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Tarron Khemraj¹

Abstract

A debt ceiling limit and overdraft on the government's central bank account provide evidence in favour of the idea that monetary efflux occurs before reflux. These events occurred in Guyana, an economy with a managed exchange rate. While the exchange and inflation rates remained relatively stable during the period of overdraft, the central bank lost international reserves. It is argued that this outcome reflects some policy space under quasi monetary sovereignty. The events also raise the critical issue of debt sustainability, especially for economies without a hegemonic global currency. Therefore, MMT-type coordination of efflux and reflux is embedded in a stock-flow model of debt. The derived debt model includes the following characteristics: (i) the degree of coordination of efflux and reflux; (ii) the propensity to mop up excess reserves; and (iii) private sector's expected demand for government securities.

JEL Classifications: E12, E42, E52, F41

Key Words: Exchange Rate, Monetary Reflux, Debt Sustainability, Excess Reserves, Ample- Reserves Regime

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1. Introduction

Neo-Chartalist theory or Modern Monetary Theory (MMT) proposes that money must first be spent before it is withdrawn as taxes or by bond sales (Mosler 1996, Wray 1998 and 2003, Bell 2000, Forstater 2003, Mitchell and Muysken 2008). The idea of monetary injection via government spending (efflux) and withdrawals in the form of taxation or bond sales (reflux) can be framed using a monetary circuit with government and central bank (Bougrine and Seccareccia 2002, Parguez 2002, Rochon and Rossi 2004, Tymoigne 2014). At the heart of monetary efflux and reflux is the integration of the operations of the Ministry of Finance, hereafter Treasury, and central bank (Tymoigne 2014, 2016). In practice, unravelling the complexity of the integrated operations and policies of the Treasury and central bank makes it difficult to clearly trace the various effluxes and refluxes.

However, recent monetary developments in Guyana present an opportunity – a form of ‘natural experiment’ – for clearly isolating efflux and reflux. A debt ceiling limit and a legal constraint, as well as persistent overdrafts on the government’s central bank account from end of 2015 to the first quarter of 2021 present an opportunity to isolate a core proposition of MMT: that monetary efflux must occur before reflux. In other words, the government first spends (efflux) and then the central bank mops up the excess money balances by continually selling a security to the private sector (reflux). The proceeds from the one-sided sales of Treasury bills are deposited into a Monetary Sterilisation Account and/or the Consolidated Fund (SN 2021a, Goolsarran 2020).

No law prevents the government from incurring an overdraft on its central bank account, which subsumes the Monetary Sterilisation Account (MSA) and is linked to the Consolidated Fund (Goolsarran 2020). Moreover, owing to the debt limit, there was not complete reflux during the period of analysis – implying a significant increase in non-remunerated excess bank reserves. The expansion of money balances owing to the overdraft should not be interpreted as money printing. Indeed, such a monetary expansion is the product of complex coordination between Treasury and central bank (Felipe and Fullwiler 2021). It, therefore, means that a more nuanced interpretation of the effect of money on inflation and exchange rates is necessary (Ibid.).

The Bank of Guyana Act of 1998 – which proposes the laws governing the operations of Guyana’s central bank, Bank of Guyana (BoG) – prevents the monetary authority from directly purchasing bonds from the government. In addition, a debt ceiling limit has been in place since 1994 (MOF 2021; SN 2021b). Both of these restrictions meant that the government significantly extended its overdraft on its account at the central bank (BoG 2020). The overdraft was the quickest road for financing government spending in an atmosphere of contentious politics. As noted earlier, the annual overdrafts expanded excess reserves beyond the already high levels that previously existed in the Guyanese banking system. Indeed, persistent excess reserves (recently rechristened ‘ample reserves’ by Federal Reserve economists) is a recurring theme in many economies (Khemraj 2006, Liu and Wray 2010, Gagon and Sack 2014, Tamini and Petsey 2021)².

What makes this an even more interesting study is the fact that Guyana maintains a managed exchange rate system. Proponents of Neo-Chartalism have often expressed doubt whether a core idea of theirs – monetary sovereignty involving, among others, central bank-Treasury coordination – is applicable to

² Fed economists have recently changed the goal post by renaming excess reserves as ample reserves (Igrig et. al. 2021). This relabelling was done for the purpose of laying to rest the old textbook fable known as the money multiplier. However, those working in the framework of endogenous credit money have long recognised that the causation implied by the money multiplier is reversed. The Fed economists note that the American central bank conducts monetary policy under an ample-reserves regime. Developing economies, it should be noted, have been conducting monetary policy – with the exchange rate as the objective – under excess reserves for decades (see Ganga 2000, Khemraj 2006, Khemraj 2007, Khemraj 2009).

economies with managed and fixed exchange rates³. This paper argues that there is substantial evidence of monetary coordination in Guyana between Treasury and the central bank. As a matter of fact, a key conclusion herein is such coordination is crucial for the management of the exchange rate and availability of foreign currency in the domestic market. The coordination, furthermore, indicates monetary sovereignty, which is a central idea of Modern Monetary Theory (Wray 1998, p. 167; Tymoigne 2020). However, this paper proposes the notion of quasi monetary sovereignty given the managed exchange rate system.

Effective management of the exchange rate requires that the BoG continually engineer monetary reflux via the one-sided sales of Treasury bills after the government spends⁴. In other words – in the spirit of MMT-like coordination – the central bank is essentially performing the role of fiscal policy by issuing a sovereign security to the private sector after the government spends from its central bank account. Furthermore, the Treasury bills present the private sector with a new profit opportunity in the national currency. This new profit center compensates the private banks for dishoarding foreign currency, which can be used by firms for importing critical intermediate goods (Khemraj 2018)⁵.

There is, however, a crucial difference in Guyana that does not contradict the notion of a monetary sovereignty, but extends it. The Bank of Guyana, as was noted earlier, cannot directly purchase bonds from the government, and then use the securities for two-sided open market operations⁶. This institutional setup enables us to focus on exchange rate management given that the benchmark policy rate is unimportant because of asymmetric passthrough to other interest rates owing to an oligopolistic banking system. The benchmark policy rate, however, is a key tool of monetary policy in advanced and many emerging economies, requiring the coordination of fiscal and monetary operations for guiding the said rate towards the central bank's target (Mosler 1996, Wray 1998, Bell 2000, Parguez 2002, Tymoigne 2014). In our case study, the coordination of efflux and reflux is meant for managing the exchange rate and enabling the dishoarding of foreign currency.

Guyana does not have in place an established public sector employment program of the type suggested by Forstater (2012) and Tcherneva (2018). Interestingly, however, a large share of government spending went into funding the expansion of civil service employment. This expansion of employment might not be consistent with the spirit of functional finance, but is the product of ethno-political contestation between two dominant groups (Khemraj 2016, Edwards 2017). Nevertheless, the political contest,

³ This is the original view of Mitchell and Muysken (2008) and it is also expressed by Forstater (2012). However, Wray (2015, p. 214) is more accommodating noting that the theory is more relevant to a country with a floating rate, but opens its applicability with some degree of restrictions – to other exchange rate systems. I interpret Wray's later writings to imply that once the country is not fully dollarized, there is still some policy wiggle room even with a managed rate or a peg rate. Indeed, while observing a small open economy, Downes and Khemraj (2019) showed that monetary financing in Barbados, which maintains a fixed exchange rate but not a currency board, did not produce the loss of foreign exchange. Downes and Khemraj attribute this outcome to the ability of the government to sell its securities to the private sector – hence, a major feature of monetary sovereignty is the ability to get the private sector to switch from excess money balances to an official domestic security. The loss of reserves was attributed to external factors, namely the trade-weighted American dollar rate that serves as a de facto rate for Barbados.

⁴ The term one-sided means the Bank of Guyana always sells the security and the private sector holds them until they mature. The central bank never repurchases them in a secondary market. A similar mechanism of exchange rate management (one-sided sterilisation or sales) was discovered in Papua New Guinea (Direye and Khemraj 2021).

⁵ The idea is to ease the demand for foreign exchange by providing the private sector with an interest-earning security denominated in the Guyana dollar (Khemraj 2009).

⁶ See Tymoigne (2014, 2020) for a discussion of a special facility created under crisis for the US Treasury to provide securities for open market operations. Hence, the second feature of a monetarily sovereign government when the Treasury is essentially conducting monetary policy.

sometimes violent, and the massive expansion of high-powered money did not produce the inflationary effects predicted by mainstream theories. The exchange rate depreciated marginally and the central bank was able to maintain its target, in spite of the fact that the debt ceiling prevented complete reflux. We argue that this outturn could be explained by a financial structure that allows for quasi monetary sovereignty.

However, there was a negative effect of the monetary expansion: a significant decline in central bank foreign reserves. The study of foreign exchange pressure in the presence of monetary-induced fiscal expansion has been a preoccupation of researchers and practitioners associated with small open economies (Worrell 1995, 2016, Downes and Khemraj 2019). Finally, the paper presents a model of domestic debt accumulation in the context of government efflux and Treasury-central bank coordination. Also, the debt accumulation function embeds the idea of a foreign exchange constraint according to Thirlwall's law.

The rest of the paper is organised as follows. Section 2 presents a detailed account of the overdraft and the institutional context. Section 3 presents a theoretical discussion and a different model of debt sustainability. Section 4 performs a numerical simulation of debt stability. Section 5 proposes the idea of quasi monetary sovereignty and Section 6 concludes.

2. Institutional Context and Background

The Bank of Guyana Act of 1998 spells out the legal framework under which the central bank operates. The Act makes it clear that the BoG cannot expand credit to the government through the purchase of securities. For instance, Section 47 of the Act says: 'Except as provided in Sections 7 (3), 45, 49 (2) and 50, the Bank shall not extend credit directly or indirectly to the government or any public entity.' Contrastingly, Section 45 (e) of the Act specifies that the BoG can sell Treasury bills for the government; therefore, enshrining coordination between Treasury and central bank.

Exceptions are made for the transfer of the BoG's operating surplus to the government's Consolidated Fund and negotiable certificates, which are a very small amount. The 'negotiable certificates' that the BoG holds as an asset form a tiny amount of total assets. These are curiously classified as Treasury bills and they amount to less than G\$1 billion (BoG 2020). Therefore, the negotiable certificates cannot be considered as classical monetary financing of the government. The discussion to follow will show that money financing takes place via efflux from the government's account at the central bank.

After 2018, most of the T-bill sales were issued for fiscal purposes and therefore were deposited into the Consolidated Fund (AOG 2019)⁷. By the end of 2018, 68.4 percent of Treasury bills were for fiscal purposes – meaning they were deposited into the Consolidated Fund to facilitate future payments (MOF 2018). This number jumped to over 99 percent for fiscal operations (MOF 2020). The BoG conducts weekly sales of Treasury bills via an auction mechanism. The continual reduction in deposits into the MSA after 2018 coincides with the largest increase in excess bank reserves which are non-remunerated in Guyana (BoG 2020).

It should be noted that when the central bank sells Treasury bills for the role of monetary policy, the money is deposited into the MSA. In this case, Treasury bills are functioning like central bank securities.

⁷ A similar system of accounts, the Consolidated Fund, exists in the United Kingdom (Pantelopoulous and Watts 2021). This should not be a surprise given that Guyana was a former British colony. The fact that the proceeds from the T-bill sales replenish the Consolidated Fund in which tax revenues are also deposited in Guyana and United Kingdom indicate new institutional variations on top of those advanced by Lavoie (2013).

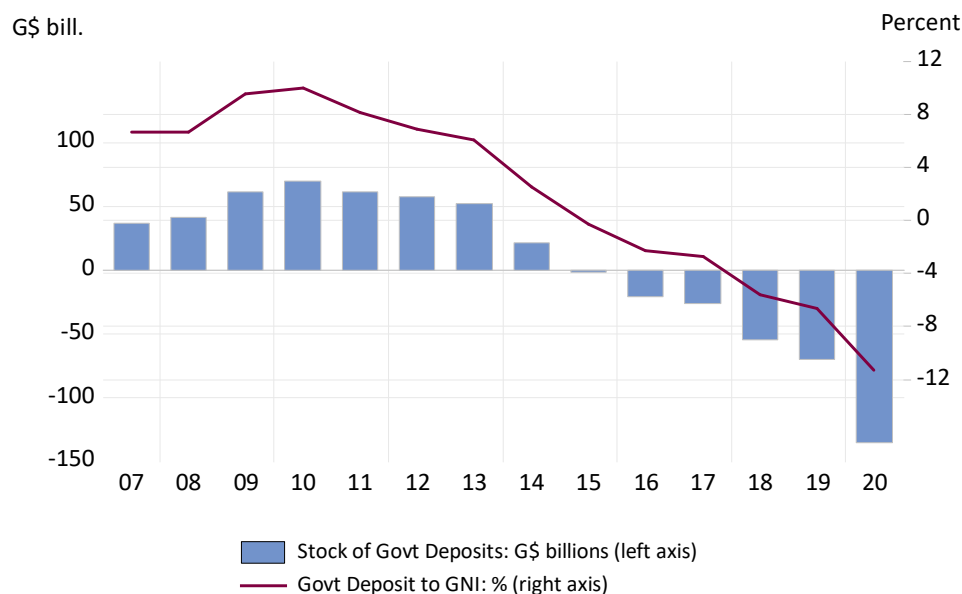
The special roles of central bank securities (or bills) are explored by Gray and Pongsaparn (2015) and Gevorkyan (2015). Monetary reflux occurs when the funds enter the MSA (and by extension the government's account at the central bank) and the Consolidated Fund.

Interestingly, 45 (c) of the Act explicitly allows the BoG to service the interest payment on the public debt. The latter condition is taken very seriously in the theoretical section where it is embedded in the mathematics of debt stability.

Figure 1 presents the evidence showing the stock of funds in the government's account at the Bank of Guyana. The left axis shows the balance in the account in local currency while the right axis indicates the deposit balance relative to Gross National Income (GNI) in percentage terms. The highest positive balance was 2010 when it amounted to G\$70 billion; afterwards it declined substantially to an overdraft or negative balance of G\$135 billion as at end December 2020. The account entered an overdraft for the first time in 2015 with a negative balance of G\$2 billion. At its peak in 2010, the balance was 9.9 percent of GNI and at the largest overdraft in 2020 it amounted to negative 11.3 percent.

After holding a steady parliamentary majority from 1992 to 2011, the Peoples Progressive Party-Civic (PPP-C) lost its majority in the 2011 general election but still won the presidency⁸. The minority status of the government made it difficult to increase the debt ceiling; and with eyes locked on the 2015 general election, the government cranked up the fiscal deficit that would be financed in large part by running down its account at the central bank. This can be seen by the continual decline in balance starting in 2011.

Figure 1: The Government's Account Balance at the Central Bank



Data source: Bank of Guyana Statistical Bulletins (various years)

⁸ The year 1992 was a pivotal year in post-independent Guyana. The country returned to free and fair elections after more than two decades of dictatorship.

It is helpful to examine the flow of money or the change in the account balance from one year to the next. The annual changes amount to flows – specifically, outflows from the account given that there is more efflux than reflux. This can be seen by Table 1 that also includes the fiscal deficit, CPI inflation rate, the three-month Treasury bill rate, exchange rate (G\$/\\$), net foreign exchange (FX) reserves of the central bank (in American dollars: \\$), and the number of employees working for the central government. This flow or change in the account balance will become very important later in the theoretical section where a debt sustainability equation is derived from a balance sheet constraint.

Table 1 indicates that the change in the stock turned negative from 2011. The fiscal deficit also increased substantially from 2011 to 2014. The PPP/C lost the election in May 2015 and a new government under a coalition of political parties took over⁹. This might have disrupted the budgeting process, but it did not stop the government from spending from its central bank account. In 2015, the overdraft of G\\$23.7 billion was more than the deficit of G\\$9.3 billion. This, of course, is a serious anomaly and the Auditor General has noted grievous breaches for 2015 as well as for 2018 when the overdraft of G\\$28.7 billion again exceeded the fiscal deficit of G\\$26.8 billion¹⁰.

Moreover, the year before the 2015 general election, the overdraft was 88.3 percent of the deficit. The APNU + AFC coalition government did not immediately address the debt ceiling issue. It is not clear why the new regime failed to increase the ceiling, but the annual overdrafts continued as it was the main way to finance government expenditures. Perhaps they were preoccupied by the very effective opposition from a regrouped PPP-C, which engineered a successful vote of no confidence in December 2018 – an event that triggered a whole new period of serious political uncertainty. The APNU + AFC government was not assured of victory in 2020 given early signs that they were losing the non-traditional votes they previously won in 2015. Indeed, they lost the March 2, 2020 general election to the PPP-C, which has vowed to increase the debt ceiling (Seoraj 2021, SN 2021b). However, the PPP-C did not assume office until August 2 of the same year after a series of court cases in which the APNU + AFC tried to overturn the election result using the courts.

⁹ The coalition was made up of several parties: The Peoples National Congress, Alliance for Change, Working Peoples Alliance and some smaller units. The name of the coalition was APNU + AFC.

¹⁰ See Stabroek News (2020) where it was reported that the government failed to account for over G\\$ 800 million in spending, according to the Auditor General.

Table 1: The Change in Government Deposit and Other Key Macroeconomic Statistics

	Change in gov. deposits: G\$ bill.	Fiscal deficit: G\$ bill.	CPI inflation: %	3-Mth. T-bill rate: %	FX rate: G\$/	BoG FX reserves: \$	Number of gov. employees
2007	NA	-14.3	12.2	3.90	203	254	8711
2008	4.4	-14.9	8.1	4.19	203	299	9364
2009	20.2	-15.3	3.0	4.18	204	569	10094
2010	8.7	-13.4	3.7	3.78	204	724	10955
2011	-9	-16.4	5.0	2.35	204	750	11184
2012	-3.5	-27.6	2.4	1.45	204	825	11729
2013	-5.1	-27.0	1.9	1.45	205	751	12056
2014	-30.8	-34.9	0.9	1.67	206	652	13988
2015	-23.7	-9.3	-1.0	1.92	206	595	14905
2016	-19	-31.6	0.8	1.66	208	597	22090
2017	-5.2	-32.8	1.9	1.54	208	584	26497
2018	-28.7	-26.8	1.3	1.54	208	529	26354
2019	-15.5	-29.9	2.1	1.54	209	576	NA
2020	-64.7	-90.5	0.9	1.54	210	680	NA

Sources : Bank of Guyana Statistical Bulletin (various years) and Bureau of Statistics

The exchange rate barely depreciated during the time of fiscal deficit and central bank financing. In addition, the rate of inflation remained subdued. Interestingly, the interest rate on the three-month, as well as other maturities, bills declined. The latter is consistent with the observations of MMT scholars who have consistently argued that the coordination of monetary and fiscal policies would stabilise interest rate. Therefore, the decline in interest rate is associated with the restrained coordination that resulted in limited sales of Treasury bills after 2011 (see Figure 2). The lower interest rate outcome could also be the result of large domestic 'monopsony' institutional investors who can afford, owing to scale, a rate of interest below where the competitive rate would have been (Khemraj 2018).

It should be noted that the BoG does not use an interest rate instrument of monetary policy. Instead it relies on interventions in the domestic FX market and moral suasion in order to target the exchange rate. Therefore, the institutional arrangements of a floor or corridor system is not applicable in the case of Guyana. The central bank also does not pay interest on bank reserves.

There was, however, a negative consequence of the deficit: a loss of international reserves by the BoG. The table indicates that the central bank's FX reserves reached a peak of \$825 million in 2012, one year after the election and the first negative change in the government's account. International reserves continued to fall until it reached \$529 million in 2018, the year when the overdraft exceeded the fiscal deficit. International reserves improved in 2019 and 2020, possibly because of the inflows associated with foreign investors linked to the newly formed production sector: offshore oil production¹¹. The

¹¹ ExxonMobil and its partners discovered a massive amount of offshore sweet crude reserves in 2015, to the extent that it is believed that Guyana has one of the highest per capita proven reserves. Production officially started in late 2019. However,

adverse adjustment in FX reserves indicates that MMT-like policies might create quantity adjustments instead of price adjustments under certain economic structures. Such quantity adjustments in the local FX market has been a longstanding emphasis of Worrell (2016). These structures will be discussed in Section 5.

Government employment increased significantly from 2007 to 2018, the last year for which the Bureau of Statistics reported the data. The government employment level rose from 8711 in 2007 to 26354 in 2018, representing an astonishing increase of 202.5 percent. The increase in government employment accounted for a significant percentage of government's current expenditure. In general, current expenditure accounts for the largest share of government spending (BoG 2020).

3. Theoretical Analysis

Consider the following stylised balance sheets in Table 2 for the central government, central bank and the aggregate private sector. The private sector's balance sheet is obtained by summing assets and liabilities of banks and non-bank economic participants. The task here is to illustrate the connection between the Treasury and the central bank, as well as the ultimate connection to the private sector. Doing so require that we consider the government deposit at the central bank during the process of debt accumulation.

In keeping with the emphasis on Treasury-central bank coordination, this paper focuses only on the accumulation of domestic debt and separate balance sheets. Foreign debt of government and private sector is held constant; therefore, they are not reflected on balance sheets. Physical assets are also held constant for the purpose of this paper. If the stock is constant, then they are zero in their respective flow equation. Hence, for the purpose of tractability, we will not express them in the balance sheets.

The first major government liability are the securities sold by the central bank on behalf the Treasury. These Treasury bills are labelled as C^{ps} to indicate they are sold to the private sector. The central bank auctions them for the Treasury. The government itself also auctions other debt instruments that can be bought by the central bank (B^{cb}) or the private sector (B^{ps}). Therefore, $B = C^{ps} + B^{ps} + B^{cb}$. However, as noted in the previous section, B^{cb} is tiny relative to debt outstanding and amounts to under G\$1 billion. It has not changed since 2015, therefore, for the rest of the paper $\Delta B^{cb} = 0$.

foreign investors were pouring in to set up onshore businesses to service the offshore production. That could explain why there was a turnaround in the BoG's net FX reserves in 2020.

Table 2: Stylised Balance Sheets

Government		Central Bank		Private Sector	
<i>Assets</i>	<i>Liabilities</i>	<i>Assets</i>	<i>Liabilities</i>	<i>Assets</i>	<i>Liabilities</i>
Government deposits ($D^g + CF$)	T-bills issued by BoG on behalf of government (C^{ps})	Foreign assets ($\bar{S}F$)	High-powered money (H)	$C + R + M$	$(D^{g,ps})$
Deposits in private banks ($D^{g,ps}$)	Other debt issued by government (B)	Domestic assets (B^{cb})	Government deposits (D^g)* ---MSA (S^{cb})**	Securities ($C^{ps} + B^{ps}$)	Net worth (V^{ps})
*Note: the proceeds from the sale of C^{ps} enter $CF + S^{cb}$. Since 2018 there is a significant decline of the amount of funds entering S^{cb}; hence, incomplete reflux over the review period. CF = Consolidated Fund; C = currency in circulation; R = bank reserves; M = checking and saving deposits; $H = C + R$ **The Monetary Sterilisation Account (MSA) is essentially a subset of D^g (Goolsarran 2020).					

The government's assets are made up of deposits held at the central bank ($D^g + CF$) and in the private commercial banks ($D^{g,ps}$). The government's account inside the private banks receive a percentage of government revenues. The movement of funds from $D^{g,ps}$ to M or vice versa rearrange the ownership of the existing stock of money inside the private sector. The existing stock of M , inside the private sector, would have been created by previous government efflux from D^g and bank loans.

More importantly for our purpose is the government's deposit at the central bank, which is linked to the Consolidated Fund. When the government emits payments, these are recorded as a debit to D^g . On the other hand, the money from T-bill sales get credited in CF and/or S^{cb} . Therefore, the one-sided sales of Treasury bills act as a source of reflux, while the debit to D^g is an efflux. This means the only way for the government's balance ($D^g + CF$) to remain positive is for reflux to be greater than efflux over time. Because the MSA is recorded as the central bank's liability, the balance on D^g is often larger than CF (Goolsarran 2020, SN 2021a). Tax revenues are also deposited into the CF – hence another source of reflux¹².

¹² Obviously, efflux and reflux will also occur when the central bank sells or buys foreign currency to/from the private sector. However, as the balance sheet indicates, the private sector's stock of foreign assets is assumed to be constant. This can easily be added to the model if needed. It also means the counterpart to the central bank's foreign assets is the rest of the world, which is exogenous in the analysis given that we are analysing a small open economy.

The central bank's main liabilities are high-powered money (H) and the government's deposits that were mentioned earlier. As we will see later, payments from this account (D^g) – including for servicing the domestic debt as allowed by the legal framework – are considered in the debt sustainability equation. The central bank's assets are the domestic currency value of foreign assets ($\bar{s}F$), where the exchange rate ($\bar{s}$) is expressed in indirect quote (local currency per one unit for foreign currency). This means an increase in $\bar{s}$ signals a depreciation of the home currency and a decrease indicates an appreciation.

Private sector assets are high-powered money (H) and bank deposits (M). Bank deposits expand endogenously when the commercial banks extend loans to private borrowers (Kaldor 1982, Moore 1983). Endogenous private money can also be illustrated using a monetary circuit (Graziani 2003, Rochon and Rossi 2004). The analysis of endogenous creation of private money is not the subject of this paper; instead, this work underscores the creation of high-powered money owing to overdraft efflux and reflux associated with one-sided sales of Treasury bills.

Let us examine how the government's overdraft emerged using a thought experiment. Imagine the government writes a cheque on D^g equaling G\$1 billion. It means that D^g falls and H rises immediately – hence there is no change on the central bank's balance sheet. The combined private sector now has G\$1 billion in extra money, thereby increasing the private net worth by the same amount and balancing the sector's balance sheet. However, the government's asset, the Consolidated Fund, went down by G\$1 billion. The only way for government to balance its account is for the BoG to sell Treasury bills equaling G\$1 billion. Over time the central bank may not issue bills and eventually its account enters an overdraft, which is what we are observing in this case study. It should be noted, however, that the private sector's net worth is not reduced when the BoG sells T-bills for government. Bank deposits and excess reserves are exchanged for interest-earning securities. In other words, the private sector's net worth increases given the initial efflux of G\$1 billion, regardless of whether monetary reflux is instigated or not.

The accumulation of private sector's net worth can be expressed as equation 1. It is clear from equation 1 that when the government accumulates debt or the central bank sells Treasury bills, the private sector's net worth increases. In the context of a monetary circuit, the private sector can also accumulate private money by extending loans to firms. It therefore means that ΔM is positively related to the change to loans to firms. However, studying the evolution of endogenous private sector (credit) money is beyond the scope of this work.

$$\Delta V^{ps} = \Delta B + \Delta H + \Delta M - \Delta D^{g,ps} \quad (1)$$

The government could transfer funds from the private sector to its central bank account, thereby mopping up excess reserves. On the other hand, the government could expand its deposits in the private sector to add necessary liquidity. When private agents pay taxes, there is an initial intra-private sector transfer of funds from M to $D^{g,ps}$ before the funds enter CF.

There are two ways the government's domestic debt is accumulated in Guyana. First, government sells bonds directly to the private sector. Second, the central bank sells Treasury bills for the government after the latter emitted payments from D^g . There are, therefore, two debt accumulation functions. It is the second debt accumulation function which shows the practice of a monetarily sovereign

government in which there is coordination between Treasury and central bank. The fraction of debt sold directly by government to the private sector is ω_b . The fraction of Treasury bills sold by the central bank for the Treasury is ω_c . Therefore, $\omega_b + \omega_c = 1$.

First, debt is accumulated according to equation 2a.

$$\Delta B^{ps} = \omega_b (G_t - T_t + i_b B_{t-1}^{ps}) \quad (2a)$$

Noting that $\Delta B^{ps} = B_t^{ps} - B_{t-1}^{ps}$ gives the following

$$B_t^{ps} = \omega_b (G_t - T_t) + (1 + \omega_b i_b) B_{t-1}^{ps} \quad (2b)$$

Divide both sides of equation 2b by nominal income ($P_t Y_t$). Let $P_t = P_0(1 + \pi)$ and $Y_t = Y_0(1 + g)$. We now have $P_t Y_t = P_0 Y_0(1 + \pi)(1 + g)$, where P_0 and Y_0 are initial values for the price level and real income, respectively; π = the inflation rate; and g = the rate of growth of real income. The division leads to equation 2c.

$$B_t^{ps} / P_t Y_t = [\omega_b (G_t - T_t) + (1 + \omega_b i_b) B_{t-1}^{ps}] / P_0 Y_0 (1 + \pi)(1 + g) \quad (2c)$$

With one modification, the inclusion of ω_b , equation 3 is the popular equation of motion for sovereign debt. The fiscal deficit-to-income ratio is given by $d_t = \frac{G_t - T_t}{P_t Y_t}$. It shows that perturbations in the deficit (d_t) will produce a sustainable debt path providing that $1 + \omega_b i_b < (1 + \pi)(1 + g)$. Sustainability means that the debt-to-income ratio (b_t^{ps}) converges to a long-run ratio following a perturbation in d_t .

$$b_t^{ps} = \left[\frac{\omega_b}{(1 + \pi)(1 + g)} \right] d_t + \left[\frac{1 + \omega_b i_b}{(1 + \pi)(1 + g)} \right] b_{t-1}^{ps} \quad (3)$$

Equation 3 is interesting for other reasons. If there is no interaction and coordination between Treasury and central bank, then $\omega_b = 1$. Moreover, considering the institutional restriction whereby the central bank cannot purchase bonds directly from the government, and assume for a moment that $\pi = 0$, we obtain the popular and mainstream debt sustainability condition: $1 + i_b < 1 + g$. The debt is sustainable once the real income growth is greater than the interest rate. However, if $i_b \geq g$ the debt is unsustainable or will not converge given a deficit perturbation. This stability condition is the 'Domar condition' of debt sustainability (Vernengo and Caldentey 2020, Taylor 2019).

3.1 Debt Under Treasury-Central Bank Coordination

Once there is Treasury-central bank coordination, meaning that $\omega_b \neq 1$, the Domar condition has to be modified. Let us invoke the central bank's balance sheet for the purpose of finding the sibling of equation 3. From the balance sheet we get equation 4a (note that $\Delta B^{cb} = 0$). Equation 4b expresses the balance sheet items in terms of flows. The exchange rate can be treated as a constant since we are working with a managed exchange rate system.

$$H + D^g = \bar{s}F \quad (4a)$$

$$\Delta H + \Delta D^g = \bar{s}\Delta F \quad (4b)$$

Equation 4c shows that the government first makes payments from its account to fund a fraction (ω_c) of its expenses, including the interest cost on the domestic public debt ($i_c C_{t-1}^{ps}$).

$$\Delta D^g = -\omega_c(G_t - T_t + i_c C_{t-1}^{ps}) \quad (4c)$$

Equation 4d indicates the central bank's reaction to government's spending; hence, one aspect of the coordination between Treasury and central bank. It is a simple behavioural equation showing the extent to which the central bank replaces the change in money balances with the interest-earning security. In other words, it is a rule of compensation in which the private sector is sold an interest-earning asset in order to incentivise them to onload foreign currency into the domestic market. The parameter λ captures the intensity of the BoG's willingness and ability to mop up excess reserves and/or rearrange money ownership inside the private sector (where $0 < \lambda < 1$).

$$\Delta C^{ps} = \lambda \Delta H \quad (4d)$$

Substituting 4c and 4d into 4b, and rearranging terms, will produce equation 5a, which is the equation of motion showing how the level of central bank securities will evolve over time. The purpose here is not to model ΔF explicitly¹³. Therefore, divide ΔF by F_{t-1} and then multiply by $F_{t-1}/P_t Y_t$. Finally, also divide the other terms by $P_t Y_t$ while also noting the inflation and real income growth rate from above. This will produce equation 5b.

$$C_t^{ps} = \lambda \bar{s} \Delta F + \lambda \omega_c (G_t - T_t) + (1 + \lambda \omega_c i_c) C_{t-1}^{ps} \quad (5a)$$

¹³ Doing so will require a second difference equation showing how F evolves over time. It would imply that debt sustainability is modelled as a system of equations in which the domestic C^{ps} interacts with foreign assets (F). This is the purpose of another paper, also incorporating the foreign debt in a three-equation system.

$$\frac{c_t^{ps}}{P_t Y_t} = \lambda \omega_c \frac{\Delta F}{F_{t-1}} \frac{F_{t-1}}{P_t Y_t} + \frac{\lambda \omega_c (G_t - T_t)}{P_t Y_t} + \frac{(1 + \lambda \omega_c i_c) c_{t-1}^{ps}}{P_t Y_t} \quad (5b)$$

Let the rate of growth of the central bank's foreign reserves be μ_f that is constant for some period of time (where is $\mu_f = \Delta F/F_{t-1}$). Also, assume a constant foreign reserves-to-aggregate income ratio: $\bar{f} = F_{t-1}/P_t Y_t$. This produces the equation of motion, equation 6, assuming that the private sector will demand all securities supplied. In the next subsection we will introduce a demand function constraining the supply of T-bills.

$$c_t^{ps} = \lambda \omega_c \mu_f \bar{f} + \left[\frac{\lambda \omega_c}{(1+\pi)(1+g)} \right] d_t + \left[\frac{1+\lambda \omega_c i_c}{(1+\pi)(1+g)} \right] c_{t-1}^{ps} \quad (6)$$

For now, let us compare equations 6 and 3 since both are derived under the assumption that the private sector will purchase both categories of government debt without reservation. Note that when $i_b = i_c$, the stability condition in 6 is smaller than that of 3. This is expressed by inequality 6a. It follows that a perturbation in the fiscal deficit will result in faster convergence for securities sold by the central bank on behalf of government. Hence, Treasury-central bank coordination could produce a relatively more sustainable domestic debt.

$$\frac{1+\lambda \omega_c i_c}{(1+\pi)(1+g)} < \frac{1+\omega_b i_b}{(1+\pi)(1+g)} \quad (6a)$$

What if all debt is sold by the central bank? This means that $\omega_c = 1$. The sustainability condition now becomes the expression 6b, in which $\lambda < 1$ once the central bank is willing to accommodate persistent non-remunerated excess reserves. Therefore, the propensity to mop up excess reserves (the propensity to reflux) is crucial to the stability of debt under Treasury-central bank coordination.

$$\frac{1+\lambda i_c}{(1+\pi)(1+g)} \quad (6b)$$

3.2 Expected Demand for Government Security

Until this point we proceeded under the assumption that all securities issued by the central bank will be purchased by the private investors. Moreover, many banks – particularly in developing economies – demand interest-earning liquid assets such as T-bills in excess of the minimum amount required for macro-prudential regulation.

Consider equation 7 that specifies the private sector's demand for T-bills as a percentage of national income. The demand in the previous period (c_{t-1}^d) is the expected (or next period) interest earning discounted by a suitable interest rate other than the T-bill rate. In a small open economy, the foreign interest rate (i_f) would determine the demand for the domestic security. Often this form of discounting adds a subjective rate of return to i_f . However, for economy of symbols, we will omit such investor

subjectivity and gut feelings to keep the analysis simple. For the rest of the paper, the foreign interest rate is a long-term average that does not change from one period to the next.

$$c_{t-1}^d = \frac{c_t^{ps}}{1+i_f} - \bar{c} \quad (7)$$

This fraction of demand is in excess of the amount the banks must hold to meet their secondary liquid asset requirement, as part of macro-prudential framework. The minimum required liquid assets as a percentage of income is $\bar{c}$.

Setting equations 6 and 7 equal produces the final equation of motion that considers expectation and macro-prudential regulation.

$$c_t^{ps} = (\lambda\omega_c\mu_f\bar{f} + \bar{c})(1+i_f) + \left[\frac{\lambda\omega_c(1+i_f)}{(1+\pi)(1+g)} \right] d_t + \left[\frac{(1+\lambda\omega_c i_c)(1+i_f)}{(1+\pi)(1+g)} \right] c_{t-1}^{ps} \quad (8)$$

The modified stability condition and constant, respectively, are expressed as follows:

$$\frac{(1+\lambda\omega_c i_c)(1+i_f)}{(1+\pi)(1+g)}$$

$$(\lambda\omega_c\mu_f\bar{f} + \bar{c})(1+i_f)$$

The modified impact coefficient is given as

$$\frac{\lambda\omega_c(1+i_f)}{(1+\pi)(1+g)}$$

4. Debt Sustainability Analysis

An analysis of the stability of the debt requires that a solution be obtained for equation 8. This equation is chosen for the debt stability analysis because Treasury bills that are sold by the central bank accounts for 86 percent of the domestic national debt ($\omega_c = 0.86$). The same procedure can be used for equation 3, debt sold by government to the private sector.

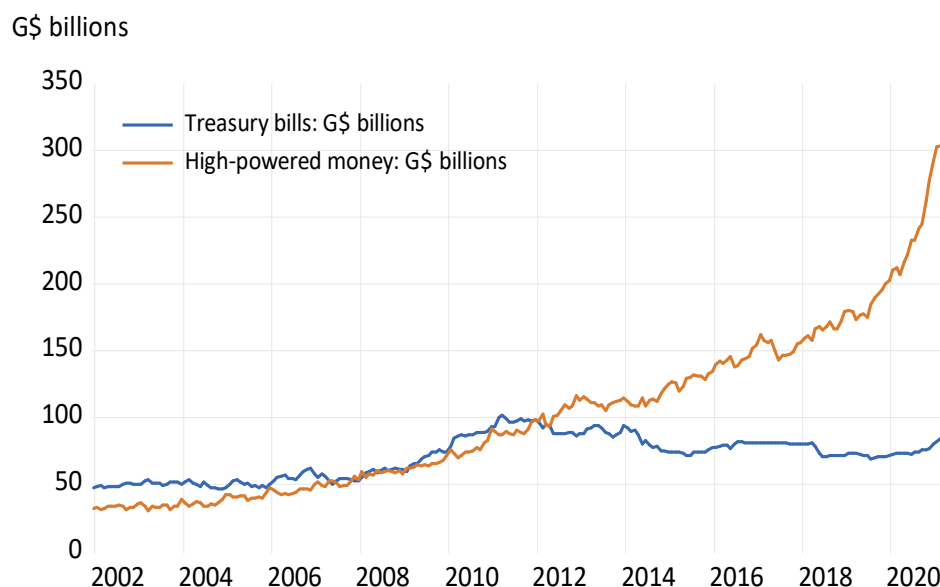
The simulation also requires that we estimate λ , which comes from equation 4d. It would be instructive to consider Figure 2, which shows the total outstanding Treasury bills and high-powered money from Dec: 2001 to Feb: 2021. It is clear that there was a tight relationship between the two variables from 2001 to December 2011. As noted earlier, 2011 was a pivotal year for political reasons. It also indicates a break in Treasury-central bank coordination with the government relying more on its central bank deposit to make payments. When λ is estimated using an autoregressive distributed lag (ARDL) model for Dec: 2001 to Dec: 2011, the value is 0.93, thereby indicating a strong tendency for the BoG to conduct one-sided sales of Treasury bills after government spends¹⁴. However, for the period Jan: 2012 to Feb:

¹⁴ The usual econometric protocols were followed. The results and data are available on request. Essentially, equation 4d was estimated in ARDL form with lags selected by the Schwartz Information Criterion. The coefficient values mentioned above are

2021, λ was much smaller at 0.13. The smaller value is expected given that government relied more on overdraft financing following the failure to increase the debt ceiling¹⁵.

The government subsequently made an official announcement for increasing the debt ceiling (M.O.F. 2021). It is therefore reasonable to expect that λ will return to around 0.9, indicating a reactivation of deeper central bank-Treasury coordination. Therefore, $\lambda = 0.9$ will be used for the simulation exercise.

Figure 2: Incomplete Reflux: Treasury Bills Outstanding Versus High-Powered Money



Data source: International Financial Statistics and Bank of Guyana Statistical Bulletins

One can reasonably expect that the past growth rate is no guide for future growth given the discovery of oil. This would likely increase the growth rate over the next decade. On the other hand, there is evidence of a contraction of some of the traditional agricultural sectors with the new focus on oil. Nevertheless, a net positive long-term growth rate of 8 percent is assumed ($g = 8\%$). A long-term inflation rate of 3 percent is assumed ($\pi = 3\%$). This has to do with the steep increase in demand for imported goods since the discovery of oil. An interest rate of 4 per cent is assumed ($i_c = 4\%$). In general, the domestic interest rate could be seen as a markup over the foreign rate. Therefore, we assume a foreign corresponding T-bill rate of 1 percent ($i_f = 1\%$).

the aggregated long-run values using all lags. They are both statistically significant and the models reflected no serial correlation.

¹⁵ There is an interesting parallel to the overdraft economy that was described by Lavoie (2001). The overdraft economy is one in which the banks borrow reserves from the central bank. Hence, these loans are an asset to the central bank. However, the BoG never has to lend reserves to the banks because the government supplies them when it emits payments in excess of the T-bill reflux. The high reflux parameter prior to 2011 was fairly close to Lavoie's one-to-one compensation. After 2011, the 'reflux' parameter was much smaller. The reflux parameter could increase after 2021 given the higher debt ceiling, providing that most of the funds enter the central bank's sterilisation sub-account.

It is assumed that the long-term growth rate for international reserves should converge to Thirlwall's law plus a compound rate of growth for inflows of foreign direct investments (FDIs)¹⁶. The calculation of μ_f is therefore based on Thirlwall's law plus a compound rate of growth for exports. The compound rate of growth of FDI inflows from 2007 to 2019 is 5.2 percent.

Modeste (2011) is the only known relatively recent estimate of the import-income elasticity. He calculated a value of 1.068 for Guyana. The compound rate of growth for real export is 4.9 percent. This means that $\mu_f = 9.8$ percent. The ratio of international reserves to GDP is approximately 28 percent (therefore, $\bar{f} = 28\%$). Finally, the stock of required liquid assets as at the end of 2020 stands at 8.9 percent of GDP ($\bar{c} = 8.9\%$).

In summary, therefore, substituting the following values ($\omega_c = 0.86, \lambda = 0.9, g = 0.08, \pi = 0.03, i_c = 0.04, i_f = 0.01, \mu_f = 0.098, \bar{c} = 0.089$, and $\bar{f} = 0.28$) into equation 8 will produce 9. The stability or the debt sustainability condition is 0.927. The latter can be seen as the numerical approximation of the stability coefficient from the previous section. The impact coefficient and constant are, respectively, 0.696 and 0.121.

$$c_t^{ps} = 0.121 + 0.696d_t + 0.927c_{t-1}^{ps} \quad (7)$$

Assuming an initial value for $c_t^{ps} = c_0$ and using several iterations will produce a solution given by equation 8a. Note that $\sum_{j=0}^{\infty} 0.927^j = 12.697$.

$$c_t^{ps} = 0.121 \sum_{j=0}^{t-1} 0.927^j + 0.927^t c_0 + 0.696 \sum_{j=0}^{t-1} 0.927^j d_{t-j} \quad (8a)$$

Moreover, taking the limit of equation 8a will produce the long-run debt-to-GDP ratio for the domestic debt.

$$\lim_{t \rightarrow \infty} c_t^{ps} \approx 154\% \quad (8b)$$

Sustainability also requires that we assess the time it takes for debt to return to 154 percent following a perturbation caused by the deficit at a given moment. The paper will only focus on debt sold by the central bank since we are interested in studying debt sustainability under Treasury-central bank coordination.

The following dynamic multipliers (ψ_j) are derived from equation 8a:

¹⁶ See Thirlwall (2011, Britto and McCombie 2009). The version of Thirlwall law used in the simulation is equation 6 in Britto and McCombie (2009). The simpler equation is used because there is no estimate of the income elasticity of export for Guyana.

$$\psi_0 = \frac{\partial c_0^{ps}}{\partial d_t} = 0.696 \quad (9a)$$

$$\psi_1 = \frac{\partial c_1^{ps}}{\partial d_t} = (0.696)(0.927) = 0.65 \quad (9b)$$

$$\psi_2 = \frac{\partial c_2^{ps}}{\partial d_t} = (0.696)(0.927^2) = 0.60 \quad (9c)$$

$$\psi_3 = \frac{\partial c_3^{ps}}{\partial d_t} = (0.696)(0.927^3) = 0.55 \quad (9d)$$

and so on.

Repeating this process over many periods will produce a chart in which (ψ_j) is on the vertical axis and forecast periods on the horizontal axis. The chart illustrates the dynamic adjustments following a change in the fiscal deficit. Moreover, it shows the long-term debt of 42 percent and two sets of dynamic multipliers: a unit change a two-unit change in the deficit.

Figure 3: Dynamic Multipliers Showing Adjustment to Long-term Debt

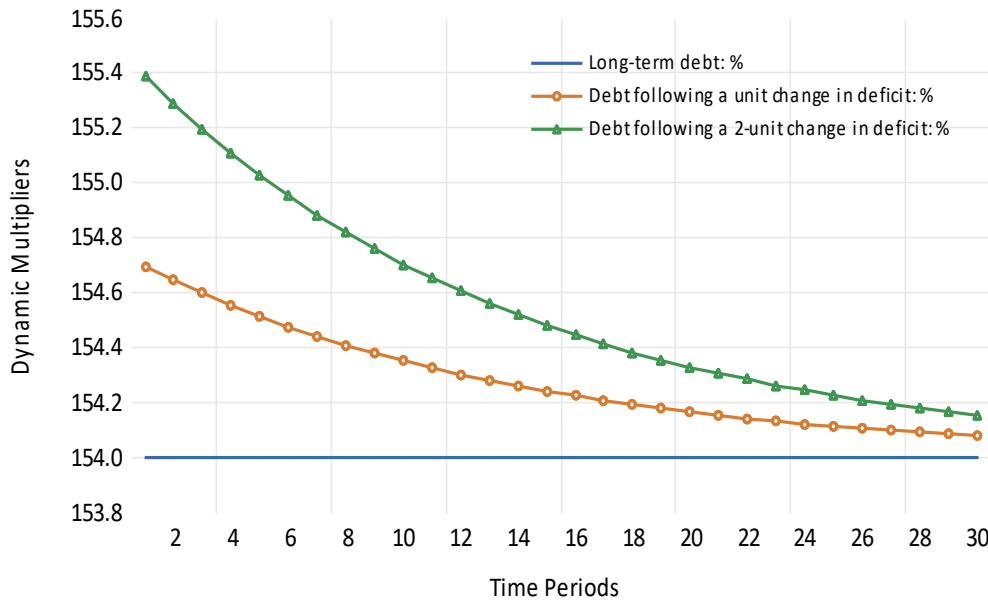


Figure 3 indicates that the debt converges to its long-term steady state following a shock to the deficit, thus being consistent with stability or sustainability. Had the dynamic multipliers diverged from 154 percent, it would indicate an unsustainable debt path. Nevertheless, in spite of the stability, it takes a long time for the debt to return to its long-term steady state. This outcome is determined by the stability

parameter of 0.927, which although less than one, indicates long memory or slow convergence. The simulation using values for Guyana shows that the convergence takes longer than 30 periods following a positive fiscal shock. Impatient and highly speculative financial markets could mistake the slow convergence as unsustainable, particularly if the initial debt (c_0) is perceived to be high.

5. Quasi Monetary Sovereignty

A fully monetarily sovereign country would tend to have the following characteristics: (i) a fiat currency, (ii) a flexible exchange rate, (iii) ability to issue debt in the national currency, (iv) freedom from holding large amounts of foreign exchange reserves, (v) no dollarization, and (vi) minimum exposure in foreign currency debt (Pantelopoulous and Watts 2021). However, developing economies in the periphery do not tick all the boxes, thereby resulting in some degree of monetary sovereignty, which is termed here quasi monetary sovereignty (QMS). In terms of the classification scheme proposed by Prates (2020, p. 507), Guyana falls somewhere in box 5 along with economies such as Turkey and Peru. Other Caribbean economies such as Jamaica and Trinidad and Tobago would also tend to fall in box 5 of Prates' classification system. Therefore, box 5 clearly indicates quasi monetary sovereignty in which the country has some fiscal and monetary policy space even when there is a target exchange rate.

It is clear that Guyana has a fiat currency and can issue debt in said currency. The domestic debt is not held by foreign nationals because the government does not allow foreign short-term funds in the Treasury bill market. Instead, domestic banks, insurance companies, non-bank financial companies and the National Insurance Scheme regularly purchase the securities that are sold via auction by the central bank. As at December 2020, the government's external debt was a 22 percent to GDP, which does not appear to be extremely onerous – at least not yet. Roughly 70 percent of the external debt is owed to multilateral agencies and another 26 percent comprised of foreign bilateral loans¹⁷. The government has no debt exposure to foreign private banks and markets.

However, the country has a managed exchange rate system that requires that the BoG maintain foreign exchange reserves of at least three months of import cover. In that sense, Guyana is not fully sovereign but displays QMS. There are two important trends to consider: (i) the FX reserves of the BoG declined continually from 2012 to 2019; and (ii) Figure 3 suggests that the ratio of Treasury bills to high-powered money declined substantially from 2012. The implication of the latter is the central bank was unable to sell more bills, thus unable to mop up excess reserves, because of the domestic debt ceiling that was in place. Coinciding with the decrease in the ratio is the loss of international reserves as noted in Table 1, thus confirming the feature of QMS.

We still have to explore, however, why the exchange rate did not depreciate steeply given the loss of FX reserves and steep increase in high-powered money owing to the reduction in reflux that was associated with the debt ceiling. The clue comes from Keynes: 'a government which has control over the banking and currency system can always find money to pay for its purchases of home-produced goods' (Keynes 1940 [1972], p. 416).

The nature of the FX market in Guyana is crucial as we consider Keynes' dictum. There are six commercial banks licensed to trade foreign currencies, as well as nineteen non-bank cambios (BoG 2019). The main foreign currencies traded in the local market against the Guyana dollar are the American dollar, euro,

¹⁷ The percentages are the author's calculations based on data from the Bank of Guyana Statistical Bulletins.

Canadian dollar, pound sterling and several currencies of the Caribbean. The dollar, on average, over the past five years, accounts for approximately 96 percent of all trades¹⁸.

Table 3 looks at the quantity of foreign exchange purchased by all bank and non-bank cambios. It is clear that the quantity traded has increased over time, albeit in a somewhat zigzag manner. The significant increase in 2020 is likely reflecting the expansion of economic activities surrounding the nascent oil sector. Importantly, for our purpose, is the domination of the banks in trading foreign currencies. By 2020 the non-bank traders only accounted for 0.7 percent of all purchases.

¹⁸ Author's calculation using data from Bank of Guyana Statistical Bulletins (various years).

Table 3: Annual Stock of Foreign Exchange Traded by Bank and Non-Bank Cambios

	Banks US\$ mill.	Non-banks US\$ mill.	Total US\$ mill.
2008	1,096.5	63.5	1,160.0
2010	1,198.1	70.9	1,269.0
2012	1,709.3	60.0	1,769.3
2014	1,381.8	42.1	1,423.9
2016	1,474.9	53.1	1,528.0
2018	1,832.0	57.0	1,889.0
2020	2,486.6	16.4	2,503.0

	Banks %	Non-banks %	Total %
2008	94.5	5.5	100
2010	94.4	5.6	100
2012	96.6	3.4	100
2014	97.0	3.0	100
2016	96.5	3.5	100
2018	97.0	3.0	100
2020	99.3	0.7	100

Source : Bank of Guyana Statistical Bulletins
(various years)

The high concentration of FX trades and the oligopolistic nature of the market makes it easier for the central bank to exercise moral suasion over the targeting the rate (Khemraj and Pasha 2012). The bank and non-bank cambios have to be licensed by the central bank and they are supervised by the same. This no doubt helps the BoG to exercise control over the price of foreign currency even though it cannot effectively target the quantity traded. Therefore, in spite of high excess reserves, the central bank can maintain control of the rate because licensed banks – instead of a parallel market – account for most foreign exchange trades.

The asset composition of the banks could also motivate them towards cooperating with the central bank's exchange rate target. The composition, moreover, is the product of regulation that makes it illegal for banks to borrow externally and make loans in foreign exchange. As can be seen in Table 4, the banks largely hold assets in the national currency. A rapid depreciation of the rate could likely passthrough to higher inflation that erodes the real value of assets expressed in the national currency. As a percentage of total assets, foreign currency assets account for a declining share from 2008 to 2020. The average for the same period is 17.3 percent. Similarly, loans to the private sector, in terms of percentage share, has declined gradually over the said period, with an overall period average of 29.4 percent. Loans in the national currency formed the largest asset class for banks and are extended to sectors which have to import fuel and machinery.

Table 4: Asset Composition of Banks

	FX assets	Loans	T-Bills	Reserves*	Others**	Total
	G\$ mill.	G\$ mill.	G\$ mill.	G\$ mill.	G\$ mill.	G\$ mill.
2008	49,465	67,233	50,909	21,820	43,202	232,629
2010	47,126	78,308	67,066	40,843	62,782	296,125
2012	64,086	112,970	69,249	41,182	90,637	378,124
2014	73,838	137,736	61,007	46,969	102,254	421,804
2016	73,399	144,281	66,172	66,824	116,622	467,298
2018	80,339	151,517	71,052	73,320	127,199	503,427
2020	112,890	168,945	79,239	131,007	137,986	630,067
	FX assets	Loans	T-Bills	Reserves	Others	Total
	%	%	%	%	%	%
2008	21.3	28.9	21.9	9.4	18.6	100
2010	15.9	26.4	22.6	13.8	21.2	100
2012	16.9	29.9	18.3	10.9	24.0	100
2014	17.5	32.7	14.5	11.1	24.2	100
2016	15.7	30.9	14.2	14.3	25.0	100
2018	16.0	30.1	14.1	14.6	25.3	100
2020	17.9	26.8	12.6	20.8	21.9	100
AVERAGE	17.3	29.4	16.9	13.6	22.9	100

Source : Bank of Guyana Statistical Bulletin (various years)

* Includes required and excess reserves

** Includes fixed assets and a small amount of loans to state-owned companies

The share of Treasury bills has also declined reflecting the debt ceiling. However, there has been a substantial increase in bank reserves – primarily excess reserves – from 9.4 percent in 2008 to 20.8 percent in 2020, indicating the monetary expansion associated with the negative balance on the government’s account at the BoG.

In closing, the asset composition and bank dominance in the localised FX market allow the central bank policy space to exercise moral suasion over the control of the exchange rate in spite of persistent fiscal deficits and monetary expansion. It is also in the interest of the banks to have a stable currency. These features, then, are the facilitators of QMS. The net foreign assets of the commercial banks are also meant for trade financing and helping long-established customers – who have loans from the banks as well as deposits – for importing critical items such as machinery and fuels.

6. Conclusion

This work drew on insights from Neo-Chartalism to analyse recent monetary developments in an economy with a managed exchange rate. It shows that the government first spends from its central bank account (efflux), following which the central bank conducts one-sided sales of Treasury bills – which we observed declined after 2011 because of a debt ceiling limit. In addition, funds mobilised by the one-sided sales were deposited largely into the Consolidated Fund and a much smaller amount into the Monetary Sterilisation Account, resulting in monetary reflux. However, the debt ceiling restricted reflux compared with government spending from its overdrawn account at the central bank (incomplete reflux), thereby significantly increasing high-powered money – which had limited negative consequences on the exchange rate and rate of inflation.

However, the central bank's stock of international reserves declined substantially during the period of incomplete reflux. This outcome is attributed to the limited one-sided sales of Treasury bills that not only produce reflux but also help to stabilise the domestic foreign exchange market by encouraging dishoarding of foreign currency inside the private sector. Dishoarding likely results because Treasury bills avail the private banks and non-banks with an alternative interest-earning asset in the national currency. It was argued that the one-sided sales of Treasury bills by the central bank on behalf of the government is in keeping with the broad principle of Treasury-central bank coordination in the tradition of MMT. The paper, furthermore, argued that this coordination is crucial for exchange rate management when a country does not satisfy several of the features of a monetarily sovereign government.

The paper also introduced the notion of quasi monetary sovereignty to emphasise that even under a system of managed exchange rates, Treasury-central bank coordination could provide some policy space. However, QMS depends on whether a certain financial structure remains. In particular, there should be limited asset and liability dollarisation, as well as, perhaps, licensed oligopolistic traders of foreign currency in the local market. Far-reaching financial liberalisation and financialisation will most likely constrain monetary sovereignty.

Finally, the government pays the interest cost of the securities by emitting payments from its central bank account, an idea consistent with Guyanese law and embedded in the equation of motion explaining debt accumulation. Therefore, the traditional Domar model of debt accumulation was modified to account for Neo-Chartalist coordination. The debt sustainability condition changes when MMT-style coordination, excess reserves, and the foreign exchange constraint consistent with Thirlwall's law are added in the model.

Two key conclusions can be made from the debt model. First, debt sold by the central bank is relatively more stable compared with those sold by the Treasury – hence, the importance of Treasury-central bank coordination. Second, the slow speed of convergence, or long memory, could be mistaken for unsustainable debt by financial markets. Hence, policy makers may want to communicate that long memory does not mean unsustainable debt.

The model is flexible enough that it can be extended by endogenising external debt and the stock of international reserves in a three-equation system. Ministries of Finance and central banks should find this alternative analysis of debt useful.

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