

Assessing Debt Sustainability in Belize

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Abstract

Belize has restructured its commercial debt with external creditors three times within a 10-year span, but the level of its public debt remains high and future roll-over risks loom. The International Monetary Fund (IMF) has recommended a fiscal consolidation effort equal to an outturn of 4 to 5 percent of GDP on the Government's primary balance account to reduce the debt-to-GDP ratio to 60% of GDP by 2025. Instead, Government plans to undertake a more gradual fiscal consolidation path, which raises concerns about debt sustainability. This paper assesses Belize's debt sustainability in two steps. Using non-parametric methods, it examines the relationship between real GDP growth and public debt between 1981 and 2016. Then, debt dynamic equations are used to trace the outcome of extending the Government's plans over a 12-year horizon and determine the size of the fiscal effort needed to reduce the debt-to-GDP ratio to an appropriate target by 2028. The results of the study show that on average real GDP growth is highest when public debt is below 60% of GDP, so a debt-ratio of 60% of GDP was chosen as the desired target. If Government continues on its current path, it will not reach the targeted debt threshold of 60% of GDP by 2028. However, a minimum constant primary balance of 3.3% of GDP will enable the Government to achieve this goal, with implementation of sound debt management strategies, growth enhancing policies, structural and governance reforms and fiscal rules.

Keywords: debt sustainability, Belize, debt dynamics

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I. Introduction

After restructuring its external debt to commercial lenders three times between 2007 and 2017, Belize's public debt-to-GDP ratio and risks of future debt distress remain high¹. The International Monetary Fund (IMF) indicated that Belize's fiscal policy and public debt are unsustainable and recommended that Government raises its primary fiscal balance to 4-5 percent of GDP over the near to medium term to lower the level of public debt to a "safe" but arbitrary debt-to-GDP threshold of 60% of GDP by 2025 (International Monetary Fund, 2016 and 2017).

However, the Government agreed to a more gradual fiscal consolidation path with bondholders in its third restructuring. The preceding entailed a fiscal consolidation effort equal to 3% of GDP in the 2017/2018 fiscal year (FY), relative to the previous FY, and a primary surplus of at least 2% of GDP for the following three consecutive FYs, spanning from April 2018 to March 2021. This situation raises three key questions. Is the policy objective of lowering the debt-to-GDP ratio to 60% of GDP appropriate for Belize? Will Government's planned fiscal adjustments put public debt on a trajectory to meet the desired target, if fully implemented? If not, what size of fiscal adjustment should the government consider to assure creditors that public debt remains on a sustainable path? This paper examines these questions.

The IMF conducts a standardized analysis of Belize's public debt sustainability using a framework for advanced and emerging countries. Under this framework, Belize is classified as a high scrutiny case because its current or projected debt-to-GDP ratio exceeds the 50% benchmark and/or its current and projected public gross financing needs exceed 10 percent of GDP. The results of the assessment are discussed with the authorities and published in the appendix of the Article IV Reports at the end of the annual country surveillance review.

However, the IMF's debt sustainability analysis (DSA) framework has several deficiencies. The most significant is the over-reliance on arbitrary debt thresholds as benchmarks for debt sustainability when studies have shown that "safe" debt thresholds, apart from being nonlinear in relation to growth, are also time-variant and heterogeneous across countries. This raises the issue of the validity of a debt-to-GDP threshold of 60% to anchor fiscal policy in Belize, particularly since Belize faced a balance of payments crisis in 1984 when the public debt-to-GDP ratio was lower than this threshold at 52.6% of GDP.

In the literature, debt sustainability has been defined and measured in numerous ways. To facilitate comparison with the IMF approach, this paper adopts the definition used in the 2011 DSA framework for market access countries (MACs). It states that "public debt can be regarded as sustainable when the primary balance needed to at least stabilize debt under both the baseline and realistic shock scenarios is economically and politically feasible, such that the level of debt is consistent with an acceptably low rollover risk and with preserving potential growth at a satisfactory level" (IMF 2013, p.4). This definition incorporates the criteria of solvency and liquidity. Solvency is met "if the present discounted value (PDV) of the current and future primary expenditure is no greater than the PDV of the current and future path of income, net of any

¹ A high level of debt is undesirable for three reasons: (i) it exacerbates an economy's vulnerability to growth and interest rate shocks; (ii) it raises the probability of a rollover crisis, and (iii) it exerts a drag on growth (IMF 2013).

initial indebtedness. An entity is illiquid if, regardless of whether it satisfies the solvency condition, its liquid assets and available financing are insufficient to meet or roll-over its maturing liabilities” (IMF 2002, p.5). A sustainable fiscal policy should keep a government solvent and liquid in the long-run through the generation of future primary surpluses to offset fiscal deficits. In this framework, fiscal policy is represented by a pre-determined primary surplus that is distributed over a specific length of time.

This paper adds to the empirical literature on debt-related studies on Belize. In the late 1980’s and 1990’s, several qualitative papers analyzed the impact of rising external debt on economic growth, fiscal stability and external stability (see Alvarez (1987) and Solis (1997)). On the empirical side, Robinson and Palacio (2001) applied ordinary least squares (OLS) to a debt dynamics equation with seigniorage on data spanning from 1986 to 2000. They found that seigniorage was an important source of revenue to service government debt. Worrell et al. (2015) used OLS estimations to measure sustainability based on the impact of fiscal policy on the balance of payments and domestic foreign exchange markets. In this framework, fiscal policy becomes unsustainable when governments cannot service their external debt obligations, and on this basis, risks to sustainability were detected in Belize during the 2000’s².

This study provides a simple, transparent complementary analysis to the IMF’s DSA. A simple nonparametric approach was applied to annual data on Belize from 1981 to 2016 to examine the relationship between debt and GDP growth. Secondly, the accounting approach was used to trace the trajectory of public debt-to-potential GDP under two hypothetical fiscal consolidation programs. The results show that on average, GDP growth is greater when public debt is below 60% of GDP in Belize. In 2017, the solvency criterion would be satisfied with a small primary deficit due to a small negative growth-adjusted weighted average real interest rate. However, liquidity risks persist in the medium to long-run. A sustained primary balance of 1% of GDP and 2% of GDP would reduce the public debt-to-potential GDP ratios to 77.6% and 65.2%, respectively, by 2028. Further, a constant primary balance of 3.3% would reduce the public debt ratio to 60% of GDP. The paper’s findings could inform policy discussions relating to sustainable borrowing practices in Belize.

The remainder of the paper is organized as follows. Section II reviews the increase in public debt after the post-Independence era. Section III summarizes the theoretical literature, the IMF’s DSA framework and recent criticisms of the framework. Section IV describes the methodology used to examine the debt-growth relations in Belize and the debt dynamic equations used. The results are presented in Section V, and the findings are discussed in relation to similar studies in Section VI with the conclusion following in Section VII.

² See (Worrell, et al., 2015) for a good literature review of debt sustainability studies done on CARICOM countries.

II. Background

The share of foreign debt in Belize's public debt portfolio has exceeded safe limits³, since the beginning of its post-independence history. The preceding has raised Belize's external financing needs and put intermittent pressure on the Central Bank's foreign exchange reserve holdings for over three decades.

Faced with the problem of underdevelopment, Government spending rose sharply⁴, funded by loans from external sources and suppliers' credit, shortly after the country's independence in September 1981. The rapid increase in domestic absorption coincided with a sharp deterioration in the terms of trade due to the collapse in world sugar prices. As a result, Belize's net international reserves turned negative, and a full-fledged balance of payments crisis emerged. In mid-1983, Belize borrowed \$7.6mn from the IMF under its Compensatory Financing Facility, but the severe macroeconomic imbalances landed Belize into an IMF Standby Arrangement for SDR 7.125mn at the end of 1984. While the latter included the standard neoliberal prescriptions⁵, continued funding from bilateral sources, in parallel with IMF disbursements, drove spending on capital projects and pushed the public debt-to-GDP ratio above the 60% threshold for the first time in the post-independence era in 1985. However, aggressive fiscal consolidation coupled with privatization receipts quickly arrested the rise in debt. In FY 1988/1989, government operations yielded overall and primary surpluses of 8.1% and 9.8% of GDP, respectively, resulting in a marked contraction in the debt ratio from 65.6% in 1985 to 44.3% by 1989⁶.

During the 1990's, the public debt-to-GDP ratio stood well below the 60% threshold, averaging 43.7% of GDP and fluctuating between 36.8% and 50.9% of GDP. Even so, due to a period of fiscal expansion between 1990 and 1993, pressure to meet external financing commitments intensified early in the decade⁷, as the Central Bank's reserves declined to 1.3 months of imports in 1994 and 1995. Consequently, Government implemented a "home grown" fiscal consolidation programme between 1994 and 1998 to put debt on a sustainable path.

A new phase of fiscal expansion started in FY 1999/2000 with the public debt-to-GDP ratio rising rapidly from 46.1% of GDP to 96.2% of GDP between 1999 and 2005. During this period, Central Government's gross financing requirements averaged 17.3% of GDP, relative to the IMF's safe threshold of 15% for emerging countries (see Figure A.4). Furthermore, Central Government's external financing requirements peaked at 33.4% of GDP in 2002 and averaged 22.8% of GDP from 2000 to 2005, which also

³ Table A.1 shows the description of the terms used for the fiscal indicators in this section, Table A.2 provides a description of debt burden and risk profile indicators and Figure A.1 shows the share of public debt in foreign currency.

⁴ The public investments in the early 1980's focused on building the basic infrastructure of the country, including expanding electricity, telecommunications, water and sewerage and port services (Alvarez 1986, p. 10).

⁵ To increase revenues and control costs, government strengthened tax collection procedures, implemented a freeze on wages and hiring and privatized the telecommunications company, (BTL).

⁶ Figure A.2 shows the path of the public-debt-to-GDP ratio from 1981 to 2016.

⁷ Belize's external financing requirements rose above the 5% of GDP lower benchmark for majority of the 10-year period, as shown in Table A.5.

exceeded the IMF's safe threshold of 15% for emerging countries (see Figure A.3). Belize's external position also deteriorated with the Central Bank's gross international reserves shrinking from 3.2 months of merchandise import coverage in 2000 to less than one month by 2005.

After the mid-2000s, Belize faced severe solvency and liquidity risks. High external debt servicing costs and low levels of international reserves forced Government to restructure US\$542mn of commercial external debt in August 2006. The debt exchange, which was finalized in February 2007, improved the maturity structure of the government's external debt portfolio, lowered external debt servicing costs and contributed to a reduction in the public debt-to-GDP ratio to 87.8% of GDP at the end of 2007⁸.

The fiscal space carved out with the first restructuring was short-lived. The global financial crisis of 2007/2008 dampened real GDP growth, while the external current account position worsened due to declines in export earnings, tourist arrivals, inward remittances and foreign direct investments. Fiscal space was further squeezed by the decline in revenues from domestic oil production, which began its downward trajectory after peaking in 2011. Further, external debt servicing costs (interest) on the 2029 U.S. Dollar Bond was to step up from 6% to 8.5% in August 2012⁹. Meanwhile, Government's contingent liabilities ballooned with the nationalization of Belize Telemedia Ltd. (BTL) and Belize Electricity Ltd. (BEL) in 2009 and 2011, respectively. Although the public debt-to-GDP ratio declined from 88.0% of GDP in 2009 to 81.6% of GDP by 2011, the Prime Minister formally announced the Government's intention to restructure the 2029 U.S. Dollar Bond in March 2012 to mitigate liquidity risks. The U.S. Bond was once again rescheduled in March 2013, after getting 86.2% of the bondholders to agree. Under the new terms, the payment schedule was extended from 2029 to 2038, and the interest rate was lowered to 5% until 2017 and then scheduled to step up to 6.767% thereafter. The benefit in debt reduction that was gained with the approximately 3% net haircut¹⁰ in the new bond exchange was short-lived, since by year end, the public debt-to-GDP ratio had increased by 2.2 percentage points to 79.0% of GDP.

Fueled by increased spending on wages, nationalization settlements and a robust public investment program, amid municipal and general elections, the public debt-to-GDP ratio rose to 90.5% of GDP by 2016. During this period, fiscal shortfalls were financed from external multilateral and bilateral sources as well as from government securities issued on the domestic market. Between 2013 and 2016, the stock of external public sector debt from multilateral and bilateral sources rose by \$50.9mn and \$190.0mn, respectively¹¹. Meanwhile, the stock of domestic debt almost doubled from \$376.1mn in 2014 to \$747.8mn in 2016, driven by increases of \$40.0mn and \$343.5mn in new issuances of Treasury-bill and Treasury-note securities, respectively.

⁸ The exchange lengthened the average maturity of the external public debt from 5.7 to 22 years and provided debt service relief of about US\$247mn over a 10-year period. See Table A.3 for a summary of the terms of the Bond.

⁹ It is estimated that interest costs would have risen by approximately 0.6% of GDP in 2012 and 1.2% in 2013.

¹⁰ A 10% face value haircut was agreed but overdue interest was added to the face value of the new bond yielding a net face value haircut of about 3% (see Table A3).

¹¹ The entire increase in bilateral debt was attributable to borrowings through the Venezuela's Petrocaribe Agreement facility as the debt stock from other bilateral creditors contracted during the period.

In November 2016, Government once again announced its intention to adjust the terms of the 2038 U.S. Dollar Bonds to improve “debt serviceability”. Reasons listed by the Government included low or no GDP growth, rising unemployment, negligible revenues from oil production, damages from Hurricane Earl, harmful effects of de-risking and settlement of nationalization claims. The terms and conditions of the new instrument were settled in March 2017, and included a lower interest rate of 4.9375% as well as a shortened maturity profile from 2038 to 2034, which entailed 5 equal, annual principal repayments, starting in February 2030. Unlike the previous restructuring, no debt haircut was negotiated.

III. Literature Review

The sustainability of public sector deficits has concerned economists for some time. While multiple definitions and ways to assess debt sustainability are offered, no consensus exists on a framework to undertake such analysis. Chalk & Hemming (2000) attributes this lack of consensus to the development of practical indicators of sustainability, which have emerged independent of the traditional theoretical framework.

A. Overview

The early literature focused on the theoretical definition of solvency, based on the premise that the government budget should be balanced in present-value terms for sustainability to hold (Buiter, 1984 and see also Hamilton & Flavin, 1985). This hypothesis directly challenged political views that public deficits could run indefinitely (Hamilton & Flavin, 1985). In the mid-1980s and 1990s, economists tested the hypothesis on whether governments' intertemporal budget constraint holds, mainly on data from advanced countries, using a battery of stationary (Hamilton & Flavin, 1985) and cointegration tests (Trehan & Walsh, 1988) with various restrictions. However, the theoretical approach is viewed as "too loose" and unrealistic to assess sustainability, since the generation of primary surpluses could occur at any point in the future (Roubini, 2001).

Employing a more pragmatic approach, Blanchard (1990) introduced the use of accounting identities to assess fiscal sustainability in OECD countries. Using this framework, he aimed to determine whether a government's current course of fiscal policy could be sustained without exploding or imploding debt, or increasing taxes, decreasing spending, monetizing deficits or repudiating debt (Blanchard, 1990, p. 21). He proposed three fiscal indicators of sustainability — the "primary gap", the "medium term tax gap" and the "long-run tax gap" — for assessing fiscal policy.

The use of indicators to assess fiscal distress, which stemmed from Reinhart, Kaminsky, & Lizondo (1998) design of an Early Warning System (EWS) to detect currency crisis, is another widely used approach for assessing fiscal sustainability. These early warning indicators have been developed using non-parametric and parametric¹² approaches. The non-parametric "signal" approach entails monitoring the evolution of several economic indicators that tend to behave differently before a crisis. A warning signal of a crisis event is given off when an indicator exceeds a certain threshold value, and these particular thresholds are determined so as to balance the risks of having too many false signals against that of missing the crisis. For example, Baldacci, Petrova, & Belhocine (2011) developed an index of fiscal stress that provides early warning signals of fiscal distress as defined in Cottarelli (2011) for advanced and emerging countries. They found that in advanced economies indicators of gross financing needs and fiscal solvency were good predictors of fiscal stress, while in emerging market economies indicators of short-term external debt and spillovers from financial markets provided the best signals. On the other hand, Bruns & Poghosyan (2016)

¹² See Bruns & Poghosyan (2016) for a recent survey of the empirical literature on early warning indicators of fiscal distress.

applied an extreme bound analysis technique on a dataset covering eighty-one countries and spanning from 1970-2015 to analyze thirty-seven leading indicators of fiscal distress. They found the fiscal and non-fiscal variables to be robust indicators of fiscal distress. Interestingly, the latter group included a positive output gap (driven by unsound economic activities that led to financial and external sector imbalances), low foreign reserves and increased openness.

Roubini (2001) proposed that a non-increasing foreign debt-to-GDP ratio is a more practical condition for sustainability. In his framework, the government's intertemporal budget is met when the ratio of public debt-to-GDP is stable or declining. Worrell (2012) warned that while fiscal adjustments could lead to reductions in debt-to-GDP ratios in small very open economies (SVOEs), servicing foreign debt could remain challenging if their capacity to meet external debt service payments does not sufficiently improve. He found that the ratio of external debt service to foreign exchange earnings and maturity risks on the external loan portfolio are the most sensitive indicators of fiscal sustainability in SVOEs.

B. IMF's DSA

Assessment of fiscal policy and public debt sustainability is a core component of the IMF's advice on macroeconomic policies for member countries in Fund-supported programs and Article IV surveillances. The IMF's DSA is a hybrid of the signal and accounting approaches. The IMF and World Bank (IMF-WB) use two standardized frameworks for conducting DSA. One is designed specifically for market-access countries (MACs) – defined as sovereigns that typically have significant access to international capital markets – and the other is for low-income countries (LICs) – defined as countries that meet their external financing needs mostly through concessional resources.

Belize is assessed under the high scrutiny¹³ framework for MACs, which provides a more in-depth assessment of sustainability risks compared to the low scrutiny version. The assessment for high scrutiny countries comprises of the basic debt sustainability assessment (with baseline and alternative scenarios) based on a 5-year projection horizon, risk identification and analysis (which focuses on the realism of the baseline scenario, vulnerability of debt profile, sensitivity to macro-fiscal risks and contingent liabilities), and risk reporting in the form of heat map, fan charts and a write-up.

C. Criticisms of the IMF's DSA

The IMF's DSA has been severely criticized for several reasons. Chief among them is the use of an arbitrary debt-to-GDP ratio as an indicator of debt sustainability for a country based on its grouping. The DSA uses two thresholds — 80% for advanced economies and 50% for emerging market economies — to classify countries as high risk or low risk. However, empirical evidence suggests that thresholds for sustainable levels of public debt vary based on the country-specific characteristics. In their influential study,

¹³ See International Monetary Fund, 2013 for a description of the criteria used to distinguish countries that are assessed as low or high scrutiny.

Reinhart & Rogoff (2010) used non-parametric techniques to investigate the relationship between high public debt levels, growth and inflation, based on data from 44 countries spanning around 200 years. They found that in advanced countries median growth rates were about 2 percentage points lower when debt exceeded 90 percent of GDP, compared to debt below 30% of GDP. In addition, real GDP growth rates fell from 4.1% when public debt was below 30% of GDP to -0.1% when debt was greater than 90%. In emerging countries, median and average growth rates were 4% to 4.5% when debt was below 90% of GDP and fell to 2.9% when debt exceeded 90% of GDP. Hendron, Ash, & Polin (2013) replicated their study and found several critical errors, including selective exclusion of data, coding errors and inappropriate weighting methods, which significantly reduced the average GDP growth rate for countries with debt exceeding 90% of GDP. After correcting the errors, they found no evidence of a significant reduction in average GDP growth rates when sovereign public debt levels rose above 90% of GDP. Instead, they detected non-linearity in debt-growth relations at much lower thresholds between low (0-30%) and medium (30-60%) ranges of debt. In theory, the tipping point when public debt dampens growth should be different in low income countries when compared to advanced countries due to less developed financial markets, a different degree of openness, different institutional strengths, inflation and monetization of debt (Caner, Grennes, & Koehler-Geib, 2010). Studies done by the IMF have also produced wide ranges of debt thresholds varying between 25% and 75% for emerging market economies and between 75% and 150% for advanced economies (IMF 2013). Thus, the application of a generic threshold for emerging market countries may or may not be an appropriate level to anchor Belize's fiscal policy.

Another major criticism is that the DSA framework lacks a vigorous analysis of the debt profile – the maturity, currency composition and the creditor base – into the medium term where liquidity risks could arise. The nature of the creditor base – whether it is diversified, reliable, captive, domestic or foreign – could also adversely influence roll over risks. Historically, debt distress events are usually preceded by an increase in the shares of short-term debt and foreign currency-denominated debt, which raises external financing needs and puts pressure on foreign exchange reserve holdings. Gray, Lim, Loukoianova and Malone (2008) applied a modified contingent claims analysis framework to investigate the DSA's limitation in accounting for changes in risk appetite as well as maturity structure and currency composition of debt. In their framework, debt sustainability is met when risk indicators such as the credit spread of foreign currency debt, the default probability of foreign currency debt and risk premiums on local currency debt fall below set threshold values.

The standard 5-year projection horizon may be too short to sufficiently capture risks to debt sustainability and other factors in order to adequately assess long-term fiscal sustainability. For example, increases in public spending on pensions, health care and long-term care due to an aging population is expected to threaten long-term debt sustainability in Austria (Eskeen, 2002). The expected increase in spending pressure should be accounted for in any fiscal sustainability analysis. Similarly, rising debt service costs and multi-year fiscal adjustment programs that extend beyond the medium term also warrant debt assessments beyond the 5-year period. Under the joint World Bank-IMF Debt Sustainability Framework (WB-IMF DSF) for lower income countries (LICs), the debt sustainability analysis looks at a country's projected debt payments over a 20-year horizon to assess vulnerabilities to external and policy shocks as

well as the risk of debt distress within the period. Such analysis must be done however, with caution since accuracy and credibility suffer as the forecast period is extended.

Others have noted that the DSA does not adequately capture the macroeconomic effects of debt-financed public investment on growth, which in turn impacts debt sustainability. Chakraborty & DablaNorris (2009) investigated the link between public investment and growth outcomes and found that the latter depended critically on the quality and efficiency of public capital and not on debt levels. Mu (2012) stressed that a wider set of factors must be considered when making decisions about the size of public investment projects, particularly when a country's public debt level exceeds safe thresholds. Applying a model designed for low income countries, Buffie, Berg, & Pattillo (2012) concluded that the benefits and the debt sustainability risks of large deficit-financed public investment plans are determined by the efficiency of public investment, the absorptive capacity of the country, the response of the private sector as well as the authority's capacity to adjust expenditure, taxes and other factors.

Wyplosz (2007) stressed that the IMF's DSA suffers from the impossibility principle, which implies that any debt sustainability assessment is only valid within the bounds of its assumptions, since the true outcome of projected variables such as GDP, budget balances, interest rates, etc. are unknown and, thus, imprecise. He contends that scaling debt-to-GDP may be a misleading indicator of a Government's ability to sustain a certain debt level because what matters is the source of revenue to service public debt, which is ultimately determined by a government's ability to raise taxes. Sacrificing growth to imprecise debt sustainability assessments could also be costly. A recent review of IMF-supported programs aimed at reducing debt-to-GDP ratios over the medium term during the global financial crisis showed that, in some instances, programs with ambitious fiscal consolidations increased their debt ratios because of the adverse impact of fiscal adjustments on output and other factors combined (IMF, 2013).

Recognizing that the quality of institutions matters, the WB-IMF debt sustainability framework (DSF) incorporates the WB's Country Policy and Institutional Assessment (CPIA)¹⁴ index, which measures the quality of a LIC's policies and institutional framework, in its debt threshold assessment. Using probit regressions, Kraay and Nehru (2006) found that debt burden, the quality of policies and institutions, and shocks explain a substantial fraction of the cross-country and time-series variation in the incidence of debt distress. Unsurprisingly, countries with stronger policies and institutions were found to face lower liquidity risks, compared to those with weaker policies and institutions.

Emphasizing that debt-growth relation varies with country-specific characteristics, Worrell et al. (2016) developed an empirical model to signal debt distress specifically for SVOEs. Their framework is based on the view that the impact of fiscal policy and public debt on spending, and not the level of public debt, constrains fiscal space and increases the risk of fiscal instability.

Since our objective is to evaluate the application of the DSA framework, this study will utilize dynamic equations, which are central to the DSA framework, while addressing three of the criticisms above. First, the study investigates the relationship between high public debt levels and GDP growth for Belize to

¹⁴ See World Bank (2010) for a description of the World Bank's Country Policy and Institutional Assessment (CPIA).

identify a suitable threshold to anchor fiscal policy instead of relying on an arbitrary threshold for emerging countries. Second, it extends the period of analysis to 2028, instead of the 5-year period in the standard DSA, to trace the trajectory of planned fiscal strategies approximately one year before the first principal payment on the 2034 U.S. Dollar Bond commences. Third, the analysis utilizes 10-year historical averages to approximate interest, GDP growth and inflation, which are core variables in the debt dynamic equations, rather than depending on forecasted values to eliminate any arbitrariness or bias in estimating their long-run values. The description of the data used are shown in Table A.4 of the appendix.

IV. Methodology

Belize's debt sustainability is examined using a two-step approach. First, simple descriptive statistics are used to examine the systemic relationship between categories of public debt and real GDP growth. Then, a long-term fiscal strategy that puts public debt on a sustainable trajectory in line with the threshold level determined in step one is proposed.

A. Statistical Relationship between Real GDP growth and Public Debt-to-GDP

Following Reinhart and Rogoff (2010), annual real GDP growth rates from 1981 to 2016 are classified into four categories. Each category captures growth rates that fall within predefined ranges of debt-to-GDP ratios labelled as low, medium, high and very high debt. The four categories are defined as follows:

- (i) Real GDP growth when the debt-to-GDP ratio is less than 30% – low debt
- (ii) Real GDP growth when the debt-to-GDP ratio is between 30% and 60% – medium debt
- (iii) Real GDP growth when the debt-to-GDP ratio is between 60% and 90% – high debt
- (iv) Real GDP growth when the debt-to-GDP ratio is above 90% – very high debt

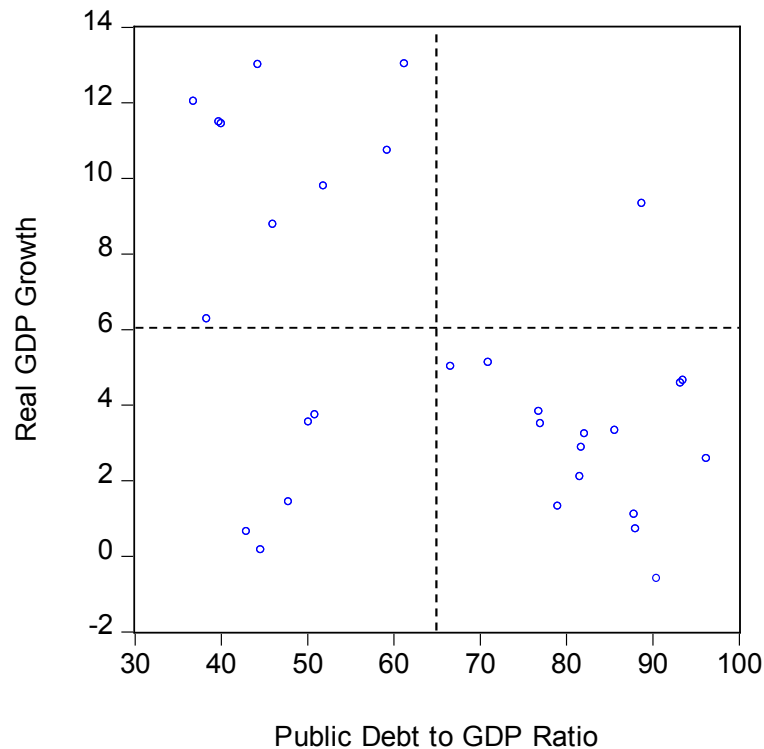
Table 1 provides a frequency distribution of real GDP growth rates, grouped according to their magnitude in non-overlapping intervals of 5 percentage points and classified by categories of public debt-to-GDP ratios. The results show that Belize's public debt-to-GDP ratio was above 30% during the entire post-independence period. Furthermore, the highest frequency of growth rates occurred when debt was at medium to high levels. Real GDP contractions were also infrequent, even at high levels of debt.

Table 1: Frequency Distribution Table of Real GDP Growth from 1981 to 2016

Ranges of Real GDP Growth (%)	(-5,0)	(0,5)	(5,10)	(10,15)	Total
$G_t < 30\%$ (low debt)	0	0	0	0	0
$30\% < G_t < 60\%$ (medium debt)	2	7	3	5	17
$60\% < G_t < 90\%$ (high debt)	0	11	3	1	15
$G_t > 90\%$ (very high debt)	1	3	0	0	4
	3	21	6	6	36

A scatter plot was graphed to examine the shape of the relationship between real GDP growth and the public debt-to-GDP ratio. The scatter plot in Figure 1 shows that real GDP growth tended to be lower at higher ratios of public debt-to-GDP, supporting the hypothesis of a negative, non-linear contemporaneous relationship between the two variables as suggested in other empirical studies.

Figure 1: Scatter Plot of Real GDP Growth and Public Debt-to-GDP Ratio



Next, a simple Pearson correlation analysis was done to measure the degree of linear association between the real GDP growth and the public debt-to-GDP ratio. A correlation coefficient (ρ) of 1 or -1 indicates a perfect positive or negative linear relationship between the two variables. If $\rho = 0$, then there is no linear association between the two variables. Annual data between 1987 and 2016 had a correlation coefficient, ρ , of -0.48, that is statistically different from zero at conventional levels. The results indicate a weak, negative linear relationship between the public debt-to-GDP ratio and real GDP growth.

According to economic theory, it is more likely that slower growth leads to higher debt rather than high debt causing growth to slow. Slower growth, especially unanticipated slowdowns, will lead to higher debt as revenues fall and automatic-stabilizer spending increases. Higher deficits will lead to more borrowing, which in turn, increases interest rates (or borrowing costs). Higher interest rates reduce private investments and ultimately, future economic growth. Persistently low growth rates will eventually result in high debt levels and produce contemporaneous combinations of high public debt and low GDP growth rates. On the other hand, running of large fiscal deficits continuously will result in combinations of high public debt and low growth in the future, as amortization payments on the rising debt stock require public spending to be diverted away from public investment projects. Government would also have a smaller fiscal space to implement counter-cyclical policies and absorb external shocks.

A Pairwise Granger-causality test was performed on the sample data from 1986 to 2016, using 2 to 8 lags to test whether causality runs from debt to growth or whether lower growth results in higher debt. The test results in Table 2 show that at every lag length, we cannot reject the hypothesis that GDP growth does not Granger-cause debt to GDP. But we do reject the hypothesis that debt-to-GDP does not Granger-cause

GDP growth at 6 lags at the 10% level of significance. Therefore, there is evidence that Granger causality runs one way from debt to growth and not the other way. This implies that real GDP growth outcomes of the past could help explain high levels of public debt today.

Table 2: Pairwise Granger Causality Test

	Lags			
	2	4	6	8
Debt-to-GDP does not Granger-cause GDP growth				
F-statistic	1.40461	1.03334	2.68669	0.52526
Probability	0.2666	0.4204	0.0806***	0.7967
GDP growth does not Granger-cause debt-to-GDP				
F-statistic	0.51512	0.80712	1.24917	2.10028
Probability	0.6045	0.5385	0.3597	0.2470
Observations	27	25	23	21

Note. ***Denotes significance at the 10% level.

B. Debt dynamics

(i) Baseline scenario

A baseline scenario was developed, which reflects Government's announced fiscal strategy extended over a 12-year horizon. The fiscal strategy is adopted from the commitments made by the Government of Belize during the third debt restructuring. Government pledged to produce a primary surplus of 1.8%¹⁵ of GDP for the 2017/2018 FY, which reflects a consolidation effort equal to 3% of GDP, and a primary surplus of 2% of GDP in the next three consecutive FYs. For the rest of the strategy period, it is assumed that Government will continue to maintain a primary surplus equal to 2% of GDP as a commitment to measured fiscal prudence.

The one-period budget constraint faced by the public sector expressed as a ratio to GDP or the "primary gap" is represented by the following debt dynamics equation:

¹⁵According to the March Economic Review of the Central Bank (2017), the Government primary balance outturn for the 2016/17 FY was -1.2% of GDP. An improvement of the primary balance by at least 3.0% of GDP in the new FY would set the primary balance for the 2017/18 FY to at least 1.8% of GDP.

$$d_t = (1 + \lambda_t)d_{t-1} - pb_t \quad (1)$$

where, d_t is debt-to-GDP at the end of period t , pb_t is the primary balance as a ratio of GDP in time, t , and the expression $(1 + \lambda_t)$ represents the growth-adjusted real average interest rate. The later can be further dissected as follows:

$$1 + \lambda_t = \frac{1+r_t^w}{1+g_t} \quad (2)$$

and, therefore

$$\lambda_t = \frac{r_t^w - g_t}{1+g_t} \quad (3)$$

where, r_t^w is the weighted average real interest rate (WARIR) in time t and g is the real growth rate in time t . Thus, equation 1 shows that the level of debt in the current period depends on the growth-adjusted WARIR, the initial debt level and the primary balance or size of planned fiscal adjustment. The primary balance is defined as the overall balance plus gross interest. It is assumed that all changes in liabilities are reflected in above-the-line operations. All debt creating flows that would be recoded below-the-line¹⁶ are captured by the primary fiscal balance.

The WARIR in period t , is defined as follows:

$$r_t^w \equiv \left(\left[\frac{(1 + i_t^f)(1 + \varepsilon_t)}{(1 + \pi_t^f)} \right] - 1 \right) * (\alpha) + \left(\left[\frac{(1 + i_t^d)}{(1 + \pi_t^d)} \right] - 1 \right) * (1 - \alpha) \quad (4)$$

where “ f ” and “ d ”, represent foreign-currency and domestic-currency denominated debt. Other notations referred to are as follows¹⁷:

i_t^d is the weighted average nominal interest rate on local currency-denominated debt in period t ,

i_t^f is the weighted average nominal interest rate on foreign currency-denominated debt in period t

π_t^d is the 10-year average domestic inflation rate (2007-2016)

π_t^f is the 10-year average U.S. inflation rate (2007-2016), as a proxy for potential GDP

¹⁶ These include items such as: (i) privatization receipts; (ii) recognition of contingent liabilities; (iii) debt relief; and, (iv) other specific items such as bank recapitalization.

¹⁷ Table A.4 shows the description of the data used.

ε_t is the nominal exchange rate¹⁸ at the end of the period t

α_t is the share of foreign currency debt to total debt at the end of period t

Inflation impacts the debt ratio through the real interest rate. The fiscal theory of the price level implies that inflation (deflation) reduces (increases) the real interest rate on government debt, if the debt is not indexed to inflation or markets did not expect future inflation. At the end of June 2017, inflation indexed bonds accounted for 18.5% of Belize's total Central Government domestic debt, and none of the external debt stock was inflation indexed. For the domestic inflation indexed bonds, future inflation is approximated to equal the 10-year average domestic inflation rate (2007-2016), π_t^d .

The change in the debt-to-GDP ratio can be easily obtained from Equation 1 as follows:

$$\Delta d_t = d_t - d_{t-1} = \lambda d_{t-1} - pb_t \quad (5)$$

Equation 5 shows that the change in the ratio of debt-to-GDP is determined directly by the size of the growth-adjusted WARIR and the stock of debt in the previous period and inversely to the primary balance. Blanchard (1990, p. 14) first noted that the primary gap indicator is “very primitive” since it cannot account for dynamics in the economy or in fiscal policy. He advised that if $r_t^w - g_t$ is small, one should consider making long projections and use constant values of r_t^w and g_t by taking the 10-year averages of the variables. Under the no-Ponzi game condition (or the transversality condition), government cannot roll over its amortization payments in perpetuity. The no-ponzi game restriction is implied by the following expression:

$$\lim_{N \rightarrow \infty} (1 + \lambda)^{-N} d_N = 0 \quad (6)$$

This equality requires that over the long term the present value of the debt must decline towards zero. This means that asymptotically the public debt-to-GDP ratio cannot grow at a rate equal to or higher than the growth-adjusted WARIR. Further, when equation 5 holds, the present value budget constraint of government is met.

Under the *modified golden rule*, the WAIR, r_t^w , must exceed the real growth rate, g . This is expressed as follows:

$$\lambda > 0 \quad (7)$$

If the real growth rate exceeds the real interest rate, i.e., $\lambda < 0$, fiscal deficits could be run indefinitely without increasing the debt ratio, contravening the no-Ponzi game condition. In such instances, a primary fiscal deficit will stabilize the debt ratio. Under the assumption that λ is time invariant ($\lambda_t = \lambda$), the expression representing the debt-to-GDP ratio in period N, d_N , is

¹⁸ Note that the change in the nominal exchange rate ($\Delta e_t = 0$) was assumed to be 0 in our calculations, i.e. ($\Delta e_t = 0$).

$$d_N = (1 + \lambda)^N d_0 - \sum_{t=1}^N (1 + \lambda)^{N-t} p_t \quad (8)$$

Equation 8 can be generalized as follows:

$$d_N - d_0 = \lambda \sum_{t=0}^{N-1} d_t - \sum_{t=1}^N p_t \quad (9)$$

$$d_N - d_0 = \lambda N \bar{d} - N \bar{p} \quad (10)$$

$$\bar{d} \equiv \frac{1}{N} \sum_{t=0}^{N-1} d_t ; \bar{p} \equiv \sum_{t=1}^N p_t \quad (11)$$

where \bar{d} and \bar{p} are averages over the period $t = 0, \dots, N - 1$ and $t = 1, \dots, N$, respectively. The debt stabilizing primary balance, p^* , which provides the primary balance that maintains the debt-GDP ratio at the same level as that in the previous period, d_{t-1} , is determined by the following equation:

$$p_t^* = d_{t-1}(\lambda - 1) \quad (12)$$

The constant primary balance will bring the debt ratio to a desired level if maintained constant over a long, but finite period, N , under current consolidation plans to ensure solvency. Starting with an initial debt ratio, d_0 , and a target debt ratio, d_N^* to be achieved in N periods, the required constant primary balance during $t = 1, \dots, N$ is yielded by the following equation:

$$cp_N^* = \frac{\lambda}{(1 + \lambda)^N - 1} ((1 + \lambda)^{-N} (d_N^* - d_0)) \quad (13)$$

In Equation 13, the primary balance is kept constant throughout the period, but the overall balance will vary over time (Escalano, 2010). Computation of the constant primary balance provides a pragmatic approach to using the primary balance as a policy tool to achieve a predetermined target in the medium to long-term. However, the solution does not provide a benchmark to determine whether planned policies are sustainable or unsustainable.

The N -period constant primary balance gap in period t , GAP_t^N , is defined as the difference between the constant primary balance in period N and the average fiscal primary balance in period N , \bar{p} .

$$GAP_t^N \equiv cp_N^* - \bar{p} \quad (14)$$

(ii) Alternative Scenario

Next, an alternative scenario is considered in which Government achieves a primary balance of 1% of GDP instead of 2% of GDP and interest rates on government securities are 200 basis points higher across

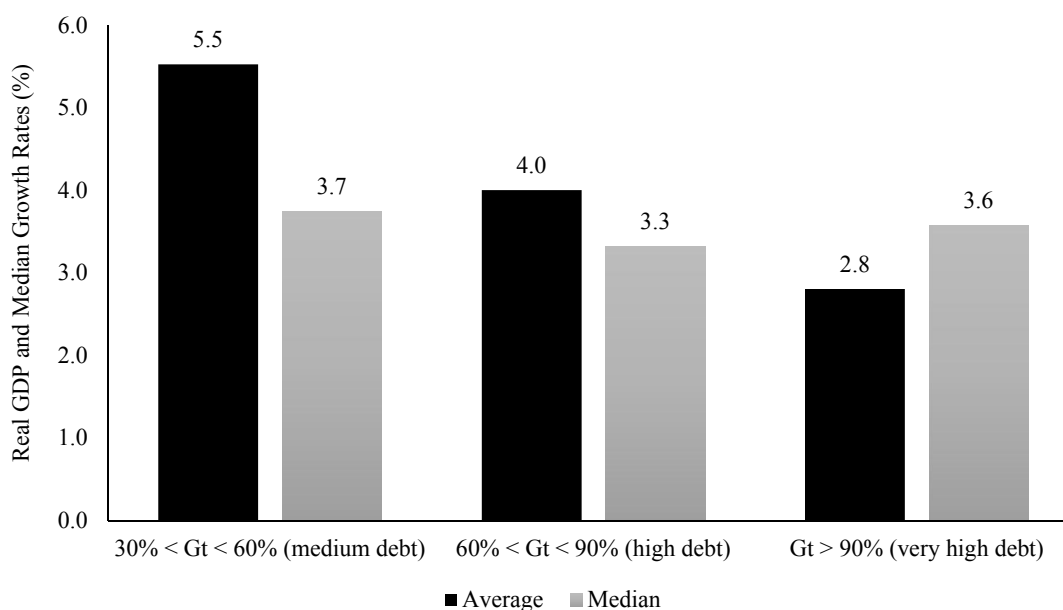
the forecasted period. The alternative scenario reflects a moderate slippage in fiscal stance, which leads to a one-time increase in average interest rates on domestic debt. This approach may produce unrealistic variables, however, if past trends do not mirror future trends, particularly when the economy is moving through different phases of the business cycle.

V. Results

A. Statistical Relationship between Real GDP growth and Public Debt-to-GDP

The median and average real growth rates for each category are displayed in Figure 2. The bar chart reveals that on average real growth rates and median real growth rates are highest at lower levels of public debt. The average real growth rate is 5.5% when the public debt-to-GDP ratio is moderate and reduces by almost 2 percentage points to 2.8% when the public debt-to-GDP ratio rises above 90%. Similarly, at 3.7%, the median real growth rates is at its highest point when the debt ratio is below 60% of GDP (medium debt), compared to 3.3% and 3.6% in the high debt and very high debt categories, respectively. This result compares favourably to other rigorous econometric debt threshold analysis done on the Caribbean region. In their study, Greenidge et al. (2012) found that debt had a negative impact on growth after reaching between 55% and 56% of GDP in a sample of Caribbean countries (excluding Belize), while Wright and Grenade (2012) found the same (in a similar sample including Belize) after 61% of GDP.

Figure 2: Average and Median Real GDP Growth Rates by Categories of Public Debt-to-GDP



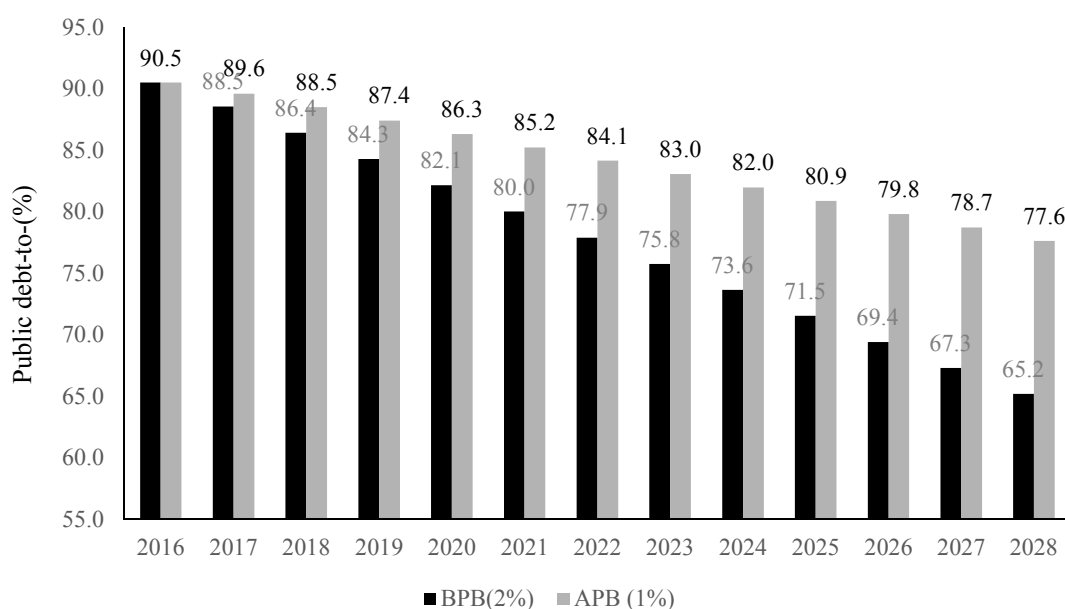
B. Debt dynamics

Debt dynamic equations are particularly sensitive to interest and growth rates assumptions. The key assumptions in the baseline and alternative scenarios are shown in Tables A.5 and A.6, respectively. In both scenarios, the growth-adjusted WARIR (λ) was -0.1% because the WARIR of 2.0% was slightly lower than the potential growth rate of 2.1% across the forecast period in both scenarios, that is, $\lambda < 0$. This implies that government can borrow and capitalize interest as long as $\lambda \leq 0$ without debt exploding. Even though the “weak” fiscal solvency criterion would be met, legitimate liquidity concerns persist. Real interest rates are usually negative when markets fail to anticipate a sharp rise in the price level or when debt has a high concessionary element. Currently, real interest rates are negative on domestic Treasury bills, which posted

an average annual nominal interest rate of 0.17% in 2016¹⁹. Similarly, real interest rates on the stock of Petrocaribe loans in 2016 would be near zero due to the combination of below market interest rate of 1% and the 2-year grace period on the loans²⁰. However, roll over risks on the commercial portion of the external debt remain high and bounded by the foreign exchange constraint. In the long-run, the growth-adjusted real interest rate is expected to turn positive²¹, particularly if deficit-financed spending continues. O'Connell & Zeldes (1988) noted that feasibility of a rational Ponzi game in relation to external debt depends on the characteristics of the external creditors and not the sovereign borrower. They assert that uncertainty in the real economy of the lenders eventually rules out the probability of complete debt roll over.

The debt stabilizing primary balance computed for 2017 is -0.14% and -0.09% of GDP under the baseline and alternative scenarios, respectively. This compares to a debt stabilizing primary balance of 0.0% for 2017 in the 2017 IMF Article IV Report. If the government were to successfully implement its fiscal plans of maintaining a 2% primary balance up to the 2020/2021 FY and extend its efforts to 2028, the debt-to-GDP ratio would fall to 65.2%. If planned fiscal consolidation efforts eased and government maintained a lower average primary balance surplus of 1% of GDP over the 12-year period, the debt-to-GDP ratio falls to 77.6%.

Figure 3: Public Debt-to-GDP Ratios



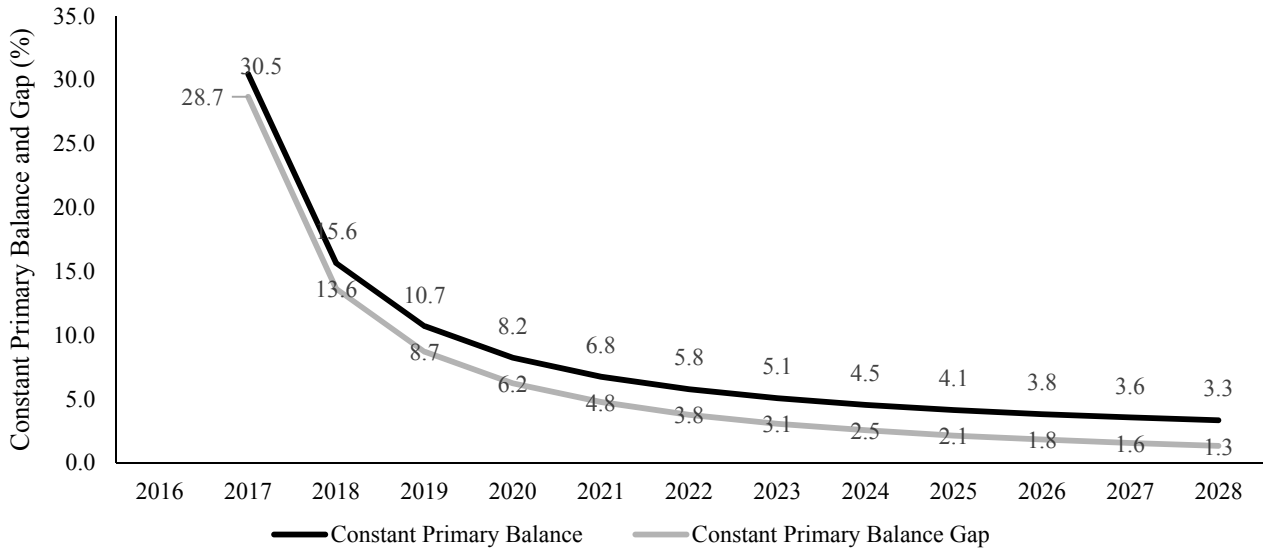
¹⁹ The average annual inflation rate in 2016 was 0.7% (CBB, 2016) and the effective nominal interest rate is shown in Table A.7.

²⁰ See Table A. 8

²¹ The occurrence of negative growth-adjusted real interest rates is not unique to Belize. Escolano (2010) noted that growth-adjusted interest rates were negative for a few economies in the 60's and 70's and more recently in Ireland (1991-2008), Greece (1992-2008) and Spain (1995 -2008).

The constant primary balance that will gradually bring the debt ratio to 60% of GDP by 2028 was found to be 3.3%. The constant primary gaps in relation to the target under the baseline and alternative scenarios are therefore 1.3% and 2.3% of GDP, respectively.

Figure 4: Constant Primary Balance and Constant Primary Balance Gap



VI. Discussion

Debt dynamic analysis hinges on the assumption of key variables, including real GDP growth, inflation, interest rates and the primary balance. As a test for robustness, the growth-adjusted factor, λ , was increased to 1%, as recommended by Escolano (2010) when λ is negative. This would require any combination of real interest rate increase and/or reduction in real GDP growth that sums to 1.1%. The results show that under the baseline scenario the public debt-to-GDP ratio declines to 76.2%, while under the alternative scenario the public debt-to-GDP ratio dips slightly as shown in Figure A.5. With the adjustment, the primary surplus that would need to be maintained over the forecast period to reduce the debt ratio to 60% of GDP increases by approximately 0.5% of GDP. This outcome emphasizes that a sustainable fiscal policy needs to incorporate prudent debt management practices (to minimize any unexpected rise in real interest rates) and growth enhancing strategies (that facilitate the earning of foreign exchange) to reduce external stability risks and increase fiscal space.

Glenday and Shukula (2006) conducted their analysis before the first debt exchange was done. Starting with a debt stock of 104% of GDP, they assumed a nominal economic growth rate of 5%, inflation rate of 2.5%, and a nominal effective interest rate of 8%. They calculated a debt-stabilizing primary balance of 3.0%, and recommended gradual adjustments that amounted to a primary surplus of 4.2% in FY 2005/06, which then rises to 5.5% of GDP by FY 2008/09 and maintained at that level until FY 2011/12 to keep debt on a sustainable path. Following the global financial crisis, average economic growth and global inflation declined. Furthermore, the effective nominal interest rate was markedly lower due to the subsequent bond restructurings and the increase in borrowings from multilateral and bilateral partners as a share of public debt, given that the government was unable to access loans from external commercial markets.

Our findings are closer to those computed by the IMF in their most recent Article IV Report (IMF 2017). By 2022, the debt-to-GDP ratio reaches 77.4% in our baseline, compared to 83.4% in the aforementioned report. In their analysis, they assumed a relatively smaller average real GDP growth rate of 1.9% (compared to our 2.1%), a higher average nominal inflation rate of 2.1% (compared to our 1.3%), and a higher average effective nominal interest rate of 3.6% (compared to our 3.2%) between 2017 and 2022. The assumptions are different because we aimed to minimize arbitrariness in deriving long-term values for GDP, inflation and interest rates by relying on long-term averages instead of making subjective calls on the trend of the variables in the medium to long term.

A wide menu of revenue enhancing and cost reducing measures that the Belizean authorities could undertake to improve its primary balance was detailed in Glenday and Shukula (2006) and more recently in the 2016 IMF Article IV Report (IMF 2016, p 34-35). Furthermore, implementing structural reforms and measures to improve governance will strengthen growth outcomes and maximize citizens' welfare. Other forms of fiscal rules should also be considered to anchor fiscal policy, since unbridled fiscal expansion in the past has led to destabilizing outcomes. Grenade, Wright, & Scott-Joseph (2015) recommended the implementation of a spending rule and debt rule (with indicative targets, enforcement mechanisms and escape clauses) to ensure commitment to long-term debt sustainability in Belize. Thus, a well-designed fiscal policy should also incorporate structural and governance reforms as well as fiscal rules to strengthen fiscal discipline and credibility.

VII. Conclusion

Stylized facts suggest that on average real GDP growth in Belize is higher at lower ratios of public debt-to-GDP. In 2017, a small primary deficit would result in a stable debt-to GDP ratio and satisfy the theoretical solvency criterion. Given the high debt, fiscally constrained, low-growth situation, liquidity concerns will persist in the future, especially with regards to rollover risks associated with the amortization payments of the 2034 U.S. Dollar Bond.

Government must ensure that debt-financed spending in the short term and in the future, can be financed from current and future revenues in the form of primary surpluses. A sustained gradual fiscal consolidation effort could provide financial markets with the assurances that the public debt is on a sustainable trajectory. This strategy could provide government with the opportunity to regain access to financial markets to minimize roll over risks and create fiscal space to mitigate external shocks. However, government would need to strengthen its current consolidation plans and maintain a constant primary balance of at least 3.3% of GDP in the long run. The IMF's prescription of running a primary balance of 4% to 5% may be a case of too much, too soon given past fiscal performances and considering present economic and social conditions. A well-designed fiscal policy has several dimensions including a sound debt management strategy, growth enhancing policies, structural and governance reforms as well as fiscal rules to strengthen discipline and credibility.

This paper could be enhanced in several ways. The analysis could be expanded to include the maximum sustainable debt level and the turning point at which public debt dampens growth. Risk analysis of the debt profile into the medium and long run and examination of macro-economic shocks on debt-growth relations would also be useful. However, more rigorous empirical approaches would be somewhat constrained by the small sample of available fiscal data.

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Appendix*Table A. 1: Description of Data*

Variable	Description	Period	Data Source
EFR	External Financing Requirement is the short-term debt, plus the amortization of medium and long-term debt, minus the current account.	1986-2016	Central Bank of Belize
GFR	Central Government Gross Financing Requirement is the fiscal deficit, plus loan amortization, plus any other transaction that requires financing; e.g. nationalization payment	2000-2016	Central Bank of Belize
GDP	Gross Domestic Product	1981-2016	Central Bank of Belize
DFC	Debt in Foreign Currency (DFC) is Central Government external debt plus external debt on other public-sector entities	1981-2016	Central Bank of Belize
PD	Public Debt is Central Government's domestic and external debt, plus external debt of other public-sector entities.	1981-2016	Central Bank of Belize

Table A. 2: Benchmarks for Debt Burden and Risk Profile Indicators

	Indicative benchmarks	Direction to be safe		
		Direction	Range	
			Early warning upper benchmark (75%)	Early warning lower benchmark (25%)
Debt burden indicators				
Public debt (in percent of GDP)	60	<		
Gross central government financing requirements (in percent of GDP)	15	<		
Debt profile indicators				
External financing Requirement (percent of GDP)	20	<	15	5
Public debt in foreign currency (share of total)	80	<	60	20

Note. Adapted from IMF (2013).

Figure A. 1: Debt Profile Indicators: Public Debt in Foreign Currency

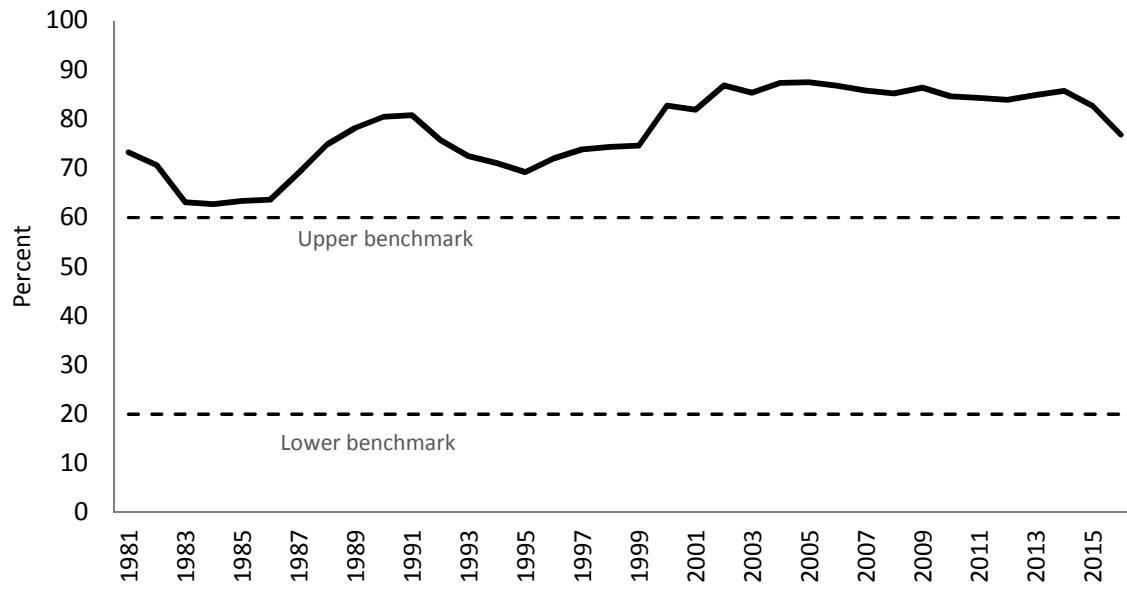


Figure A. 2: Debt Burden Indicator: Public Debt-to-GDP Ratio

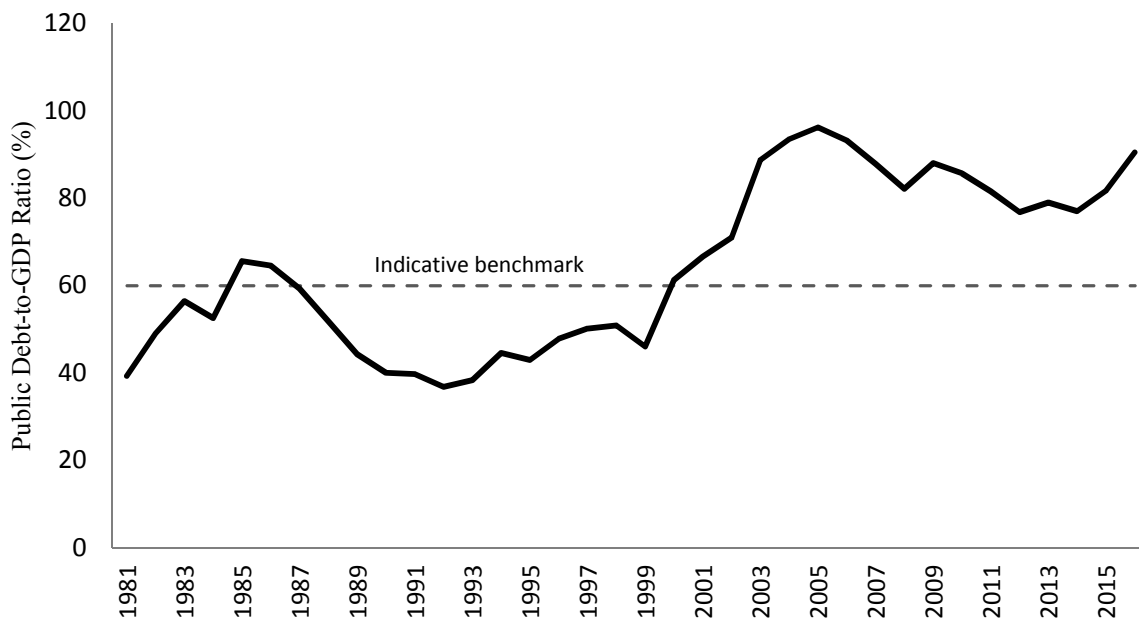


Figure A. 3: External Financing Requirements in Percent of GDP

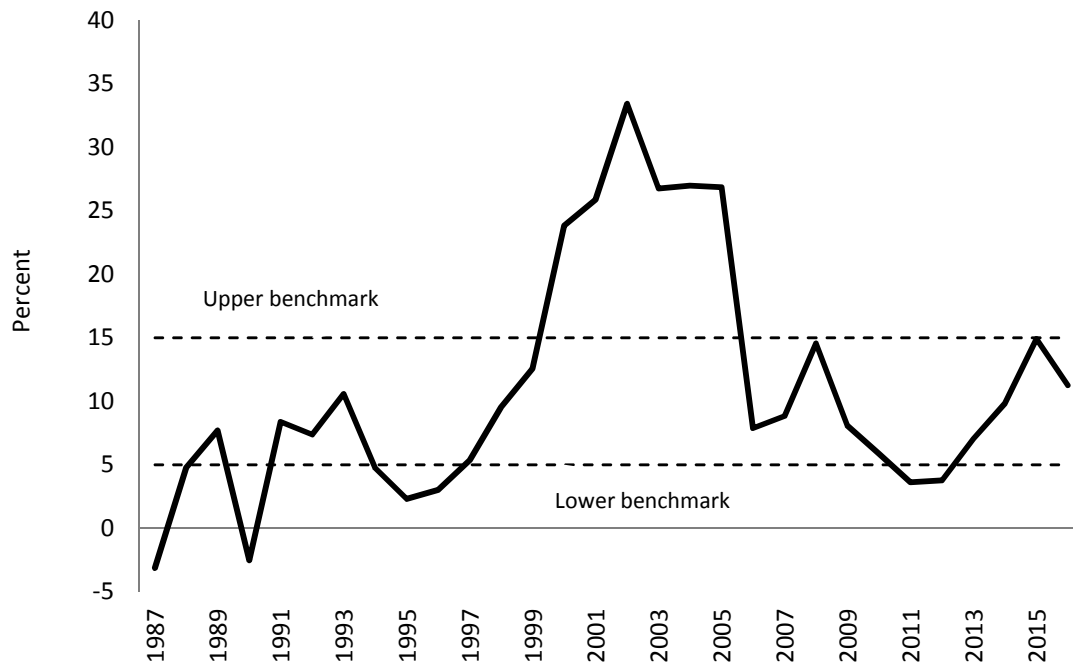


Figure A. 4: Central Government Gross Financing Requirements in Percent of GDP

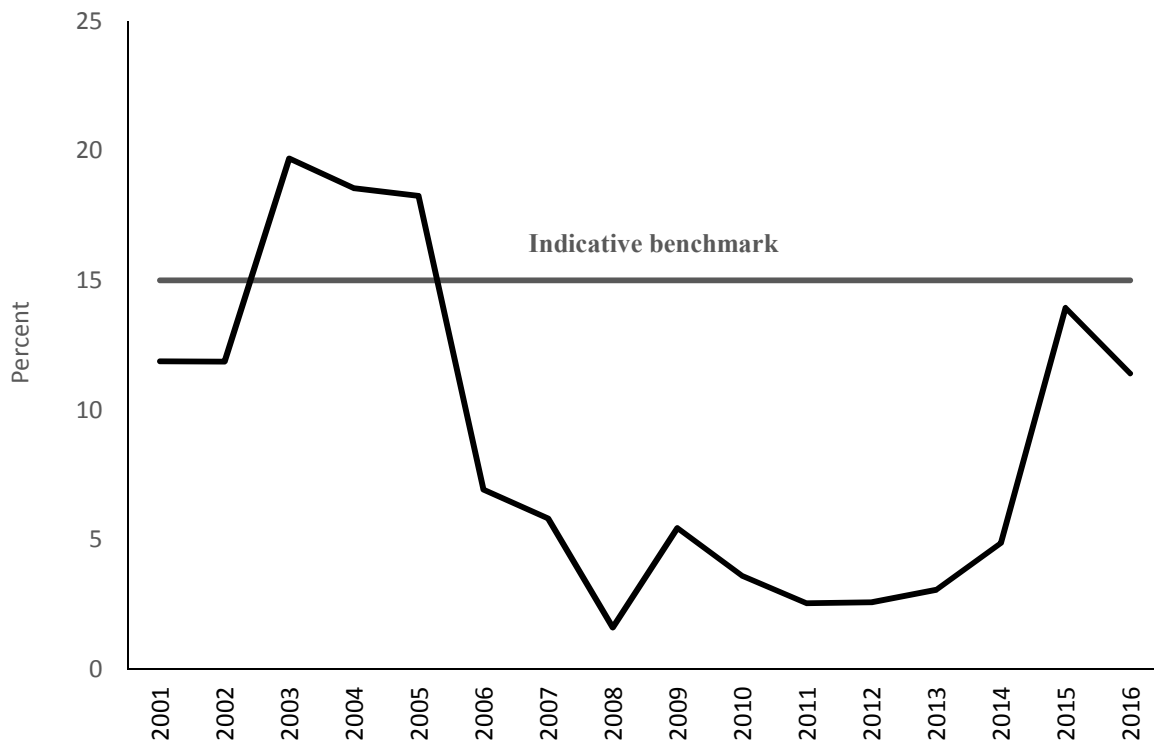


Table A. 3: Outcomes of Three Debt Restructuring Undertakings

	Instrument 1 (2007)	Instrument 2 (2013)	Instrument 3 (2017)
Instruments	2029 US\$ Bond	2038 US\$ Bond	2034 US\$ Bond
Face value (US\$m)	542	526	526
Face value haircut	0	10% (3% net) ¹	0
Maturity	2029	2038	2034
Remaining maturity (years)	22	25	17
Coupon	4.25% until 2010, 6% until 2012, 8.5% until maturity	5% until 2017, 6.767% until maturity	4.9375% until maturity
Repayment profile	2019-2029	2019-2038	2030-2034
Net Present Value	94%	67%	64%

¹ After receiving a haircut of 10%, a missed coupon payment of US\$35.0mn was added to the bond, which resulted in a net face value haircut of 3%.

Table A 4: Data Description

<i>Year</i>	<i>Real GDP Growth (%)</i>	<i>Domestic Inflation</i>	<i>U.S. Inflation</i>
		(%)	(%)
<i>2007</i>	1.1	2.3	2.8
<i>2008</i>	3.2	6.4	3.8
<i>2009</i>	0.7	-1.1	-0.4
<i>2010</i>	3.3	0.9	1.6
<i>2011</i>	2.1	1.7	3.2
<i>2012</i>	3.8	1.3	2.1
<i>2013</i>	1.3	0.5	1.5
<i>2014</i>	3.5	1.2	1.6
<i>2015</i>	2.9	-0.9	0.1
<i>2016</i>	-0.6	0.7	1.3
<i>Average</i>	2.1	1.3	1.8
<i>Minimum</i>	-0.6	-1.1	-0.4
<i>Maximum</i>	3.8	6.4	3.8
<i>Standard deviation</i>	1.5	2.1	1.3

Table A 7: Nominal Effective Weighted Average Interest Rates on Central Government Domestic Debt at June 2017

Loan Instrument	Outstanding Liability at June 2017 (\$'000)	Weight	Interest Rate (%)	Effective Weighted Average Interest Rate (%)
Overdraft with Central Bank	\$55,048	5.83	9.0	0.52
Treasury bills	245,000	25.96	3.2	0.84
Treasury notes	640,000	67.82	4.7	3.21
Other loans	3,683	0.38	4.7	.02
Total	943,733	100.00		4.59

Table A 8: Nominal Effective Weighted Average Interest Rates on External Public Debt at June 2017

Creditor	Effective Average Nominal Interest Rate (%)	Average Term to Maturity
Bilateral	2.0	19.8
Multilateral	2.5	13.9
Commercial	5.0	17.1

Figure A. 5: Robustness Check for Public Debt-to-GDP

