_{i=1}^n \gamma_i \Delta \ln \text{TO}_{t-1} + \sum_{i=1}^n \eta_1 \text{Growth}_{t-1} + \eta_2 \ln \text{ED}_{t-1} + \eta_3 \ln \text{DSX}_{t-1} + \eta_4 \ln \text{BM}_{t-1} + \eta_5 \text{POP}_{t-1} + \eta_6 \ln \text{TO}_{t-1} + \varepsilon_t$$

where α_0 is a drift component and ε_t is the white noise error. The long-run multipliers are signified by the coefficients of the lagged level variables while α_i , δ_i , δ_i , β_i , σ_i and γ_i represent the short-run impacts on economic growth.

However, prior to this, the lag length selection for both models should be performed, using the Akaike information criteria and Schwarz information criterion (SBC). The presence of a long-run relationship is then investigated through the bounds test.

Long and short-run estimation

After testing for long-run-co-integration in the ARDL equation, the short-run coefficients are estimated as an error correcting model while allowing for the long-run estimates.

Model 1

$$\Delta Growth_t = \alpha_0 + \alpha_0 + \sum_{i=1}^n \alpha_i \Delta \ln ED_{t-1} + \sum_{i=1}^n \partial_i \Delta \ln DSX_{t-1} + \sum_{i=1}^n \delta_i \Delta \ln INVT_{t-1} + \sum_{i=1}^n \beta_i \Delta \ln BM_{t-1} + \sum_{i=1}^n \sigma_i \Delta \ln POPT_{t-1} + \sum_{i=1}^n \gamma_i \Delta \ln TOT_{t-1} + \Psi_t ECM_{t-1} + \gamma t$$

Model 2

$$\Delta Growth_t = \alpha_0 + \alpha_0 + \sum_{i=1}^n \alpha_i \Delta EDP_{t-1} + \sum_{i=1}^n \partial_i \Delta \ln DSX_{t-1} + \sum_{i=1}^n \delta_i \Delta \ln INVT_{t-1} + \sum_{i=1}^n \beta_i \Delta \ln BM_{t-1} + \sum_{i=1}^n \sigma_i \Delta \ln POP_{t-1} + \sum_{i=1}^n \gamma_i \Delta \ln TO_{t-1} + \Psi_t ECM_{t-1} + \gamma t$$

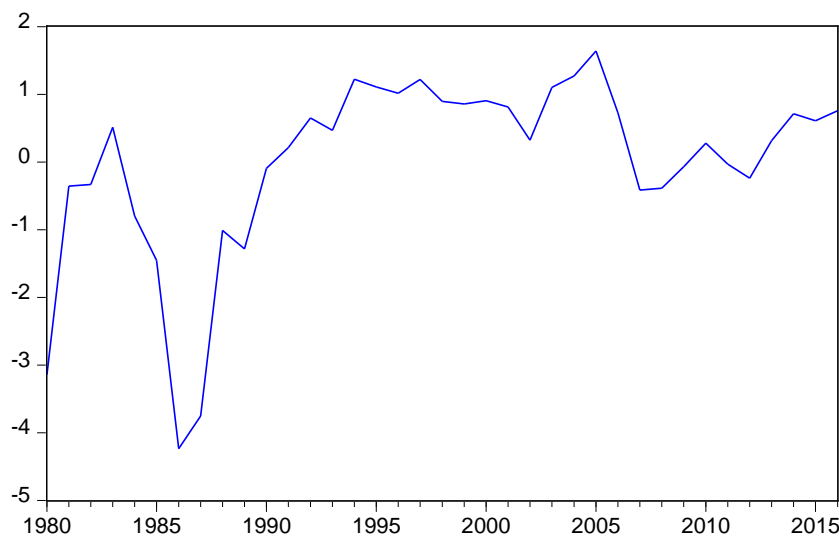
whereby ECM_{t-1} is the error correction term and its coefficient Ψ_t is the speed of adjustment. To assess stability of the model, the CUSUM and CUSUMQ tests are employed.

Empirical Results

Construction of macroeconomic policy index

The index is constructed using PCA. The variables are tested using factorability with Bartlett's test of Sphericity and the KMO measure of sampling adequacy. The KMO test shows a value of 0.6490 and is hence acceptable since it is higher than 0.50. It can thus be concluded that the sample size is adequate for the factor analysis. The result obtained for the Bartlett test of Sphericity is valid.

Figure 3: Policy Index



The graph above shows the trend of the policy index being constructed. It can be observed that there is a sharp decline in the value of the policy index in 1986 due to a sharp fall in the interest rate. During the 1980s and into the 1990s, the index remained consistently negative. It was during this period that

macroeconomic reforms were introduced to face balance-of-payments difficulties and fiscal dilemmas. Since then, the index varied between -1% and 2%. This is supported by the fact that the Mauritian authorities adopted appropriate policies such as tight fiscal discipline in periods of boom, good monetary policy to keep inflation stable and a proper exchange rate policy used to maintain competitiveness of exporters.

Test for stationarity and multicollinearity

The results of the Phillips-Perron unit root test reveal that only growth, Ed^*p , $logto$ and $logbm$ follows an $I(0)$ process. As for the other variables, $logdebt$, $logdsx$, $loginv$ and pop , they follow an $I(1)$ process. The ARDL model can hence be employed for the purpose of this study. As for multicollinearity, the correlation matrix indicates the absence of a strong correlation.

Bounds testing

To test for the existence of long-run relationships between the variables, the bounds test, is employed. The F-statistic for each model is tabulated as follows:

Table 3: Bounds Testing - Model 1

Test Statistic	Value	K
F-statistic	8.337175	6
Critical Value Bounds		
Significance	0 Bound	1 Bound
10%	1.99	2.94
5%	2.27	3.28

The F-statistic is 8.337175 for model 1 and hence exceeds both the lower bounds and the upper bounds for all the levels of significance. It can, therefore, be concluded that co-integration exists for model 1.

Table 4: Bounds Testing - Model 2

Test Statistic	Value	K
F-statistic	3.353686	6
Critical Value Bounds		
Significance	0 Bound	1 Bound
10%	1.99	2.94
5%	2.27	3.28

The F-statistic is 3.3537 for model 2 and hence exceed both the lower bounds and the upper bounds at 10% and 5% levels of significance. Thus, there is evidence of co-integration existing among the variables, and the null hypothesis of no co-integration can be rejected. Following the estimation of the long-run coefficients, the short-run dynamics can also be determined.

The long-run result is shown in the table below:

Table 5: Results for Long-run Dynamics

Variable	Model 1			Model 2		
	Coefficient	t-Statistic	Prob.	Coefficient	t-Statistic	Prob.
Logdebt	-1.722413*	-3.325936	0.0032			
Ed*p				-0.133984***	-1.721928	0.0974
Logdsx	-1.338142*	-3.920024	0.0008	-0.014544	-0.055817	0.9559
Logto	1.632827*	3.822431	0.0010	1.007193*	3.098364	0.0048
Loginv	10.222076*	6.047445	0.0000	6.353080*	3.119960	0.0045
Logbm	0.362541	0.802388	0.4313	0.628617	1.310386	0.2020
Pop	-1.478088**	-2.617236	0.0161	-0.859488	-1.138586	0.2657

Note: * significant at 1%, ** significant at 5% and *** significant at 10%.

External debt is found to be negatively linked to economic growth. A 1% increase in external debt will lead to a 1.72% decrease in growth. This observation is in line with Seetanah et al. (2007) and Rauf and Khan (2017). External debt can negatively affect growth in the long-run when external debt is used for non-productive purposes (Gomez-Puig & Rivero, 2015). In fact, the Mauritian government has been using external debt to finance the budget deficit. On the other hand, when good macroeconomic policy is used, a 1% increase in external debt causes a 0.13% decrease in growth. Though still negative and significant, this effect is substantially lower, matching the results of Ramzan and Ahmad (2014) and Jayaraman and Lau (2009). This can be explained by the fact that good economic policy allows better use of external funds.

The coefficient for debt servicing is both negative and significant, thus confirming the presence of the crowding out effect in Mauritius in the long-run. A 1% increase in debt servicing leads to a 1.33% decrease in growth. This is consistent with the findings of Weeks (2000) and Karagol (2002). This negative relationship can arise due to structural economic weaknesses and transitory disturbances and long-term factors (Williams, 1978). Conversely, under model 2, the negative coefficient is small and insignificant. Good economic policy hence decreases the crowding out effect. This can be explained by the fact that an increase in the interest rate can attract hot money into the country and lead to currency appreciation which can ease the interest payments on debt denominated in foreign currency.

As for trade openness, the findings show that a 1% increase in trade openness leads to a 1.632% rise in economic growth. This positive relationship found is consistent with Keho's (2017) and Kim's findings (2011). According to Zahonogo (2016), trade eases the transfer of technological progress in the long-run. Surprisingly, in the second model, trade has a lower positive effect in the long-run. A 1% increase in trade openness leads to a 1.007% increase in growth. It may be that the macroeconomic policies are not fully supportive of technology transfer. For example, rising interest rates may make it difficult for firms to seek funds to invest in technology.

Domestic investment exhibited a strong positive and significant correlation with growth, thereby matching Yusoff and Febrina's (2014) results. Capital formation leads to the development of economic

and social capital which can contribute to reducing inequality and market imperfections (Pradhan & Prasad, 2002). Surprisingly, the positive and significant coefficient of investment is lower in the presence of good policy. This may arise because a reduction in government spending reduces public investment and hence the onus rests on private domestic investment. However, rising interest rates make it difficult for private investors to obtain funds and invest, thus harming investment.

Financial development is observed to have a positive but statistically insignificant impact on economic growth. This is in contrast to Seetanah's (2008) findings. This may be due to a lack of competition and private sector participation.

Short-run dynamics

The results for the short-run effects of explanatory variables on economic growth are reported in the following table:

Table 6: Results of Short-run Dynamics

Variable	Model 1			Model 2		
	Coefficient	t-Stats	Prob.	Coefficient	t-Stats	Prob.
Growth(-1)	0.31**	2.61	0.02	0.23***	1.75	0.09
Logdebt	-1.80**	-2.58	0.02			
Ed*p				-0.31**	-2.23	0.03
Logdsx	-1.01**	-2.35	0.028	0.083	0.19	0.85
Logdsx(-1)	0.63	1.68	0.11			
Logto	2.04*	5.12	0.00	1.35*	3.21	0.003
Loginv	9.69*	3.27	0.003	8.48**	2.55	0.017
Logbm	0.54	1.16	0.26	0.561	1.11	0.28
Pop	-2.34	-1.51	0.14	-3.49**	-2.08	0.047
Cointeq(-1)	-1.79*	-7.85	0.00	-1.58*	-6.43	0.000

Note: * significant at 1%, ** significant at 5% and *** significant at 10%.

In the short-run, it is found that economic growth causes itself after one year. Higher growth leads to higher income and living standards, leading to higher demand and a further increase in production and revenues by firms. On the other hand, when macroeconomic policy is used, this coefficient is smaller. It may be that tighter monetary policy encourages savings and discourages consumption, thus reducing the ability of economic growth to drive further growth.

According to Elbadawi et al. (1997), debt overhang can create uncertainty which can dampen the efficacy of reform programs, hence harming growth in the short-run. This matches the results of studies such as Mohamed's (2013). On the other hand, under the second model, in line with Ramzan and Ahmad (2014), external debt when interacted with the variable for good policy has a lower negative effect on growth in the short-run.

The coefficient for debt servicing is negative, thereby confirming the existence of the crowding out effect. As advocated by Williams (1978), external debt servicing can be problematic in the short-run

due to the ‘transfer problem’, where there is insufficient foreign exchange to meet debt repayments on time, and thus internal funds may be used to this end. In fact, Mauritius is currently employing its revenue to service its debt. In addition, debt servicing is found to have a negative but insignificant impact on growth after one time period, i.e., one year.

A 1% increase in trade leads to a 2.04% rise in growth. This is mainly because trade enables better resource use allocation (Zahonogo, 2016). Trade openness enables a country to employ its factors of production in sectors where it has comparative advantages and therefore raise productivity and growth. This has led to the development of key areas such as the Export Processing Zone, tourism, financial services and Information Technology sectors. The positive coefficient of trade is lower under model 2. It may be that tightening of the fiscal or monetary policy decreases aggregate spending and affects resource allocation between tradables and non-tradables (World Trade Report, 2004).

Domestic investment is found to be positively correlated to growth. Higher investment raises the productive capacity of the economy and hence increases the output of capital and consumer goods (Grant & Vidler, 2000). Surprisingly, the long-run effect is lower than the short-run. This is because the level of private investment has remained consistently stagnant, hovering between 11% and 20% of GDP, harming long-run growth. According to the Bank of Mauritius (2016: 1), the Mauritian economy “suffers from weak private investment and relatively sluggish export performance”. Similar to the long-run, investment in the presence of macroeconomic policies is lower.

In the short-run, financial development has a positive but insignificant relationship with growth. This is consistent with Samargandi et al. (2015).

Residual diagnostic

The results obtained from the diagnostic tests show that both models are free from both serial correlation and heteroscedasticity. They also indicate that the models are correctly specified and that the sample data is normally distributed.

Stability test

The CUSUM and CUSUMQ plots for both models are found to lie within the 5% critical bounds as illustrated in figures 3 and 4.

Figure 3: Model 1

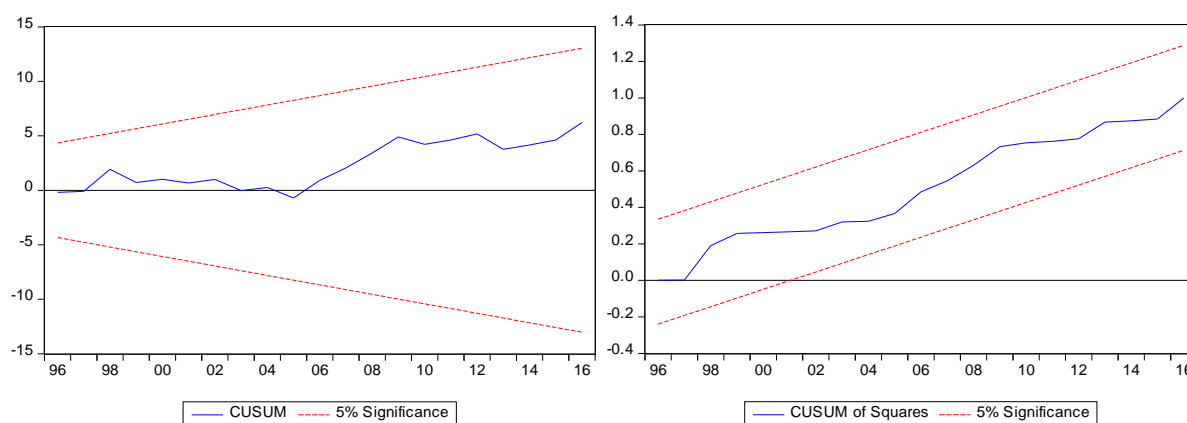
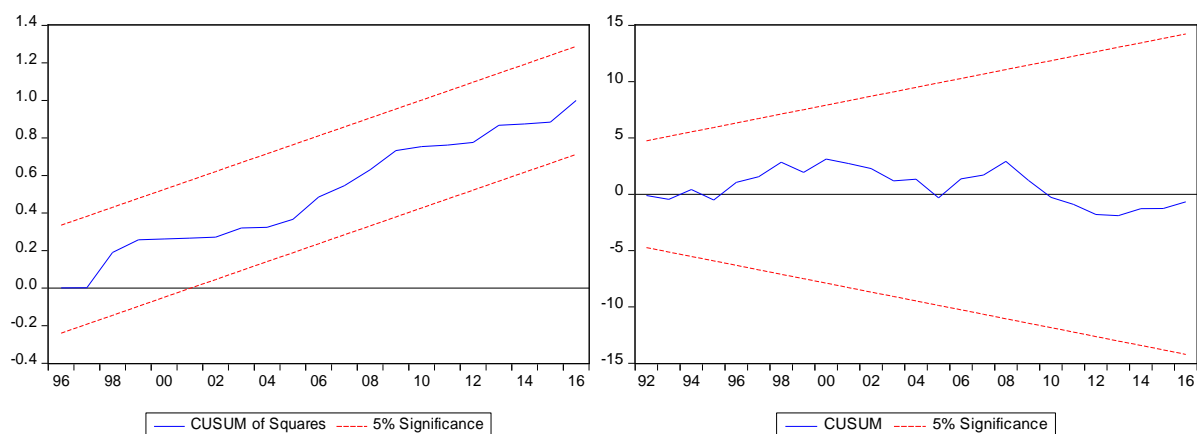


Figure 4: Model 2



Hence, the null hypothesis of stability cannot be rejected. Therefore, it can be concluded that the estimated parameters are stable and the models can be used by the Mauritius government in policy setting and decision making.

Conclusion

Using the ARDL approach for the period 1980–2016, the debt-growth nexus for Mauritius was analysed using two models whereby sound economic policy was introduced in the second model. It was found that external debt has a negative effect on growth and the fact that it is used to finance the budget deficit may be the cause of this inverse relationship. A comparative analysis showed that good policy reduces but does not reverse the negative effect of external debt on growth. However, the tightness of the macroeconomic policy adopted has a negative impact on trade and domestic investment.

Therefore, it is suggested that the implementation of tight policy should be supplemented with additional strategies in order to limit possible negative effects. The Mauritian government should look for sustainable ways to reduce its persistent budget deficit and decrease reliance on debt to finance it. In addition, since good economic policy is not enough to completely reverse the negative nexus between external debt and growth, attention should also be focused on institutional quality.

To reverse the crowding out effect, efficient debt management should be adopted to enable timely debt servicing. Also, investments should be made where the rate of return is higher than the global interest rate. Concerning trade openness, the process of technology transfer should be further encouraged by setting up an international technology transfer programme. Moreover, domestic investment promotion agencies should be further supported. Information about investment opportunities should be circulated, and there should be adequate promotion of private sector business dialogue. Financial sector development should be strengthened by creating more competition and encouraging private sector involvement. Improvements in the regulatory system and the way financial institutions are controlled are also suggested.

References

Adamu, I.M. and Rasiyah, R. (2016) External Debt and Growth Dynamics in Nigeria. *African Development Review*, 28(3) pp 291–303.

- Beaugrand, P., Loko, B. and Mlachila, M. (2002) The choice between external and domestic debt in financing budget deficits: the case of central and West African countries., IMF Working Paper No. 02/79, IMF, Washington, DC.
- Calvo, G. A. (1998) Growth, debt and economic transformation: The capital flight problem. In: F. Coricelli, M. Mattoe, and F., Hahn, (eds.) *New theories in growth and development*, St. Martin's Press Ltd. New York, pp 251 – 269.
- Chenery, H., and Strout, A. (1966) Foreign Assistance and Economic Development. *The American Economic Review*, 56(4) pp 679-733.
- Claessens, S. (1990) The debt Laffer curve: Some estimates. *World Development*, 18(12) pp 1671–1677.
- Durlauf, S., Helliwell, J.F. and Raj, B. (1996) Long-Run Economic Growth. *Studies in Empirical Economics*, pp 1–10.
- Elbadawi, I. A., Ndulu, B. J., and Ndung'U, N. (1997) Debt Overhang and Economic Growth in Sub-Saharan Africa. In I. Zubair and R. Kanbur (eds.) *External Finance for Low-Income Countries*, International Monetary Fund, Washington pp 49–76.
- Ejigayehu, D.A. (2013) The effect of external debt on Economic Growth: A panel data analysis on the relationship between external debt and economic growth. pp 1-50
- Fauzel, S. (2017) The impact of FDI on CO₂ emission in a small island developing state: A cointegration approach. *Economics and Business Letters*, 6(1) pp 6-13.
- Fauzel, S. and Keesoonah, L. (2017) A dynamic investigation of foreign direct investment and sectoral growth in Mauritius. *African Journal of Economic and Sustainable Development*, 6(1) pp 32-51.
- Fischer, S. (1993) The Role of Macroeconomic Factors in Growth. *Journal of Monetary Economics*, 32 pp 485-512.
- Gomez-Puig, M. and Rivero, S.S. (2015) Short-Run and Long-Run Effects of Public Debt on Economic Performance: Evidence from EMU Countries. SSRN Electronic Journal.
- Ghosh, A., Ostry, J. and Qureshi, M. (2017) Managing the Tide: How Do Emerging Markets Respond to Capital Flows? IMF Working Papers, 17(69), p 1.
- Grant, S. and Vidler, C. (2000) *Economics in context*. Heinemann, Oxford.
- Hunt, S.D. (2007) Economic growth: Should policy focus on investment or dynamic competition? *European Business Review*, 19(4) pp 279-291.
- Ijirshar, V.U., Joseph, F. and Godoo, M. (2016) The Relationship Between External Debt and Economic Growth in Nigeria. *International Journal of Economics & Management Sciences*, 6(1) pp 1-5.
- Jayaraman, T.K., and Lau, E. (2009) Does External Debt Lead to Economic Growth in Pacific Island Countries, *Journal of Policy Modelling*, 31, pp 272-288.
- Kaiser, H.F. (1974) An index of factorial simplicity. *Psychometrika*, 39, pp 31-36.
- Karagol, E. (2002) The causality analysis of external debt service and GNP, the case of Turkey¹. *Central Bank Review*, 2 (1) pp 39-64.
- Kawai, M. and Lamberte, M. (2010) *Managing Capital Flows*. Edward Elgar Publishing, Cheltenham

- Keho, Y. (2017) The impact of trade openness on economic growth: The case of Cote d'Ivoire. *Cogent Economics & Finance*, 5(1) pp 1-14.
- Kim, D.-H. (2011) Trade growth and income. *The Journal of Internal Trade & Economic Development. Trade Economic Development*. 20 (5) 677–709.
- Krugman, P.R. (1989) Market-Based Debt-Reduction Schemes. In J.A. Frenkel, M.P. Dooley, and P. Wickham (eds) *Analytical Issues in Debt*. International Monetary Fund, Washington D.C., pp 258-278
- Liew, V. K.S. (2004) Which Lag Length Selection Criteria Should We Employ?, *Economics Bulletin, AccessEcon*, 3(33) pp 1-9.
- Mohamed, B.M. (2013) Assessing the Short- and Long-run Real Effects of Public External Debt: The Case of Tunisia. *African Development Review* 25(4) pp 587–606.
- Nguyen, T.Q., Clements, B.J. and Bhattacharya, R. (2003) External Debt, Public Investment, and Growth in Low-Income Countries. IMF Working Papers, 03(249), p 1.
- Organisation for Economic Co-operation and Development (2011) Getting the most out of international capital flows. OECD Economics Department Policy Notes, No. 6.
- Poirson, M.H., Ricci, M.L.A. and Pattillo, M.C.A., (2004) *What are the channels through which external debt affects growth?*(No. 4-15). International Monetary Fund Washington D. C.
- Pradhan, Sh.R., Prasad, Y.M. (2002) Role of saving, investment and capital formation in economic development: A case of Nepal. *Economic Journal of Nepal*, 25 (4), pp 182-196. Available at SSRN: <https://ssrn.com/abstract=2793515>
- Prasad, E., Rajan, R. and Subramanian, A. (2007) Foreign Capital and Economic Growth. IMF Research Paper.
- Ramzan, M. and Ahmad, E. (2014) External debt growth nexus: Role of macroeconomic policies. *Economic Modelling*, 38, pp 204–210.
- Rauf, A. and Khan, A.A. (2017) Impact of Foreign Debt on Economic Growth: Evidence from Pakistan. *Asian Economic and Financial Review*, 7(10), pp 1005–1013.
- Samargandi, N., Fidrmuc, J. and Ghosh, S. (2015) Is the Relationship Between Financial Development and Economic Growth Monotonic? Evidence from a Sample of Middle-Income Countries. *World Development*, 68, pp 66–81.
- Seetanah, B. (2008) Financial development and economic growth: an ARDL approach for the case of the small island state of Mauritius. *Applied Economics Letters*, 15(10) pp 809–813.
- Seetanah, B., Padachi, K., Durbarry, R. (2007) External debt and economic growth: a vector error correction approach for the case of Mauritius. *International Journal of Business Research*, 7(5) pp 54-65
- Seiber, M.J. (1982) International borrowing by developing countries. Pergamon Press, New York.
- Weeks, J. (2000) Latin America and the high performing Asian economies: growth and debt. *Journal of International Development*, 12(5) pp 625-654.

- Were, M. (2001) The impact of external debt on economic growth and private, investments in Kenya: An Empirical Assessment. Wider Development Conference on Debt Relief, Helsinki, 17-18 August 2001.
- Williams, A.O. (1978) External debt-servicing capacity in developing countries. *The Review of Black Political Economy*, 9(1) pp 79–89.
- World Trade Organization. WTO | Trade policy review - Mauritius 2001. Retrieved: 24 February 2018 from <https://www.wto.org/english/tratop_e/tpr_e/tp176_e.htm>.
- Yusoff, M.B. and Febrina, I. (2014) Trade Openness, Real Exchange Rate, Gross Domestic Investment and Growth in Indonesia. Margin: *The Journal of Applied Economic Research*, 8(1) pp 1–13.
- Zahonogo, P. (2016) Trade and economic growth in developing countries: Evidence from sub-Saharan Africa. *Journal of African Trade*, 3(1-2) pp 41–56.