IDB WORKING PAPER SERIES Nº IDB-WP-1142

Fiscal Sustainability Assessment for Suriname 1978-2017:

A Fiscal Reaction Function Approach

Albert Mungroo
Peggy Tjon Kie Sim-Balker

Inter-American Development Bank
Department of Research and Chief Economist

October 2020

Inter-American Development Bank

Fiscal Sustainability Assessment for Suriname 1978-2017:

A Fiscal Reaction Function Approach

Albert Mungroo
Peggy Tjon Kie Sim-Balker

Centrale Bank van Suriname

October 2020

Cataloging-in-Publication data provided by the
Inter-American Development Bank
Felipe Herrera Library

Mungroo, Albert Walther, 1931-
Fiscal sustainability assessment for Suriname 1978-2017: a fiscal reaction function approach / Albert Mungroo, Peggy Tjon Kie Sim-Balker.
p. cm. — (IDB Working Paper Series ; 1142)
Includes bibliographic references.
1. Fiscal policy-Suriname-Econometric models. 2. Debts, Public-Suriname-Econometric models. 3. Debts, External-Suriname-Econometric models. 4. Government spending policy-Suriname-Econometric models. I. Tjon Kie Sim-Balker, Peggy. II. Inter-American Development Bank. Department of Research and Chief Economist. III. Title. IV. Series.
IDB-WP-1142

http://www.iadb.org

Abstract*

High and unsustainable public debt is an economic problem at the center of many emerging and developing economies. This paper investigates, for the period 1978-2017, how the Surinamese Government reacted to changes in public debt for the period 1978-2017 and assesses if fiscal policy was sustainable. To do so, a fiscal reaction function was estimated by using the following econometric techniques OLS, VAR, TAR, GMM and VECM. The results showed a positive and significant, but weak, relationship between the primary balance and total debt indicating that governments do react to debt-increases by improving the primary balance. The sustainability exercise also showed that fiscal policy is sustainable. However, it is found that this sustainability was not a result of appropriate fiscal policy. While factors outside of the Government's control worsened the primary balance through declining revenues, fiscal policy did not react swiftly by adjusting expenditures, which led to increases in inflation, affecting real interest rates, thus stabilizing debt in an unfavorable manner.

JEL classifications: B23, E62, H63, N96
Keywords: Primary balance, Output gap, Total debt, OLS, GMM, TAR, VAR, VECM

* This study was undertaken in the Research Department of the Central Bank of Suriname within the framework of the Center for Latin American Monetary Studies (CEMLA) Joint Research Program 2019 in collaboration with the Financial Stability and Development (FSD) Network of the Inter-American Development Bank (IDB). The authors gratefully acknowledge comments provided by Alejandro Izquierdo, Principal Economist of the Research Department of the IDB, and comments received during the internal peer review process. The authors additionally appreciate valuable comments by Karel Eckhorst and Gavin Ooft. The opinions expressed in this publication are those of the authors and do not reflect the views of CEMLA, the FSD Network, the IDB, or the Central Bank of Suriname.

1. Introduction

Since Suriname's autonomy in 1954, the country's policymakers have continually grappled with the issue of maintaining sustainable levels of public debt Over the period 1978-2017, the calculated median debt-ratios equal 31.4 percent of GDP. The debt data displays three distinct periods where debt exceeded the median debt ratio, namely 1983-1993 with a peak of 112.9 percent, 1999-2004 with a peak of 52.2 percent and 2014-2017 with a peak of 83.7 percent. Declining revenues from commodity exports, suspension of development-aid, and the inability to raise revenues optimally from other sectors and to cut expenditures are the most cited arguments for the widening of the primary fiscal deficit and consequently the rise in debt (Fritz-Krockow et al., 2009). Other macroeconomic variables such as exchange rate, inflation and economic growth have also affected debt-ratios.

The Government's efforts to maintain sustainable debt levels have been evident in legislation since the 1950s. Policymakers first used nominal ceilings over the period 1957-1998 to manage debt. Calculations of debt ceilings based on budgeted revenues between 1999 and 2002 were followed by the introduction of national debt definitions with corresponding debt ceilings scaled against GDP. Changes in debt ceiling-methods combined with frequent changes within each method signaled the evolution of debt in Suriname.

In light of the above, this study uses a fiscal reaction function for the period 1978-2017 to investigate how the Surinamese government reacted to changes in public debt. Moreover, it assesses if fiscal policy was sustainable. For the estimation of this reaction function, we adopted the single-country-methodology of Burger et al. (2011), who applied several econometric techniques.

The remainder of the paper is organized as follows. The next section provides a brief overview of the evolution and institutional framework of government debt. The third section reviews the literature and theory regarding fiscal sustainability and the reaction function. Thereafter, Section 4 outlines the methodology and discusses the results of our empirical analysis. The final section presents our main conclusion and recommendations.

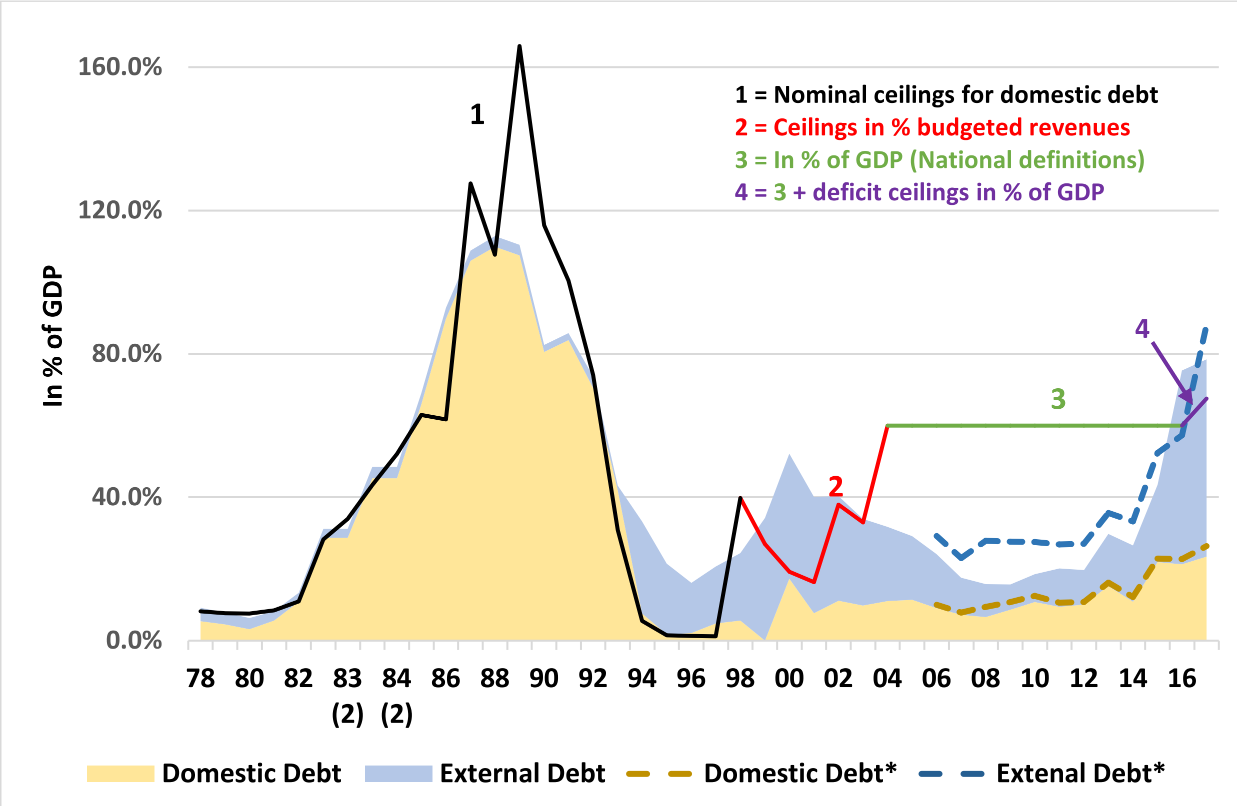
2. Evolution of Government Debt in Suriname over 1978-2017

Consecutive administrations have struggled to contain its public debt, taking into account the evolution of total debt and its ceilings (Figure 1). While median debt stands at 31 percent of GDP, three episodes of debt exceeded that median namely 1983-1993, 1999-2004 and 2014-2017. In 1983-1993, debt peaked at 112.9 percent of GDP, mostly consisting of domestic debt, while the other episodes had smaller peaks consisting largely of external debt.

By imposing ceilings, Governments' intention to contain debt is evident. From 1978 to 1998, the legislature imposed nominal ceilings on domestic debt, in accordance with a Public-Loans Act. The nominal ceilings were adjusted 10 times during this period because of breaches of the ceilings and limited debt space. The second period, 1998-2001, consisted of an adjustment of the Public-Loans Act whereby maximum public-debt levels were set as a ratio of projected current revenues (Dorinnie, Tjon Kie Sim-Balker and Mungroo, 2017). In this period, the Government established a commission to report on the amount of outstanding debt due to poor recording of debt over the period 1996-2000 (Atmodimedjo, 2002; Roseval et al., 2001). The report's recommendation led to the adoption of a Public Debt Act and the founding of the Suriname Debt Management Office.

In the last period, 2002-17, total, external and domestic public-debt levels were governed by ceilings set as a ratio to GDP. As in previous periods, both ceilings and debt definitions went through several adjustments in this period. In 2017, Parliament allowed a breach of the ceiling because of a recession in 2015-2016 that was deemed as special circumstances where real and nominal GDP declined in combination with severe exchange rate volatility. The most recent amendment of the Public Debt Act stipulates the length and size of the breach, based on a ceiling for overall deficits scaled against GDP (Dorinnie, Tjon Kie Sim-Balker and Mungroo, 2017).

Figure 1. Government Debt and Debt Ceilings[1]

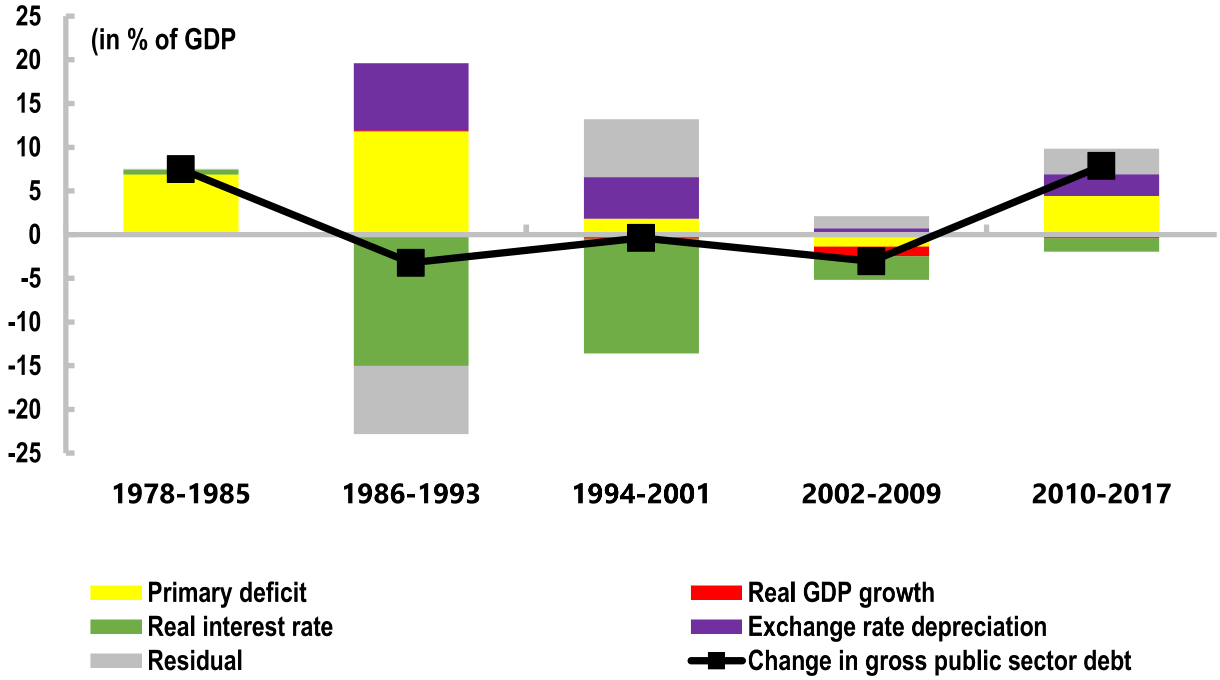


Source: Central Bank of Suriname and Suriname Debt Management Office.
Note: (2) represents a second adjustment of the ceilings in 1983 and 1984.

The efforts of the Government to contain debt are less apparent when reviewing debt-creating flows over the period 1978-2017 (Figure 2). High inflation levels as the driver of negative real interest rates contributed to the decline of total debt. The primary balance was driving debt over the period 1978-1993. While policymakers managed to reduce this balance in the period 1994-2001 and 2002-2009, this period was not free from fiscal distress, especially between 1996-1999, which led to a sizeable devaluation and thus to a sharp increase in external debt. In the last period, the primary balance is again the main contributor to the rise in debt. Declining commodity exports and the slow pace of expenditure rationalization worsened primary balances (Mungroo and Tjon Kie Sim-Balker, 2016)

[1] The Public Debt Act was enacted in 2002 but data recording based on this Act started in 2004.

Figure 2. Evolution of Total Debt



Source: Central Bank of Suriname, National Bureau of Statistics, Suriname Debt Management Office and authors' compilation.

3. Fiscal Sustainability and the Fiscal Reaction Function

In the past public debt developments have led to sharp fiscal adjustments and crises (a failure of economic agents to meet their obligation), which gave rise to the concept of fiscal sustainability (Asiama, Akosah and Owusu-Afriyie, 2014).This concept evolved over time from the Accounting Approach of Buiter (1985) and onward. The concept evolved into a more general definition of fiscal sustainability, which is explained as "the present value of future primary surpluses is equal to or greater than the current level of debt" (Asiama, Akosah and Owusu-Afriyie, 2014).The use of primary rather than total balances is justified because the Intertemporal Government Budget Constraint (IGBC) relates to the primary surplus. The use of the primary balance is consistent since primary expenditure is more easily under the discretionary control of the government (Afonso and Hauptmeier, 2009).

Some authors distinguish between solvency and sustainability. If the government is capable, over an infinite horizon, of paying its debt via future primary surpluses, then it is solvent. The concept of solvency comes from the IGBC approach of Blanchard (1990). This differs from sustainability, which is the ability of the government, under current policies, to achieve a prespecified debt-to-GDP ratio in a finite time horizon. Current policies indicate policy without making large adjustments to reach debt objectives (Asiama, Akosah and Owusu-Afriyie, 2014). These policies a priori rule out inflating debt away, selling government assets and debt defaults (Daniel et al., 2003).

Bohn (1998), however, stated that the IGBC approach is only true under certain conditions and therefore proposes using a Fiscal Reaction Function to estimate solvency. He derived the Fiscal Reaction Function from the IGBC and used it as a tool to model fiscal behavior by analyzing the response of the primary balance to past debt. Bohn's basic equation has the form:[2] $s_t = \rho d_t + \alpha \cdot Z_t + \varepsilon_t$ from which he said that fiscal policy is solvent if the response coefficient in the fiscal reaction function (ρ) is positive and significant.

After Bohn, many more studies such as De Mello (2005), Burger et al. (2011) and Mendoza and Ostry (2007) used fiscal reaction functions. Additions to Bohn's theory are that sustainability requires a stronger condition such as a strong enough response of the primary balance to changes in public debt instead of the level of the primary balance. Also important is the sensitivity of the primary balance to a change in public debt to converge to a steady state after a shock.

Starting with the Intertemporal Government Budget Constraint (IGBC), expressed by equation (1), we derive the following fiscal reaction function:

(1) $$TD_t = TD_{t-1} + iTD_{t-1} - PB_t$$

where TD_t is the stock of government debt, i the nominal interest rate on government debt and PB_t the primary balance.

From the IGBC, the change in government's debt–to-GDP ratio is estimated as:

(2) $$\Delta\ (TD/Y)_t = ((r - g)/(1 + g))(TD/Y)_{t-1} - (PB/Y)_t$$

where r is the real interest rate, g the real economic growth rate and Y the nominal GDP. If lower case letters are used to represent ratios to GDP, equation (2) becomes:

(2.1) $$\Delta\ (td)_t = ((r - g)/(1 + g))(td)_{t-1} - (pb)_t$$

Assuming that $\Delta(td)_t$ is zero then from equation (2.1) one can estimate the primary balance that is required for the debt/GDP ratio to remain stable:

(3) $$(pb)_t = ((r - g)/(1 + g))(td)_{t-1}$$

[2] Where, s_t = primary surplus to GDP, d_t = Debt to GDP, Z_t = a set of other determinants of the primary surplus and ε_t = error term.

If β^* represents (r - g)/(1 + g), equation (3) becomes the “fiscal reaction function” for the government:

$$(pb)_t = \beta^*(td)_{t-1} + \varepsilon_t \quad (4)$$

In his study for Brazil, de Mello (2005) included an AR(1) term for the primary balance, $(pb)_{t-1}$, on the right-hand side of equation (4) to allow for inertia in government’s behavior. Following Bohn et al. (2011), Burger et al. (2011) and Nguyen (2013), we have also added the output gap, y_gap, to capture the impact of the business cycle on the budget. The fiscal reaction function to be estimated is then specified as:

$$(pb)_t = \beta_1 + \beta_2(pb)_{t-1} + \beta_3(td)_{t-1} + \beta_4(y\_gap)_t + \varepsilon_t \quad (5)$$

To determine if the government does react to the level of its debt-to-GDP ratio the parameter β_3 has to be positive and significant. However, for fiscal policy to be sustainable the following condition must be met:

$$\beta_3/(1 - \beta_2) > \beta^* = (r - g)/(1 + g)$$

4. Data and Methodology

The reaction of the Surinamese Government to its debt burden is measured by utilizing a fiscal reaction function based on the methodology of Burger et al. (2011). Concomitantly, this section addresses the discussion on stationarity of the data by assuming three data and model properties.

All employed models aim at utilizing equation (5) in Section 3 or a derivation of that equation. An OLS, GMM, and VAR address the possibility of stationary data. The VAR can also capture multiple interactions between the variables, while the GMM addresses concerns regarding correlation of explanatory variables and the error term due to non-linearity, measurement error or simultaneity. The instrument variables in the GMM are the lags of the explanatory variables. Under the assumptions of possible non-linear behavior, a cubic OLS and two TAR models are utilized. The first TAR model captures a break in Government’s behavior due to a certain debt level, so-called “high” and “low” debt (Abiad and Ostry, 2005), while the second model takes into account behavioral changes regarding a negative or positive output gap. Lastly, in the case of non-stationarity a Vector Error-Correction approach (VECM) is used.

In order to execute the adopted approach, data for three variables were collected, namely, the primary balance (PB), total debt (TD)[3] and the output gap (y_gap). The PB- and TD-data were scaled against nominal GDP, and therefore for the remainder of the paper they are referred to as lowercase letters pb and td. Y_gap was calculated as:

$$y_{\_gap} = \left\lfloor \frac{y_{\_act}}{y_{\_pot}} - 1 \right\rfloor \times 100\% \quad (6)$$

where *y_act* and *y_pot*, respectively represent the real-GDP-observed-values and the real-GDP-trend which was generated the HP-filter (λ:100). The annual data set ranges from 1978 to 2017 and the data was entered as fraction in to Eviews (Appendix Table 1). All econometric tests and procedures were performed using the Eviews 10 software package.

4.1 Unit Root and Co-integration Tests

The test of unit root was conducted to determine the order of integration for each series. Therefore, in this study, the individual root of ADF, PP and IPS of the group-unit-root tests[4] were utilized for the variables *pb*, *td* and *y_gap* over two different time periods, namely 1960-2017 and 1978-2017, to see if the results from various tests reveal a consistent pattern.

The ADF, PP and IPS unit-root test results over the period 1960-2017 suggested that the variables *pb* and *y_gap* are stationary in level, while *td* is stationary in first difference (Table 1). For the period 1978-2017, only *y_gap* is stationary in levels, while *pb* and *td* are stationary in first difference.

For the two time-periods, *pb* has shown opposing results, while *td* has shown almost uniform results having a unit root in levels. Two outcomes, ir-ADF-intercept and ir-IPS-intercept, for the period 1978-2017 showed *td* is stationary in levels. Burger et al. (2011) argue that all unit root tests have weaknesses in determining the stationarity for each series. Therefore, several models will be utilized not only to capture non- vs stationarity but also issues regarding simultaneity, non-linearity and complex behavior among variables will also be captured.

[3] The data point for 1999 is missing and is linearly interpolated using EViews 10.
[4] The null hypothesis of all these tests reads: "Unit root (individual unit root process)."

Table 1. Group-Unit-Root Tests

Variable	Test-level	ir ADF			ir PP			ir IPS	
1960-2017	Rank of stability	Intercept	Trend & Intercept	None	Intercept	Trend & Intercept	None	Intercept	Trend & Intercept
pb	I(0)	0.003***	0.015**	0.001***	0.004***	0.020**	0.001***	0.003***	0.015**
td	I(0)	0.136	0.323	0.246	0.245	0.492	0.327	0.136	0.323
y_gap	I(0)	0.000***	0.000***	0.000***	0.023**	0.097*	0.002***	0.000***	0.000***
td	I(1)	0.001***	0.004***	0.000***	0.001***	0.003***	0.001***	0.001***	0.004***
1978-2017	Rank of stability	Intercept	Trend & Intercept	None	Intercept	Trend & Intercept	None	Intercept	Trend & Intercept
pb	I(0)	0.095*	0.227	0.157	0.133	0.227	0.034**	0.095*	0.227
td	I(0)	0.013**	0.418	0.304	0.320	0.629	0.398	0.013**	0.418
y_gap	I(0)	0.002***	0.008***	0.000***	0.034**	0.088*	0.002***	0.002***	0.008***
pb	I(1)	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
td	I(1)	0.013**	0.059*	0.001***	0.011**	0.048**	0.001***	0.013**	0.059*

Source: Authors' compilation.
p-value: 10 percent -*, 5 percent -**, 1 percent - *** rejection of the null-hypothesis. I(0): stationary at levels, I(1): stationary in first difference

4.2 Estimation Results: OLS, TAR, VAR and GMM Models

In view of capturing non- vs stationarity, simultaneity, non-linearity and complex behavior among variables, the results from various estimation techniques are reported. The estimation results, presented in Table 2, refer to the period 1978-2017 for the OLS-, Cubic-OLS, GMM-, two TAR and VAR-equation. All the regressions include an output gap and several dummy variables. The crisis dummy—1983, 1986, 1991, 1993 and 2000 representing economic downturns—and recovery dummy—1994 and 2001 marking periods of strong recovery—captured severe volatility in the data for the OLS, the TAR and the VAR-models. The GMM-model did not require the use of dummies, while the Cubic-OLS seemed to capture most of the volatility except for 2000 and 2001. The TAR-analysis regarding a positive or negative output-gap required an additional dummy for 2016.

In all the regressions the parameter for all forms of lagged debt (td_{t-1}) is statistically significant at a 5 percent level, except in the GMM, which is significant at a 10 percent level, indicating the Government takes into account past debt-to-GDP-levels. All are positive, but with a small impact as the parameters ranged from 0.05 to 0.20 percent except for the Cubic-OLS. The results seem most evident in the period 1994-2005 where Governments managed to reduce primary deficits and even created surpluses (Figure 2). The output-gap-parameters (including VAR-lagged) are statistically significant in most models and are always positive, indicating some type of countercyclical behavior by the Government. However, inertia seems very persistent with large—i.e., significant at 1 percent level and above 0.75 percent—lagged primary-balance parameters. Seemingly, inertia overpowers the Government's counter-cyclical behavior and their ability to stabilize debt. The effects of inertia seem evident in the period 1978-1993 and 2010-2017. In these periods, primary deficits seemed persistent (Figure 2)

The two TAR models present differences in government's reaction to different levels of debt and different business-cycle stages. The different debt levels were determined with the Bai-Perron tests taking into account one threshold. The threshold model selected a break at 40.3 percent whereby debt-levels smaller than the break are specified as low-debt and levels equal to or larger than the break are specified as high-debt. This TAR showed a diminished reaction of the government to debt levels when these levels transitions from low- to high-debt. Where the output gap serves as transition variable, the threshold was set at zero. This TAR-model produced an insignificant result for government's reaction to debt levels in busts while in booms the fiscal reaction to debt levels was significant.

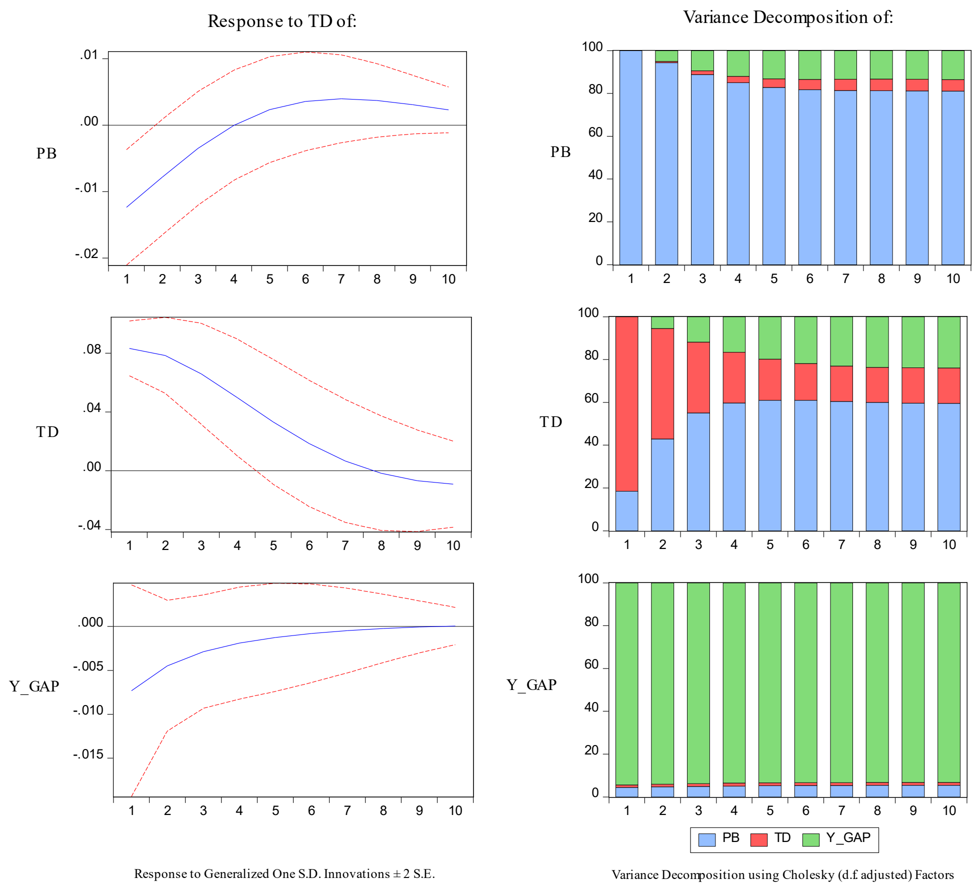
Table 2. Fiscal Reaction Functions for Suriname

Variables	OLS	OLS^^{3}	GMM	TAR_TD-break 40.3 percent	TAR_y_gap	VAR PB-equation
C	-0.027	-0.079		-0.050	-0.014	-0.025
	0,004***	0,032**		0,000***	0,099*	[-3,05551]
PB_{t-1}	0.858	0.754	1.346	0.776	0.843	0.870
	0,000***	0,000***	0,000***	0,000***	0,000***	[9,51226]
TD_{t-1}	0.053	0.530	0.089			0.056
	0,028**	0,045**	0,091*			[2,61376]
(TD_{t-1})^2		-1.110				
		0,032**				
(TD_{t-1})^3		0.642				
		0,028**				
TD_low_{t-1}				0.199		
				0,000***		
TD_high_{t-1}				0.063		
				0.002***		
TD_posgap_{t-1}					0.047	
					0,012**	
Y_Gap	0.291	0.357		0.251		
	0,021**	0,097*		0,015**		
Y_Gap_{t-1}						0.236
						[2,04106]

Source: Authors' compilation.

From the VAR-model (Appendix Tables 2 and 3 and Figure 1), the impulse responses (Figure 3, LHS) and the variance decomposition (RHS) showed that the duration and the impact of *td* on *pb* is short and small. An initial shock of *td* negatively influences *pb*. Afterward this variable corrects upward, but only the first period seems statistically significant. In addition, the variance of *pb* explained by *td* is non-existent in the first period and seems to increase to almost 5 percent in the eighth period. Most of the variance of *pb* is explained by itself.

Figure 3. Impulse Response and Variance Decomposition



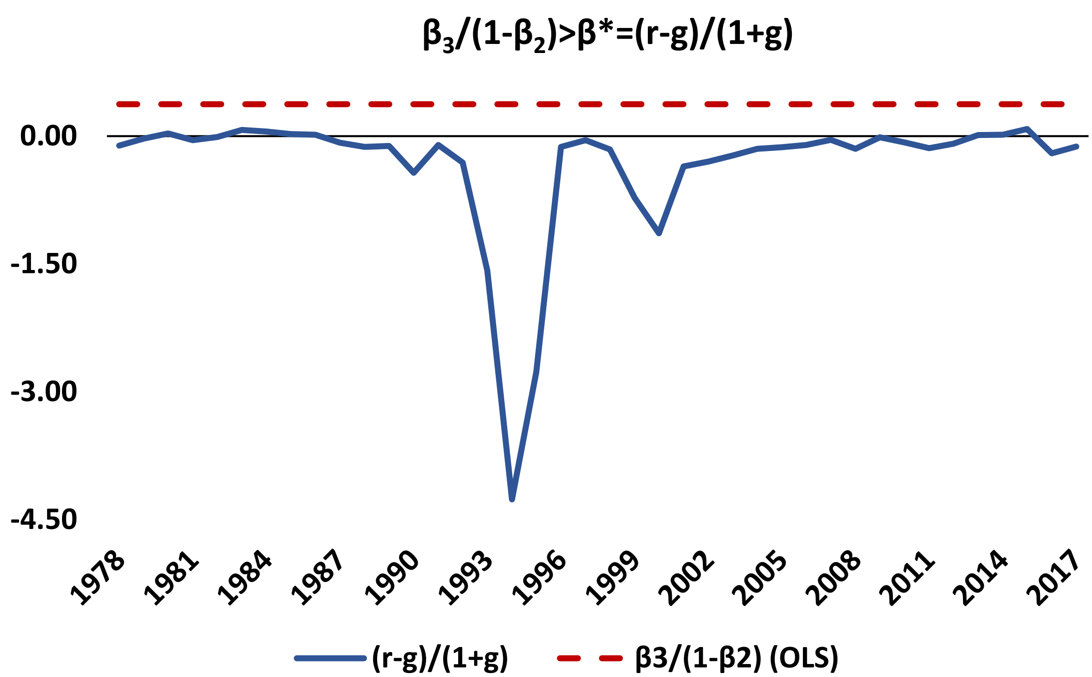
Source: Authors' compilation.

All models are well-behaved (Appendix Table 4) with the exception of the GMM-specific tests, which indicates that the explanatory variables are exogenous and the instruments are weak, thus refuting the notion of non-linearity. In addition, the cubic-OLS did suffer from multi-collinearity according to the variance inflation factors. For the VAR, one lag was selected as suggested by the Schwarz- and the Hannan-Quinn information criterion. The VECM-approach did not render any useful results. The Johansen Co-integration Summary Test and the Max-Eigen Value showed that there are no co-integration relationships among *pb*, *td* and *y_gap*.

4.3 Sustainability Exercise

As explained in section three, fiscal policy will be sustainable if $\beta_3/(1-\beta_2) > \beta^*=(r-g)/(1+g)$. Figure 4 presents an empirical estimate of $(r - g)/(1 + g)$ and $\beta_3/(1-\beta_2)$ from the OLS-equation.[5] For the OLS as well as the other models,[6] $\beta_3/(1-\beta_2)$ is greater than $\beta^* = (r-g)/(1+g)$ during the entire research period, meaning that the sustainability condition is met for fiscal policy in Suriname. Examining the (r-g)/(1+g)-equation however, learned that in Suriname real interest rates have been low and negative for the most part, primarily determined by inflation-developments (Figure 2).

Figure 4. Sustainability Exercise



Source: Author's compilation.

[5] The effective interest rate was calculated by dividing total interest payments divided by total debt. This is as the weighted average of the rates on the various outstanding debt instruments in Suriname.
[6] Except for the GMM model.

As negative commodity price shocks have worsened the primary balance in the past, they will remain a threat in the future as Governments have struggled to curb expenditure. The risks of high nominal interest rates and inflation-indexed instruments can increase the debt burden and ultimately raise debt. While negative real interest rates have favored debt in Suriname, these instruments are affected less by inflation.

In the last period, 2010-2017, the exchange rate has been a factor in explaining the increase in debt. Currently the exchange rate has been under pressure again for quite some time. A possible depreciation can lead to a further increase in debt. Also, large shocks or sustained periods of negative growth can negatively impact the debt trajectory. These episodes can cause debt levels to rise or allow high debt levels to persist. As commodity price volatility usually influences the production of price-taking commodity exporters, sluggish prices can suppress growth in these economies.

5. Conclusions and Recommendations

Over the period studied, policymakers reacted to debt increases by improving the primary balance. This conclusion is derived from the estimated fiscal reaction function for Suriname showing a significant and positive relationship between the primary balance and total debt. From 1994 to 2001 there were clear efforts by policymakers to consolidate the primary balance; nonetheless, in the period 1996-1999 fiscal distress led to a sizeable devaluation and thus to a sharp increase in external debt. In addition, the sustainability exercise also showed that fiscal policy seems to be sustainable. However, the exercise shows that negative real interest rates can be attributed to this sustainability rather than appropriate fiscal policy. While factors outside of the government's control worsened the primary balance through declining revenues, fiscal policy did not react swiftly by reducing expenditures. This led to increases in inflation, affecting real interest rates and thus stabilizing debt in an unfavorable manner.

The inability of the government to reduce its primary balance is also evident in the fiscal reaction function as inertia is very significant and sizable in the results. While Governments did improve their primary balance over the period 1994-2005, it took eight years to do so. Seemingly, inertia overpowers the Government's counter-cyclical behavior and their ability to stabilize debt.

From the above we recommend first that the Government embark on a path to improve the fiscal position and fiscal discipline. Secondly, taking the other risks into account the Government should favor concessional loans to avoid high nominal interest rates or inflation-indexed debt instruments. Thirdly, close coordination between the Ministry of Finance and the Central Bank is pivotal to manage exchange rate pressures to avoid large depreciations, which has negative effects on foreign-currency-denominated debt. Since exchange rate pass-through is large, high inflation only erodes local-currency-denominated debt while exerting pressure on domestic income.

Fourth, the Government should implement policies aimed at stimulating economic activity. The most sustainable way is to implement a structural reform of the economy aimed at reducing Government involvement in the economy and promoting private initiative. This increases the Government's revenue base, lowers expenditures and therefore improves the primary balance. Fifth, to mitigate the risk of volatile commodity prices the Government established a Savings and Stabilization Fund with stringent fiscal rules to accompany the Fund's operations. All branches of the Government should safeguard these rules from political and personal influences. Furthermore, it is advisable to create a revenue-forecasting unit to anticipate realistic levels of (commodity) revenues.

Sixth, a Risk Unit should be established within the Ministry of Finance to identify and quantify risks in various areas, particularly long-term risks associated with social spending. These long-term risks can put large pressure on spending in the future. Lastly, to understand the dynamics behind the inertia of past fiscal policy and the rules needed to combat this inertia, future research is inevitable. Therefore, this study is not exhaustive but rather a steppingstone.

References

Abiad, A., and J.D. Ostry. 2005. *Primary Surpluses and Sustainable Debt Levels in Emerging Market Countries*. Washington, DC, United States: International Monetary Fund.

Afonso, A., and S. Hauptmeier. 2009. "Fiscal Behaviour in the European Union. Rules, Fiscal Decentralization and Government Indebtedness." ECB Working Paper 1054. Frankfurt, Germany: European Central Bank.

Ali Abbas, S. et al. 2013. "Dealing with High Debt in an Era of Low Growth." Staff Discussion Note 13/7. Washington, DC, United States: International Monetary Fund

Asiama, J., N. Akosah and E. Owusu-Afriyie. 2014. "An Assessment of Fiscal Sustainibility in Ghana." Bank of Ghana Working Paper WP/BOG-2014/09. Accra, Ghana: Bank of Ghana.

Atmodimedjo, E. 2002, juni 6. "Inleiding Wet Staatsschuld." 5. Paramaribo, Suriname: Centrale Bank van Suriname. Retrieved july 29, 2014.

Blanchard, O. 1990. "Suggestions for a New Set of Fiscal Indicators." OECD Economics Department Working Paper 79. Paris, France: OECD Publishing.

Bohn, H. 1998. "The Behaviour of U.S. Public Debt and Deficits." *Quarterly Journal of Economics* 113(3): 949-963.

Buiter, W.H. 1985. "A Guide to Public Sector Debt and Deficit." Center Discussion Paper 493. New Haven, United States: Yale University, Economic Growth Center.

Burger, P. et al. 2011. "Fiscal Sustainability and the Fiscal Reaction Function for South Africa." IMF Working Paper WP/11/69. Washington, DC, United States: International Monetary Fund.

Daniel, J.A. et al. 2003. *Public Debt in Emerging Markets: Is It Too High?* Washington, DC, United States: International Monetary Fund.

De Mello, L. 2005. "Estimating a Fiscal Reaction Function for Brazil: The Case of Debt Sustainability in Brazil." OECD Economics Department Working Papers 423. Paris, France: OECD Publishing.

Doi, T., T. Hoshi and T. Okimoto. 2011. "Japanese Government Debt and Sustainability of Fiscal Policy." NBER Working Paper 17305. Cambridge, United States: National Bureau of Economic Research.

Fritz-Krockow, B. et al. 2009. *Suriname: Toward Stability and Growth*. Washington, DC, United States: International Monetary Fund, Western Hemisphere Department. Retrieved from: http://ctrc.sice.oas.org/TRC/Articles/Suriname/Stability_and_Growth_2009.pdf

Mendoza, E. G., and J.D. Ostry. 2007. "International Evidence on Fiscal Solvency: Is Fiscal Policy 'Responsible'?" NBER Working Paper 12947. Cambridge, United States: National Bureau of Economic Research.

Mungroo, A.W., and P.R. Tjon Kie Sim-Balker. 2016. "Determining a Debt Threshold for Suriname." Paramaribo, Suriname: Centrale Bank van Suriname. Unpublished manuscript.

Nguyen, T. 2013. "Estimating India's Fiscal Reaction Function." ASARC Working Paper 2013/05. Canberra, Australia: Australian National University, Australia South Asia Research Centre.

Roseval, R.W. et al. 2001. *Rapport van de Commisie Inventarisatie Staatsschuld*. Paramaribo, Suriname: Ministerie van Financien.

Appendix

Table 1. Model Variables and Data

Year	Primary Balance scaled to GDP	Total Debt scaled to GDP	Output Gap	Inflation	Interest rate	Growth rate
t	pb	TD	Y_GAP	π	i	g
1978	(0,01)	0,09	0,14	0,02	0,02	0,13
1979	0,02	0,08	0,10	0,09	0,04	-0,03
1980	0,02	0,06	(0,01)	0,11	0,06	-0,09
1981	(0,03)	0,08	0,06	0,04	0,06	0,07
1982	(0,05)	0,13	0,01	0,07	0,02	-0,04
1983	(0,16)	0,31	(0,03)	0,00	0,04	-0,04
1984	(0,15)	0,48	(0,04)	(0,00)	0,03	-0,02
1985	(0,18)	0,69	(0,02)	(0,01)	0,03	0,02
1986	(0,22)	0,93	(0,01)	0,01	0,04	0,01
1987	(0,20)	1,09	(0,07)	0,17	0,04	-0,06
1988	(0,17)	1,13	0,01	0,10	0,04	0,08
1989	(0,08)	1,10	0,05	0,12	0,04	0,04
1990	(0,02)	0,82	0,01	0,50	0,04	-0,04
1991	(0,10)	0,86	0,03	0,12	0,04	0,03
1992	(0,04)	0,74	0,04	0,35	0,04	0,00
1993	(0,12)	0,43	(0,03)	1,57	0,03	-0,07
1994	0,01	0,33	(0,01)	4,38	0,01	0,03
1995	0,03	0,21	(0,02)	2,77	0,00	0,00
1996	0,01	0,16	(0,02)	0,12	0,00	0,01
1997	(0,03)	0,21	0,02	0,01	0,02	0,06
1998	(0,06)	0,24	0,02	0,17	0,03	0,02
1999	(0,03)	0,38	(0,03)	0,74	0,01	-0,01
2000	(0,12)	0,52	(0,04)	1,15	0,01	0,02
2001	0,04	0,40	(0,04)	0,36	0,03	0,04
2002	(0,03)	0,40	(0,05)	0,32	0,05	0,03
2003	0,03	0,34	(0,04)	0,22	0,05	0,06
2004	(0,01)	0,32	(0,00)	0,12	0,04	0,08
2005	0,01	0,29	(0,01)	0,14	0,05	0,05
2006	0,03	0,24	0,00	0,12	0,06	0,06
2007	0,07	0,18	0,01	0,06	0,07	0,05
2008	0,02	0,16	0,01	0,16	0,04	0,04
2009	(0,01)	0,16	(0,00)	0,06	0,08	0,03
2010	(0,02)	0,19	0,02	0,07	0,05	0,05
2011	(0,01)	0,20	0,05	0,14	0,05	0,06
2012	(0,02)	0,22	0,05	0,11	0,04	0,03
2013	(0,04)	0,30	0,06	0,00	0,04	0,03
2014	(0,02)	0,27	0,05	0,02	0,03	0,00
2015	(0,09)	0,44	(0,00)	(0,02)	0,03	-0,03
2016	(0,08)	0,75	(0,07)	0,28	0,03	-0,05
2017	(0,07)	0,79	(0,06)	0,15	0,04	0,02

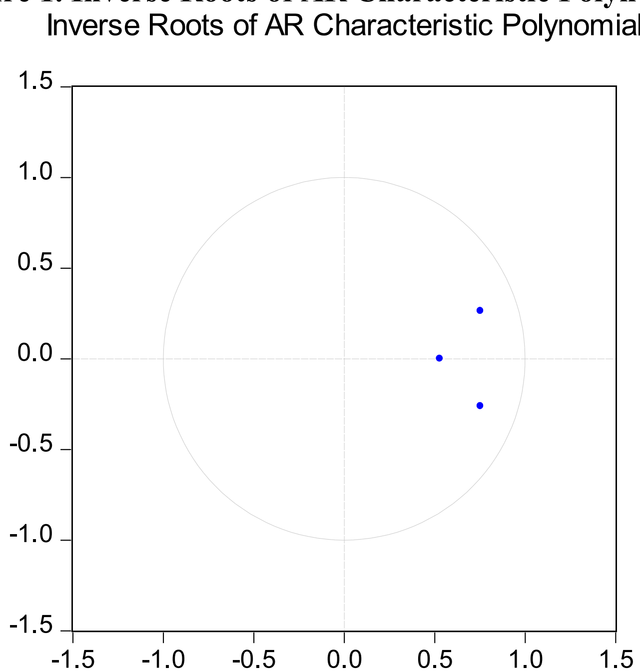
Source: Central Bank of Suriname, National Bureau of Statistics, Suriname Debt Management Office.

Table 2. VAR Lag Length Criteria

VAR Lag Order Selection Criteria Endogenous variables: pb, td and y_gap						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	1.242.465	NA	4.67e-07	-6.062.323	-5.935.657	-6.016.524
1	1.872.446	113.3967*	3.15e-08	-8.762.232	-8.255568*	-8.579038*
2	1.973.185	1.662.192	3.01e-08*	-8.815927*	-7.929.265	-8.495.338
3	2.016.426	6.486.067	3.89e-08	-8.582.129	-7.315.469	-8.124.145

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5 percent level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion.
Source: Authors' compilation.

Figure 1. Inverse Roots of AR Characteristic Polynomial



Source: Authors' compilation.

Table 3. VAR Estimates

	PB	TD	Y_GAP
PB(-1)	0,870	-1,587	0,014
	-0,091	-0,264	-0,122
	[9,512]	[-6,001]	[0,113]
TD(-1)	0,056	0,636	-0,005
	-0,021	-0,062	-0,029
	[2,614]	[10,286]	[-0,166]
Y_GAP(-1)	0,236	-0,796	0,534
	-0,116	-0,334	-0,154
	[2,041]	[-2,383]	[3,463]
C	-0,025	0,099	0,005
	-0,008	-0,024	-0,011
	[-3,056]	[4,139]	[0,470]
CRISIS	-0,096	0,061	-0,018
	-0,014	-0,041	-0,019
	[-6,783]	[1,496]	[-0,933]
RECOVERY	0,136	-0,251	-0,004
	-0,022	-0,064	-0,030
	[6,104]	[-3,898]	[-0,127]
R-squared	0,858	0,936	0,324
Adj. R-squared	0,837	0,926	0,225
Sum sq. resids	0,028	0,236	0,050
S.E. equation	0,029	0,083	0,038
F-statistic	40,979	98,857	32,625
Log likelihood	88,368	45,908	76,816
Akaike AIC	-4,118	-1,995	-3,541
Schwarz SC	-3,865	-1,742	-3,287
Mean dependent	-0,047	0,418	0,003
S.D. dependent	0,071	0,307	0,044
Determinant resid covariance (dof adj.)		6,56E-09	
Determinant resid covariance		4,03E-09	
Log likelihood		216,328	
Akaike information criterion		-9,916	
Schwarz criterion		-9,156	
Number of coefficients		18	

Standard errors in ( ) & t-statistics in [ ]; light blue depicts t-values greater than ±1.65 for 10 percent probability.
Source: Authors' compilation.

Table 4. Model Specifications of OLS, Cubic OLS, GMM, TAR and VAR

	OLS	OLS^3	GMM	TAR_TD-break 40.3 percent	TAR_y_gap	VAR PB-equation
Adjusted R-squared	0,838	0,618	0,208	0,872	0,852	0,837
Durbin Watson	2,522	2,256	2,989	2,303	2,506	N/A
Serial Correlation Test:	-	-	-	-	-	-
Heteroskedasticity Test	-	-	-	-	-	-
Ramsey RESET Test	-	-	-	-	-	N/A
Instruments	N/A	N/A	PB_{t-2} | TD_{t-3}	N/A	N/A	N/A
Variance Inflation Factors	-	+	N/A	-	-	N/A
GMM: Difference in J-stats	N/A	N/A	-	N/A	N/A	N/A
GMM:Cragg-Donald F-stat:	N/A	N/A	-	N/A	N/A	N/A
TAR: Break	N/A	N/A	N/A	40,3%	y-gap = 0	N/A
Inverse roots	N/A	N/A	N/A	N/A	N/A	-
Burger-rule: a4/(1-a2)	0,374	0,253	-0,257	0,661	0,297	0,431

The null-hypothesis, **-** = was not rejected versus + = was rejected; N/A = not-applicabel,-available or –valid.
Source: Authors' compilation.