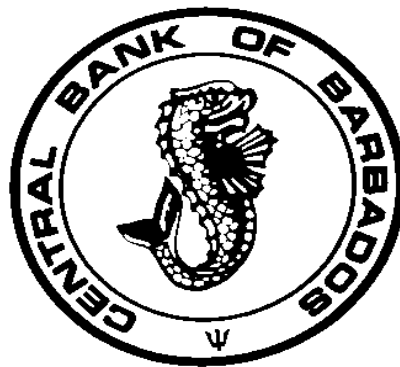


**THE IMPLICATIONS OF MONETARY POLICY SHOCKS FOR
GOVERNMENT DEBT MANAGEMENT IN BARBADOS**

BY

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The Implications of Monetary Policy Shocks for Government

Debt Management in Barbados

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Abstract

Fiscal policy has traditionally been the main means of economic adjustment in Barbados. However, if the monetary policy stance of the authorities is not consistent with fiscal objectives, then monetary shocks can have important implications for debt management. This paper provides a preliminary investigation of how changes in monetary policy have historically impacted on the cost of servicing government debt in Barbados. The findings from this study should be of use to both monetary and fiscal policymakers as well as those managing government debt.

JEL Classification: E52; E60; H63

Key Words: Fixed Exchange Rate; Debt Management; Monetary Policy

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1. Introduction

Monetary policy is the procedure used by monetary authorities (central banks) to control the money supply within an economy. Monetary authorities use three main monetary tools in an attempt to control the money supply: direct interest rate controls, open market operations, reserve requirements, and the discount rate. In most countries, open market operations are the tool most utilised, with reserve requirements and the discount rate acting as supporting monetary tools. In contrast, Barbados has traditionally relied on direct interest controls, supported by changes in reserve requirements, the discount rate as well as moral suasion.

While fiscal policy has a direct impact on debt management, monetary policy can play an important supporting role. The relationship between fiscal policy and debt is on the surface quite direct: if a government runs a fiscal deficit, the government must finance this fiscal shortfall. Deficit financing leads government to borrow and accumulate debt. Once debt has been issued it must be managed.

The government has several options to finance and manage a deficit: monetising, borrowing from the public and/or borrowing from external sources. Monetising occurs when the central bank “prints” money to finance the deficit, but this tend to stimulate domestic demand and can therefore lead to inflationary pressures in floating exchange rate countries or larger current account deficits in fixed exchange rate countries (see Downes and Moore, 2007 for a discussion of this relationship). Domestic borrowing from the public occurs with the issuing of government securities for purchase to domestic economic agents. Borrowing from external sources occurs

when the government borrows from outside of the country to finance the deficit. In many instances, borrowing from the public is more beneficial in managing and financing a deficit because local monetary authorities are in control of the purchase and sale of securities and the interest rates placed on them.

In Barbados, like other Caribbean islands, debt management is a major problem. Gross central government debt has jumped from around \$4.9 billion in 2005 (68 percent of GDP) to almost \$8 billion at the end of June 2010 (or 97 percent of GDP). The management of the nation's debt is the joint responsibility of the Central Bank of Barbados and the Treasury Department. The Central Bank of Barbados deals with the floating of domestic and external securities while the Treasury Department manages Treasury bill issues. The Ministry of Finance is responsible for the general administration of public sector debt. These three organisations are the key players in debt management and financing in Barbados.

There is good reason to think that monetary policy shocks can play an important role in relation to managing debt in Barbados. The island has historically depended on direct interest rate interventions to achieve its monetary policy goals. If these interest rate interventions impact on other interest rates, through the term structure, the cost of servicing government debt could be influenced by these monetary shocks. Many papers have attempted to examine the monetary transmission process in Barbados. For example, Greenidge and McClean (2000) examine the impact of reserve ratios on interest rates in Barbados. Similarly, Moore and Williams (2008) also investigate the interest rate channel of monetary policy, finds that commercial bank credit and deposits tend to only respond 5-10 months after a monetary policy shock. The interest

elasticities were also quite small (less than 1), suggesting that a 1 percent change in interest rates had a less than proportionate impact on both deposits and credit. Samuel and Valderrama (2006) also report that the minimum deposit rate has no statistically significant impact on local bank spreads.

Building on these studies, this paper contributes to the literature by providing an analysis of the potential impact that monetary policy can have on debt management in Barbados. The structure of the paper is as follows. After the introduction, Section 2 provides an overview of the conceptual framework used in the study while Section 3 gives a review of the previous literature in the area. Section 4, presents a statistical assessment of the potential relationship between monetary policy and debt management in Barbados. Section 5 concludes with some policy recommendations.

2. Conceptual Framework

The orthodox view of the government debt begins with the government budget constraint. The government budget constraint suggest that non-interest spending plus interest paid on the national debt should equal tax revenues, bond sales, and changes in the quantity of base money. In essence the model states that government spending must be financed either by tax revenue, bond sales or money creation. The view suggests that monetising to finance the deficit is inflationary and the use of bonds is the best option to finance the government deficit if tax revenues do not meet government spending.

Within this framework, government must accept credit terms determined by the demand and supply for loanable funds. An increase in the government deficit usually leads to an increase in interest rates to create an incentive to lenders. Without an increase in interest rates the government would have to resort to monetising to finance the deficit. Real economic forces set real interest rates and the nominal interest rate is determined once expected inflation is explained.

Several empirical studies in the area were done to test the validity of the orthodox view, however, the results found do not support the predictions of this orthodox view (Engen and Hubbard, 2004). This assessment was made after numerous regressions of current (*ex ante*) real interest rates on current fiscal variables were done, the variable proved to be statistically insignificant with real and nominal rates. Even though these empirical studies have proved the theory incorrect, the orthodoxy argues that the studies do not take into account expectations of the variables; therefore there is no sound evidence to disprove the orthodox view (Gale and Orszag, 2004).

As an alternative to the orthodox view, some authors have proposed a so-called non-traditional approach (Blanchard et al. 1990). The intertemporal budget constraint used by Blanchard to analyse the relationship between the change in the nominal value of the debt held by the non-government sector equal the current primary deficit and the interest paid on the nominal value of the debt held by the non-government sector. Gokhale and Smetters (2003) further modify the Blanchard constraint to create a new budget constraint using publicly held debt plus the present

value of projected non-interest spending is equal to the present value of projected government receipts. According to the constraint, the fiscal deficit has an impact on interest rates because as the deficit changes the interest rates change in order to compensate for the deficit. The non-traditional view of the impact of the fiscal deficit on interest rates is similarly to the orthodox view. The non-traditional view is that increases in the fiscal deficit cause a far greater increase in interest rates than in the orthodox view. This occurs according to Ferguson and Kotlikoff (2003) if investors and traders in government bonds anticipate the growing fiscal imbalance in government's fiscal policy, they will sell government bonds.

In conjunction with interest rates the reserve requirement is necessary to manage the government deficit. For example the central bank requires a large percent of the national debt be held as reserve balances and a large percent of the national debt be held as government securities by the non-government sector, using their interest rate maintenance method. Unlike the orthodox view the central bank uses bond sales to maintain the interest rate and not to finance the deficit. Monetising to finance the deficit in the way the orthodoxy proposes, by the use of the government budget constraint is not possible. It is not possible if central banks choose to target interest rates because monetising places pressure on the interest rate and to maintain the interest rate at some desired level, bonds will have to be sold. Therefore monetising is not as inflationary as thought by the orthodoxy. In contrast to the orthodox view, the interest rate on national debt is more so a monetary phenomenon rather than a fiscal one.

The interest rate paid on debt is set by the stance of the monetary policy. This occurs because the central bank can use the sale of treasury bonds and securities to manipulate the interest rate.

In essence the orthodoxy believe that fiscal sustainability has to do with whether the combination of debt and interest will create unbounded increases in interest payments, which eventually lead to rising inflation or default on the government's obligations in order to avoid inflation. The view that debt monetisation impacts monetary policy does not function in a world under a modern monetary regime where interest rates are the main focus of central banks.

3. Literature Review

Brockie (1954) was one of the earliest studies to investigate the relationship between debt and monetary policy. The study argues that debt management must be coordinated with credit and monetary policy. Looking at the three traditional tools used by central banks, open market operations, regulated discount rates and regulated reserves, Brockie notes that each one can impact on some aspect of debt management. Open market operations for example indirectly influence the interest rates and can impact on the cost of government's debt obligations. Moreover as changes in interest rates, through the monetary policy transmission mechanism impacts on the demand for credit, there could be further effects on the yields from government debt auctions.

Beard and McMillin (1986) analyse the effects of government budgets and the conduct of monetary policy. The analysis is based upon the theoretical premise that debt monetising occurs to finance the deficit only if fiscal and monetary authorities are coordinated. A reaction function for the Federal Reserve was formulated where the monetary aggregate which is assumed to be controlled by the Federal Reserve, was expressed as a function of last period's stock of money;

unemployment or the gap between real output and real potential output, inflation, interest rates, the fiscal deficit, and other controlled variables such as the balance of payments or other international variables. Beard and McMillin do find some relationship between deficits and money but how the monetary authorities react to deficits is indeterminate because no specific model can be formulated to include variables such as political factors and the self-interest of bureaucrats. For example, The Fed makes decision based on several concerns that they may deem important at the time, such as interest rates, deficits, macroeconomic stability and political factors. There is no definite pattern of monetary authorities' behaviour to deficits.

Scott et al (2008) focused on the execution of monetary policy through the instrument of open market operation: the correlation between that instrument and government debt. The Federal Reserve's open market operations directly affect the yields on government securities, and inadvertently affect the federal funds rate by its effects on the commercial bank reserve positions. Outstanding debt constrains monetary policy conduct through open market operations: if outstanding debt is smaller than the private and public demands monetary policy is less effective. Norton (1969) in an analysis of the United Kingdom, seeks to determine if government securities have a significant impact on the interest rate. Norton argues that the monetary authorities have to predict the public's reaction to changes in interest rates and the selling of government bonds and securities in order to affect debt management. Models were created for the expected interest rates based on Keynesian normal-rate hypothesis¹ and the

¹ This hypothesis assumes that investors have a normal level of interest rates in mind towards which they expect rates to move. When current rates are greater than the normal rate investors are said to expect interest rates to fall, and vice-versa.

Duesenberry's² critical reaction to the Keynesian theory. Equations were specified for the public's demand and banks' demand for government securities. These equations were used to test the hypothesis that government securities impact on the interest rate. The results suggest that the authorities should use government securities as a policy instrument to impact upon the interest rate. It was also found that open market operations are not as effective as the use of special deposits in restricting the level of advances in the banking industry to achieve debt targets. The authorities managing government securities must focus on the impact their policies have on the interest rate in order to manage debt efficiently.

In conjunction with open market operations, the interest rate and adjustments made must be monitored. Monitoring interest rates provides a basis on how to set policy measures to aid in debt management. Wolswijk and Haan (2006) main purpose was to assess the changes in debt managers' strategies considering changes in the work environment in Europe. Wolswijk and Haan narrowed the scope of debt managers' strategies to the manipulation of maturities. Maturities are manipulated through open market operations. To cope with the changing work environment debt managers created targets for the level of maturities to keep debt under control. Wolswijk and Haan noticed the authorities changed their strategies to keep maturities under control by focusing on maturity of debt, debt dominated in foreign currency, the use of interest rate swaps, inflation-indexed bonds, and issuing methods. Wolswijk and Haan analysed "innovative" products such as interest rate swaps and inflation-indexed bonds. For example, interest rate swaps government receives the long-term interest rate from the counter-party and

² He argues that on a priori grounds there is no reason why the (Keynesian) argument should not be turned just the other way. In many fields, trend projection seems to be the dominant influence on expectation. It would not, therefore, be surprising if it turned out that a rise in rates led to an expectation of a further rise in rates and vice-versa

pays short-term interest rates. Debt management in Europe has been primarily focused on the bond market and using bonds to create changes in demand for debt. It was concluded that the use of “innovative” products created more flexibility in debt management and provided for portfolio diversification.

Changes in interest rates do not only impact debt through open market operations but also through the exchange rate. Eijffinger and Goderis (2008) conducted empirical analyses on the impact of monetary policy on exchange rates during currency crises and the role debt plays. Four different types of economies were considered; countries: (1) with high domestic corporate short-term debt; (2) with high-quality institutions; (3) with high external debt and; (4) with few capital account restrictions. Eijffinger and Goderis find that raising the interest rate has larger adverse balance sheet effects and is therefore less effective in countries with high domestic corporate short-term debt. In both high quality institution and high external debt countries, increasing the interest rate is more credible and effective. In contrast, interest rate increases in countries with few capital account restrictions is less effective.

Monetary policy cannot be effective without sound fiscal policy. There must be coordination between the two authorities when making decisions on debt. IMF (2001) guidelines for public debt management declare that fiscal and monetary policy need to be coordinated in order to foster an environment to allow these policy measures to have a greater impact upon debt management. Monetary policy and debt management policy should have clear roles and objectives to reduce conflict between the two, allowing monetary policy to have a greater impact on debt. Also, there must be sharing of information between fiscal and monetary authorities to maximise the effects of monetary and fiscal policy measures on debt.

In theory, monetary policy and fiscal policy need to be coordinated. For optimal monetary and fiscal policy it is important to determine both which, and when, policy measures should be enacted. Game theory has been used to analyse fiscal and monetary policy interactions. Tabellini and La Via (1989) theoretically analyse the results of fiscal deficits depend on the expected impact the deficit has on potential fiscal and monetary policy. A two-stage dynamic game was used to determine interactions between monetary and fiscal policy on debt. In the first stage of the game the authorities are allowed to choose their optimal policy instruments and public debt. In the second stage, the authorities are restricted by a budget constraint. Two parameters λ and π were used to expose the attitudes of policy maker to stabilisation of public debt. In the analysis if $\pi \rightarrow 0$ and λ is large and positive monetary policy is dominant, if $\lambda \rightarrow 0$ and π is large and positive fiscal policy is dominant. In this game players have symmetric information, and move simultaneously (as Nash players). It was found that in the US stabilisation of debt fell on the fiscal authorities during the period of 1955-1985 instead of the monetary authorities as previously thought. Monetary policy has not been a major factor in debt stabilisation in the US.

Tabellini and La Via pinpoint which policy measure debt falls upon but do not expand on the interaction between monetary and fiscal policy and how to maximise the effects of policy on debt. Hallett (2008) focuses on the interrelationship between monetary and fiscal policy, and implications the relationship on debt. Independent monetary policy becomes ineffective with incompetent fiscal policy. Hallett argues that independent monetary policy is meant for stabilization and consistency of long-term fiscal policy. Fiscal policy possesses automatic

stabilizers; implying monetary policy has to be formulated according to the fiscal stance at each point. With the use of a two stage non-cooperative game, where in the first stage the government chooses the institutional parameter. In the second stage, a Stackelberg game in which fiscal policy takes on a leadership role, where both monetary authorities and government set their policy instruments. Hallet found that interactions between an independent Central Bank and government would lead to non-cooperative outcomes, but if government has long-term goals both parties can gain without relinquishing any independence. It was also found that granting leadership to the Central Bank could not significantly influence debt. He concludes that fiscal leadership leads to better outcomes without the Central Bank losing its ability to act independently. In a later study, Bartolomeo and Gioacchino use four two stage games to determine the effects of fiscal-monetary policy coordination and their effects on debt. Using Nash equilibrium where both fiscal and monetary policymakers make decisions simultaneously, debt is lower. In the Stackelberg model, if the Central Bank sees debt as more important than the government, under the fiscal leadership model monetary policy is more effective in lowering debt than in the monetary leadership model. In the warfare model, where both policymakers fight for leadership debt is much higher and neither policy measures are very effective in debt reduction. They found that debt is best managed with the Nash equilibrium model and monetary policy is most effective under this model.

Even though monetary and fiscal policies should be linked, monetary authorities should exercise judgment and not succumb to political pressure when making decisions on debt management. Malpass (2007) assesses the impact of the United States growing fiscal deterioration upon monetary policy and the Fed's reaction to fiscal imbalance. The study argues that fiscal policy

should focus on issues such as taxation while monetary policy should aim to achieve various inflation and interest rate targets. Malpass analyses debt trends and projections in the US to determine how a growing fiscal imbalance would likely impact on monetary policy. Malpass projects long term government spending and revenues at three levels, low, high and intermediate. Malpass uses these projections to link fiscal authorities' actions to monetary policy targets. Malpass recognises as the Fed faces political pressure, it becomes difficult for the Fed to execute efficient monetary policy considering what political powers desire. The Fed has to, in their decision-making, include the political process. Inclusion of the political process provides a way for the Fed to make better predictions about debt. He argues even though the political process is important, the Fed should not succumb to political pressure and focus on executing effective monetary policy. He concludes US monetary policy should be used to influence interest rates and keep inflation low to strengthen the US dollar to keep fiscal stability.

Printing money is one of the policies used by monetary authorities to finance debt on request by fiscal authorities. Printing money requires high levels of interaction between fiscal and monetary authorities. Fraser (2000) recognises the impact monetary and fiscal policy can have on debt sustainability. The relationship between money and debt is obtained from resolve that "the net borrowing need of government is a factor influencing the money supply, and changes might reasonably be thought of as monetary policy, even though they may have resulted from changes in taxation" [Coghlan, 1981]. Using an Overlapping Generations Model (OLG) to formulate a dynamic budget constraint, Fraser assesses the relation between debt, interest rate and seignorage. Interest rates and seignorage significantly impact on debt. They have a significant impact because interest rates through the market changes public demand for credit and

seignorage directly finances the deficit. It was found that in the Bahamas through interest rates and seignorage that debt can be sustained and provide an environment for growth. Interest rates are the causal link between fiscal and monetary management. Fiscal consistency and harmonization of growth factors and monetary policy are necessary for effective debt management.

Many developing countries have attempted to use monetary policy to stabilise debt. Correa (2001) looks at the case of Colombia: the country had relatively high debt ratios and relatively high monetary policy aimed at addressing inflation concerns. The paper is aimed at examining the relationship between public debt policy and monetary policy in Colombia. In an attempt to correct the fiscal disequilibrium; the country tightened monetary policy, followed by nominal exchange rate deductions, loose monetary policy and finally exchange rate liberalisation. Despite monetary policy changes debt still continued to accumulate. Their use of direct monetary policy through open market operations failed to reduce the fiscal deficit. It was stated that the indirect approach to monetary policy used by industrialised nations proved to be more effective than the direct approach. Though Colombia had stringent monetary policy it was ineffective because it lacked depth and the ability to significantly increase liquidity in the public debt market. It was found that Colombia should not have allowed debt to accumulate. They need a more comprehensive capital market, transparent and clear debt management strategies that must be coordinated with monetary policy.

Colombia had stringent monetary policy and it was not successful in aiding their debt problem but stringent monetary policy is not always a bad thing. Jensen (2002) in Denmark the use of monetary policy to control government is paramount. It is paramount because of Danish and

European Union legislation and rules; therefore Denmark's Nationalbank has to use monetary policy to bring about changes in debt. Since 1991 Denmark's National Bank had control of central government debt and has been efficient in carrying out its duties. Denmark has been successful in using monetary policy to manage its debt at desired levels through manipulation of open market operations, the interest rate and the exchange rate. Denmark has prohibited state owned and state guaranteed entities that sold kroner against euro forcing the central bank to raise interest rates. Those institutions are no longer allowed to undertake transactions that are inconsistent with Danish monetary policy. With these prohibitions the central bank can use the interest rate to manage debt through the market. Denmark's policy makers use fiscal policy to maintain their fixed exchange rate for debt sustainability if needed. With strong support for the exchange rate by policymakers, Denmark has been able to manage their debt through exchange rate policy. The Danish experience illustrates how monetary policy is to be structured. Brazil another developing country was successful when using monetary policy to aid their debt problems unlike Colombia. Garcia (2002) analyses the effect of Brazilian monetary policy and public debt management. In Brazil, after the years of hyperinflation, monetary policy was the major driving force behind debt management. Brazil through the use of two monetary tools, the reserve requirement and open market operations were able to impact upon debt management in a significant way. Through the hyperinflation years, Brazil used currency substitutes to combat inflation. The monetary authorities were constrained to provide positive and stable interest rates. The interest rate policies aided debt management. Reserves were raised to reduce any increase in money demand because of the high inflation. Open market operations were used to control liquidity by selling bonds and buying bonds to reduce and increase excess liquidity to clear the market for bank reserves. Manipulation of the bond market and reserves changed the demand for

debt within Brazil. These changes in demand for debt change the public debt position of the country. Brazil manipulated these monetary tools while monitoring markets changes to enact the correct policy measures at the correct time. For monetary policy to be effective in debt management, it must be structured for the economic climate of the country.

It is imperative when using monetary policy for debt management, it be fashioned for the exchange rate of a country. Many developing countries have fixed exchange rates, which makes finding an optimal monetary policy difficult. Monetary policy must be strategically designed for a fixed exchange rate regime. Egypt is a developing country that has been able to formulate effective monetary policy under a fixed exchange rate regime. Al-mashat (2000) focusing on the correlation between Egyptian monetary policy and public debt management under a fixed exchange rate regime found that monetary policy plays an important role along with fiscal policy when using domestic debt to sterilize capital inflows. Monetary policy in Egypt was executed through open market operations. Debt management and monetary policy in the Egyptian case worked in tandem to create an environment to sterilise capital inflows and maintain the exchange rate peg.

Monetary policy has also played an important in role in debt management throughout the CARICOM region. According to Caldentey (2007) it is important to understand the origins of debt in CARICOM and the implications they have on regional growth and development. The author makes the case that debt within the region is largely driven by external factors. This was found based on empirical analysis of the government fiscal balance and the external sector's fiscal balance. The two balances are supposed to be in equilibrium: if they are imbalances, they

are usually financed via debt accumulation. Caldentey argues that due to debt accumulation, debt management becomes the main focus of economic policy. Monetary policy has been fashioned according to fiscal policy needs. Monetary authorities have to intervene when government cannot reach their fiscal targets to maintain currency stability. Monetary policy has become important in debt management, whereby exchange rate depreciations occur with reductions in monetary policy once enough reserves are present to guarantee the credibility of the policy.

In the case of Barbados, Williams (2001) focusing on the role the Central Bank of Barbados plays in debt management through managing the reserve requirement, liquidity and pricing securities. In an analysis of the period 1973 –1993, Williams noted that monetary policy tools used by the Central Bank of Barbados have had a significant impact in the market, allowing them to affect debt management. Policies such as increasing the required reserves and government securities were used to control liquidity therefore causing changes in government debt. The use of monetary policy in debt management has been effective in Barbados. In Barbados government securities are used to change credit preferences in the market. For example, the Central Bank attempted to bid up yields on treasury bills to encourage a shift into bills and out of credit thereby indirectly financing the government deficit. An assessment of the optimal reserve requirement was done by regression analysis. The impact of the balance on external account, commercial bank credit net of government, GDP, prices, money supply, interest rates and the fiscal deficit on the reserve requirements were determined. It was found that there is a strong relationship between the monetary authorities' decision to use reserve requirements and the fiscal

deficit. Due to this strong relationship, monetary authorities in Barbados use the fiscal deficit as a gauge to determine changes monetary policy to maintain a certain debt level.

The impact of monetary policy on debt is very significant. The literature has analysed the many effects that monetary policy has on debt. Debt cannot be successfully managed without some form of monetary intervention. Monetary and fiscal authorities must cooperate in order to maximise the effects of fiscal and monetary policy measures on debt management. Without sound policies effective management of debt can only be an afterthought.

4. The Implications of Monetary Policy for Debt Management in Barbados

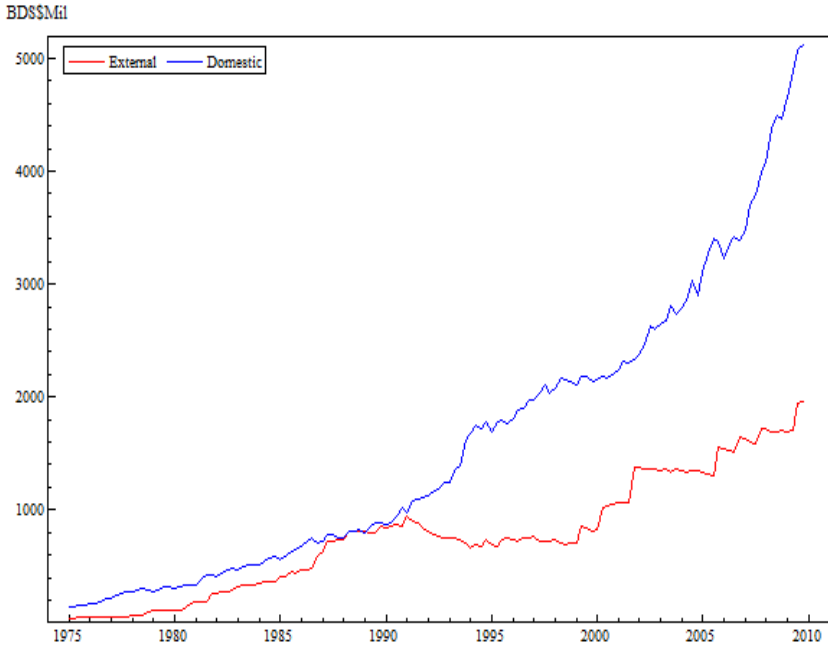
4.1 Key Debt Trends

The data set for this paper includes both quarterly and annual data for debt and monetary policy in Barbados from the years 1975 to 2009 from the Annual Statistical Digest and Economic Financial Statistics. Trends in debt and monetary policy are analysed and explained. To analyse the trends in the data, time series plots were created for each variable. Descriptive statistics of the debt variables have been included in Appendix 1.

Total debt in Barbados increased steadily between 1975 and 2004. Overall debt rose from \$186.11 million to \$4.2 billion by 2004. After 2005, however, total debt started to increase at a much faster rate than previous years, primarily due to a significant increase in the amount of domestic debt issued. In just five years, internal debt jumped from \$2.9 billion to \$5.1 billion. As a result, total national debt by the end of the review period was estimated at \$7.1 billion.

While total domestic debt has traditionally been larger than external debt, it was only after the recession of the 1990s that the finance obtained from these two sources diverged significantly (Figure 1). Consequently, the difference between domestic and external debt jumped from virtually zero in 1988 to almost \$1.5 billion at the end of 2004, and \$3.2 billion by 2009.

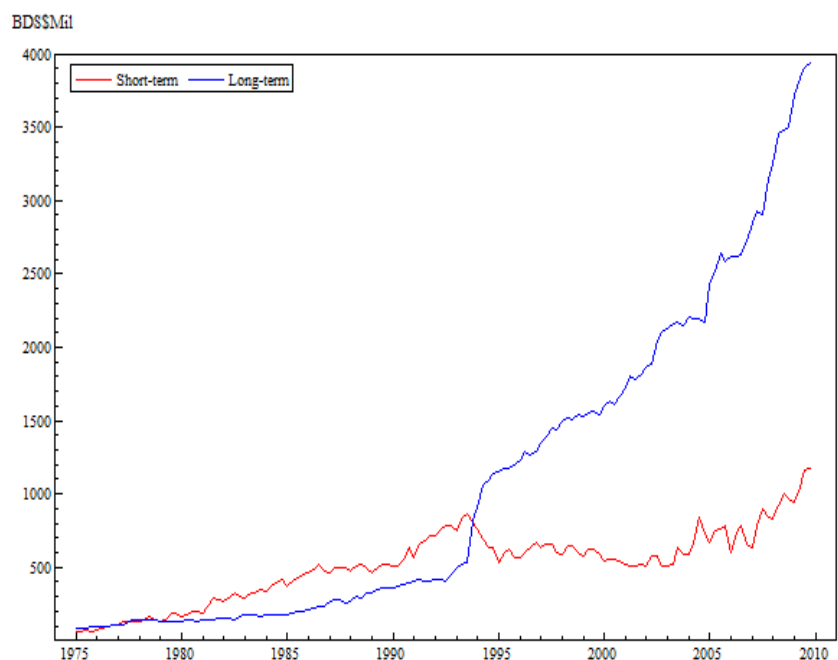
Figure 1: Domestic and External Debt (1975-2009)



Total external debt has been rising over the years. At the beginning of the period, external debt was \$42.3 million, reaching \$1964.66 million at the end of the period. External debt rose significantly during the period of the early 1990s, but then fell significantly during the structural adjustment programme of this period, the final payment of a Japanese Bond in 1992 and government policy to repay loans rather than continue external borrowing. Total external debt, however, began to rise significantly again from 2000, as authorities attempted to shore-up

the international reserves of the nation. In general, most of the debt held by the government tends to be long-term (Figure 2).

Figure 2: Short and Long-term Debt (1975-2009)

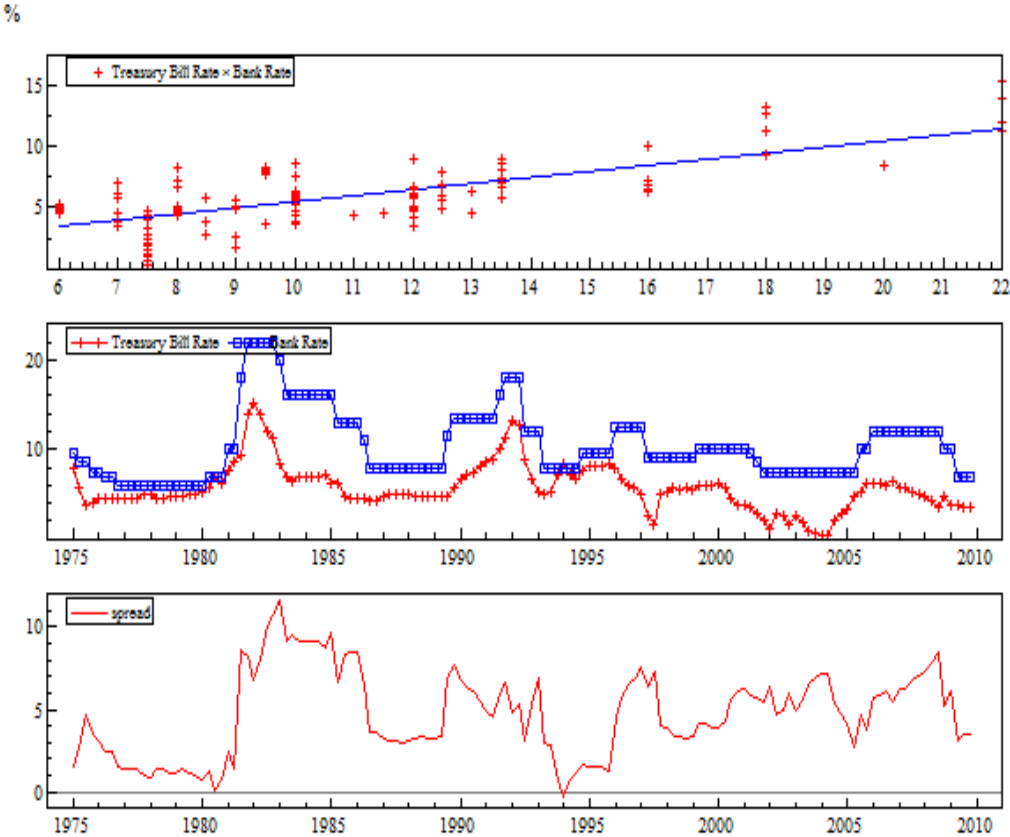


4.2 Monetary Policy and the Cost of Servicing Government Debt

Given the significant build-up in debt experienced in recent years, debt service payments will be a key issue in future years. As a result, this study provides an assessment of the possible impact of changes in monetary policy on debt service payments. Figure 3 therefore plots the relationship between Treasury bill rates and the Bank rate – the cost of commercial bank borrowing from the Central Bank of Barbados. Some relationship is shown between the two variables. Even though both rates represent short-term borrowing rates, the Bank rate exceeded

the Treasury bill rate over the review period: the spread between the two tends to be around 5 percentage points. While no causality is implied, the cross-plot provided in Figure 3, does suggest that there is positive association between the two variables: increases in the Bank rate tend to be positively correlated with rises in the Treasury bill rate.

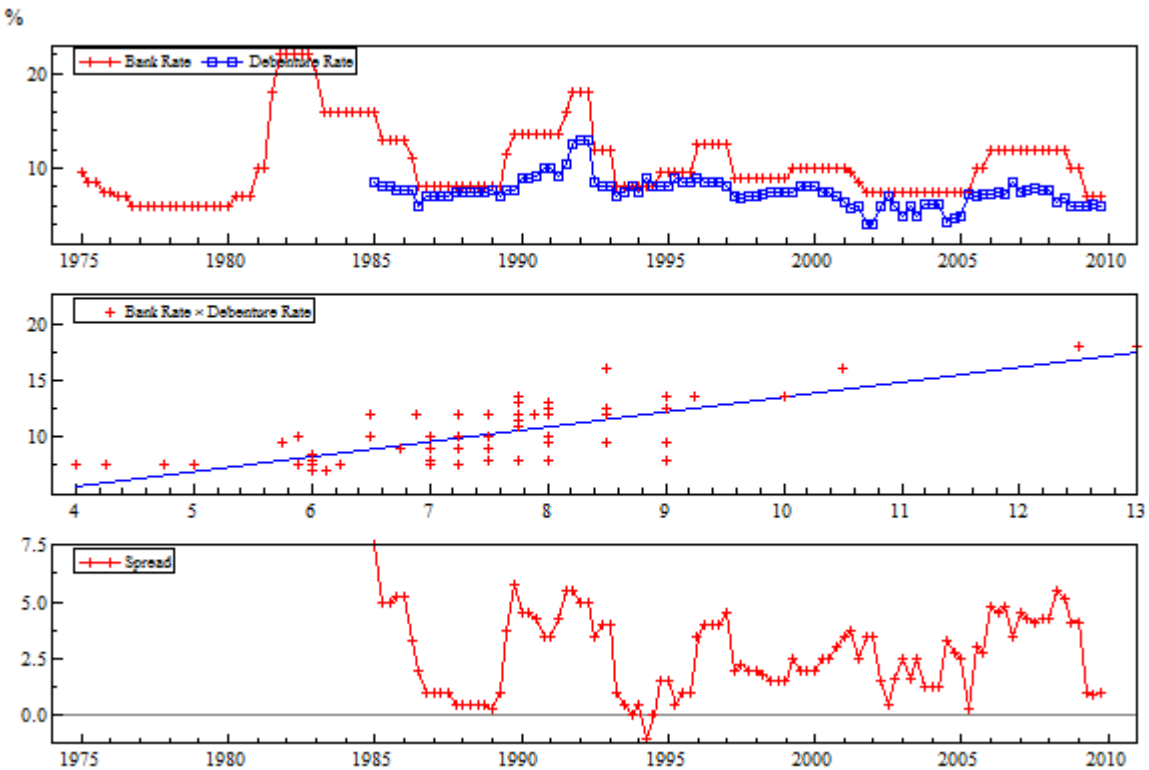
Figure 3: Treasury Bill and Bank Rate (1975-2009)



At the longer end of the term structure, Figure 4 suggests that there is also a positive association between the Debenture rate and the Bank rate. Indeed the correlation between the Bank rate and Debenture rate, represented by the regression line, was 0.78 or about 10 percentage points higher than the correlation between the Bank rate and the Treasury bill rate. On average, the spread

between the two rates tends to be between 3 and 5 percent, somewhat less than the spread between the Treasury bill rate and the Bank rate.

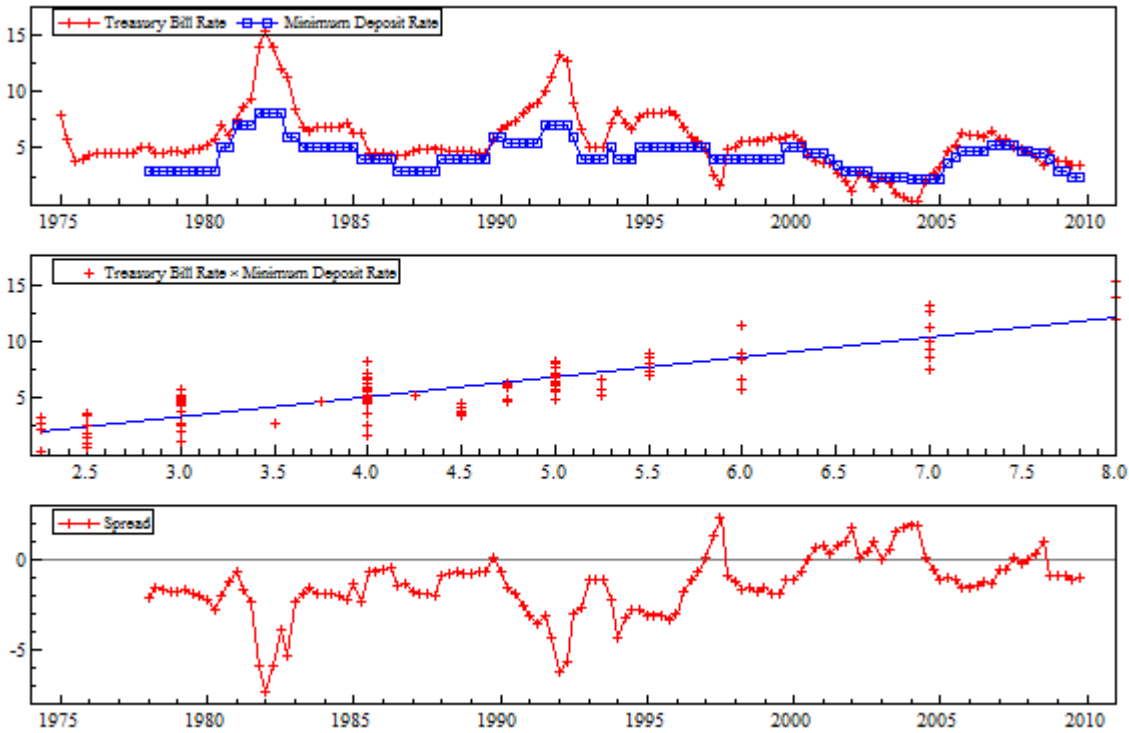
Figure 4: Debenture Rate and Bank Rate (1975-2009)



There is also a close relationship between the Treasury bill and the Central Bank of Barbados' other monetary policy tool: the minimum savings deposit rate. Figure 5 plots the relationship between the two variables. The diagram seems to suggest that the association between the Treasury bill rate and minimum savings deposit rate is even stronger than that for the Bank rate. Indeed, over the review period the correlation ratio was estimated at 0.84 compared to 0.68 if the Bank rate is used. With regards to the spread, the Treasury bill rate prior to 1997 exceeded the minimum savings deposit rate by between 2-3 percentage points. After this period, however, the

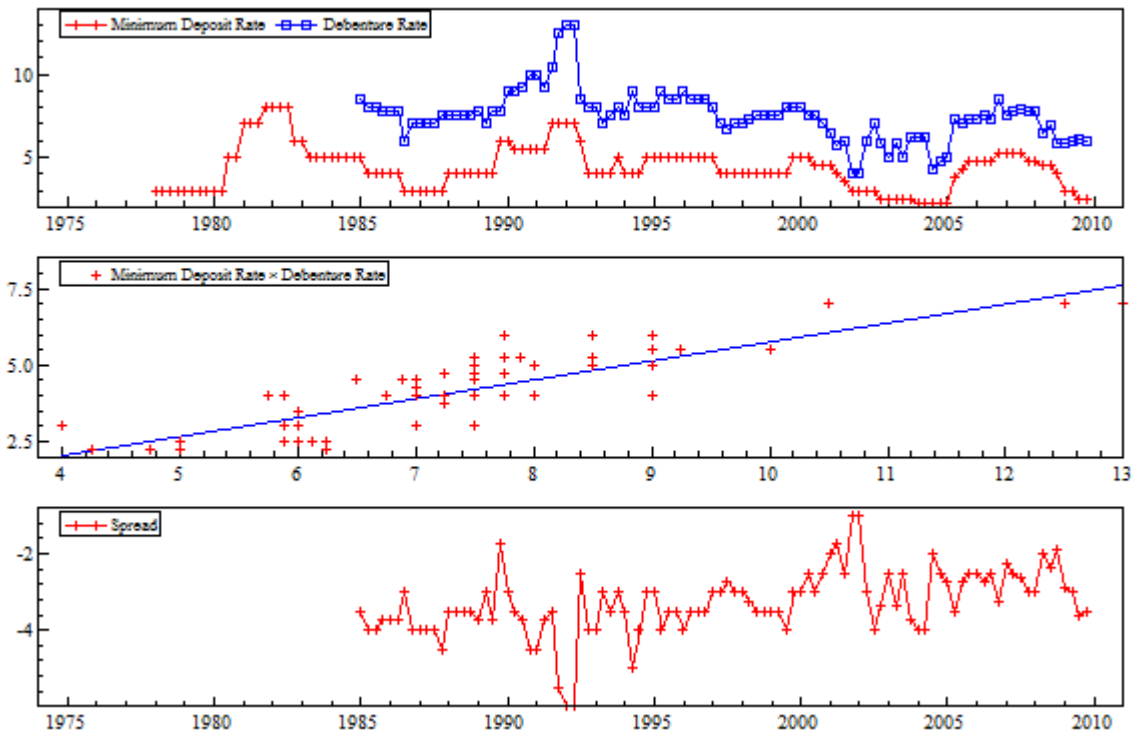
association between the two variables seems to have strengthened with the minimum deposit rate actually exceeding the Treasury bill rate on several occasions.

Figure 5: Treasury Bill Rate and Minimum Deposit Rate (1975-2009)



The association between the debenture and the minimum savings deposit rate is also quite strong. The correlation ratio between the two variables was 0.85, even higher than the measure of association between the Treasury bill rate and the minimum savings deposit rate. Unlike the Treasury bill rate, however, the Debenture rate exceeds the minimum savings deposit rate through the entire review period, with the spread fluctuating between 2 and 4 percentage points.

Figure 6: Debenture Rate and Minimum Deposit Rate (1975-2009)



4.3 *Monetary Policy Shocks and the Cost of Servicing Government Debt*

The previous section provided an initial assessment of the association between monetary policy and the cost of servicing government debt. However, the basic framework did not provide an assessment of whether or not changes in monetary policy instruments were leading or lagging predictors of key interest rates, whether or not these monetary policy shocks were statistically significant and the time it takes for monetary policy to impact on interest rates on government paper. In this study, the monetary policy variable is leading (lagging) if the maximum absolute cross-correlation value corresponds to a lag (lead) of the variable relative to contemporaneous interest rate on government paper. The series would be defined as synchronous if the maximum

absolute value is the contemporaneous correlation. A maximum of 36 lags is used in the cross-correlation analysis and asymptotically consistent approximations are estimated.

The statistical importance of monetary policy rates can be assessed by estimating a bi-variate vector autoregressive (VAR) model. If the lags of the monetary policy variable were jointly significant, then this would suggest that monetary policy shocks are statistically important determinants of the future trends in interest rate on government debt. Finally, the speed of this relationship is assessed using impulse response function analysis. The optimal lag length for each VAR is set at 8, and the optimal length is then chosen using the Hannan and Quinn criterion. Generalised impulses are used to derive the decomposition and asymptotic standard errors are provided.

The cross correlation as well as an evaluation of the statistical significance of lagged monetary policy variables are provided in Table 1. The results suggest that the minimum deposit rate is highly synchronised with changes in both the Treasury bill rate and the Debenture rate. On the other hand, changes in the bank rate tend to lag behind both the Treasury bill rate and the Debenture rate. For both the bank and minimum deposit rate, the cross-correlation coefficient tends to be fairly high, above 0.5. With regards to the statistical significance of this relationship, the final column of the table provides the chi-square statistic, where the null hypothesis that the lags of the monetary policy variable can be set to zero in a bi-variate VAR. The results, suggests that the null hypothesis could not be accepted at normal levels of testing for any of the four relationships examined.

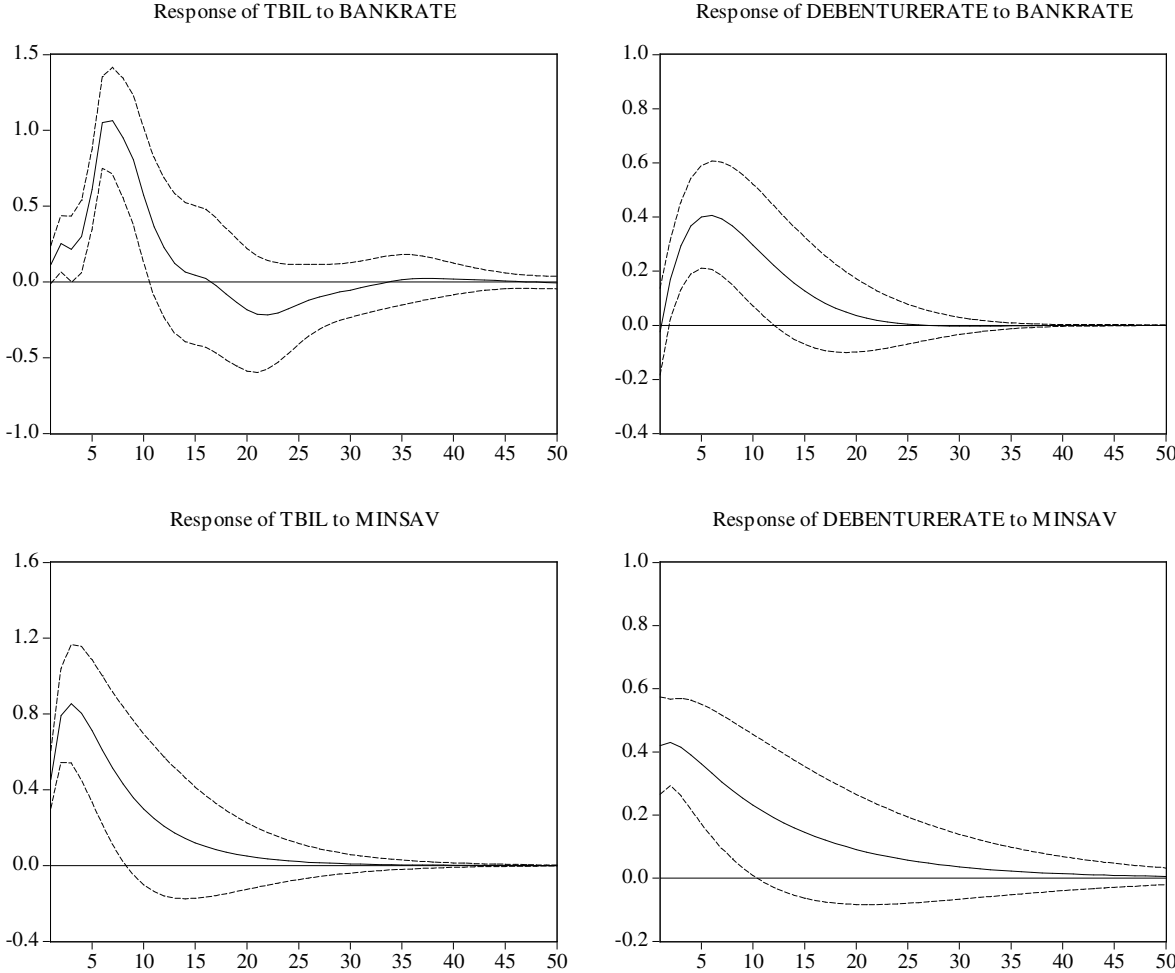
Table 1: Assessment of the Dynamic Association between Interest Rates on Government Paper and Monetary Policy Shocks

	Direction	Cross-Correlation Coefficient	Lead/lag	Chi-square statistic of lagged monetary terms
Treasury bill rate/bank rate	lag	0.720	3	75.303 [0.000]
Debenture rate/bank rate	lag	0.765	4	19.058 [0.000]
Treasury bill rate/minimum deposit rate	synchronous	0.865	0	8.388 [0.015]
Debenture rate/minimum deposit rate	synchronous	0.842	0	5.174 [0.022]

With regards to the speed with which monetary policy shocks are propagated to interest rates on government paper, Figure 7 provides impulse response functions obtained from bi-variate VARs. As suggested, by the cross-correlation coefficient, a shock to the minimum savings deposit rate has an almost immediate impact on the Treasury bill rate, while it takes 7 quarters for the full impact of changes in the Bank rate to be felt in the Treasury bill market. Some overshooting is detected in both markets, with a 1 percent increase in the Bank rate, leading to a 1.5 percent rise in the Treasury bill rate, while a 1 percent rise in the minimum deposit rate results in 1.2 percent increase in the Treasury bill rate. These effects tend to dissipate after about 25 quarters in the case of the minimum deposit rate and about 35 quarters for the Bank rate.

In the case of the Debenture rate, again, changes in the minimum savings deposit rate have an almost immediate impact, while it takes about 5 quarters for the full effect of changes in the Bank rate to be observed in the Debenture market. In this instance, the shocks to the Bank rate tend to dissipate significantly faster than minimum deposit rate shocks.

Figure 7: Response of Treasury and Debenture Rates to Monetary Policy Shocks



5. Conclusion

Monetary policy in Barbados is primarily enacted through interest rate controls. As a result, monetary policy shocks could have potentially important implications for debt management. This study provides an assessment of the relationship between the cost of servicing government's debt and monetary policy in Barbados. The results suggest that there tends to be a strong positive association between the interest rate on government paper and those rates set by the Central Bank of Barbados. As a result, negative monetary policy shocks could significantly increase the cost of servicing government debt. The minimum deposit rate seems to have the highest correlation with interest rates on government paper. Indeed, the cross-correlation ratios reported in the study suggest that the relationship is asymptotically synchronous, i.e. shocks to the minimum deposit rate have an almost immediate impact on the interest rate obtained on government paper. Given that monetary policy shocks could potentially have important implications for the cost of managing government debt, it is important that fiscal and monetary authorities work together in order to coordinate future changes in economic policy.

Appendix

<i>Short Term Debt</i>	
Mean	515.5916143
Standard Deviation	245.4975793
Minimum	62.042
Maximum	1178.055

<i>Long Term Debt</i>	
Mean	1074.432736
Standard Deviation	1069.262486
Minimum	79.7
Maximum	3942.398

<i>Total Internal Debt</i>	
Mean	1590.02435
Standard Deviation	1264.250254
Minimum	143.816
Maximum	5120.453

<i>Total External Debt</i>	
Mean	765.1254071
Standard Deviation	510.5064863
Minimum	42.296
Maximum	1964.657

<i>Total Debt</i>	
Mean	2355.149757
Standard Deviation	1749.687641
Minimum	186.112
Maximum	7085.11

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