CENTRALE BANK VAN SURINAME

The Feasibility of Open Market Operations in Suriname:

The pass-through of the policy interest rate

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Abstract

Central banks around the world set monetary policy and use monetary policy instruments to effectively improve the economy, whether to take the pressure off an overheated economy or to set policies for its expansion. According to theory and lessons learned, indirect monetary policy instruments are more effective than direct instruments in the implementation of monetary policy. This paper examines the pass-through of the policy interest rate for the Surinamese economy in the period 2008 -2013 in order to determine whether open market operations can be used as a monetary policy tool. Time series data are analyzed to determine the interest rate channel in Suriname. To empirically test this interest rate channel a vector autoregressive model is employed. The main conclusion of the study is that there is some scope for open market operations in Suriname.

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1. Introduction

Since the 1990s there has been a shift towards implementation of indirect monetary policy instruments by central banks. This shift is the result of the evolution of financial sector markets and the ineffectiveness of direct instruments in liberalized economy (Caprio and Honohan, 1990; Alexander *et al.*, 1996). Central banks attempt to manage real sector variables, through financial sector variables, such as the interest rates and the exchange rate, to affect the economy. As a country's markets expand, however, control of the financial sector becomes weak (Caprio & Honohan, 1990). This fact has been underscored by the worldwide financial crisis of 2007.

According to monetary theory, indirect monetary policy tools offer great flexibility and effectiveness in the conduct of monetary policy (Axilrod, 1996). It is flexible in terms of timing and transaction volume when compared to alternative monetary policy instruments. It also can be implemented in a step- by- step manner, which makes it easier to modify and reverse. There are different types of indirect instruments[1] of which open market operations (OMOs is the most actively and widely used. OMOs tend to offer a direct way to counteract the credit contraction or expansion created by, inter alia, the financial sector (Axilrod S., 1996). It also creates opportunities for the government to borrow from the domestic money and capital market under similar conditions as other sectors. Therefore, it enables the government to refrain from monetization of fiscal deficits and facilitates government's borrowing at market-determined interest rates.

Based on the fundamental advantages of OMOs as indirect tool Suriname has the intention to switch to the conduct of this instrument as a primary monetary policy instrument. Suriname is part of a globalized world and managing the quantity of credit, which is the policy target of the Central Bank of Suriname (CBvS), becomes difficult. The globalized world creates opportunities for individuals to circumvent the regulations. Also the increased government borrowing has mostly, especially during periods where government borrowing originated from the CBvS, impeded the economic process. OMOs, therefore, enables the government to raise resources from the market in a cost-effective manner with due recognition to the associated risks[2]. The feasibility of the implementation of this monetary policy instrument in Suriname should therefore be examined.

The implementation of OMOs has been assessed from different perspectives. Some research focused on bank liquidity which attempts to assess the excess reserves and excess liquid assets in the banking system. The level of liquidity in the banking system can be influenced through implementation of OMOs (Khemraj, 2007; Jordan *et al.*, 2012; Mahmoudi, 2012). Another area of concentration is on economic agents such as businesses

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[1] Reserve requirements, open-market operations, central bank lending facilities ,deposits management
[2] Monetary expansion, inflation, low economic growth

and households, as end receivers of central bank actions (Williamson, 2005). It is through the expenditures and savings of economic agents that enables an increase or reduction of liquidity in the market. Another strand of research has concentrated on the transmission mechanism that investigates the channels[3] through which monetary policy measure impacts the economy. Out of these, the interest rate channel has been widely used (see for example Robinson & Robinson, 1997; Burkhard & Schabert, 2000; Rodolfo & Manfred, 2008; Morais, 2008; Mishra, Montiel & Spilimbergo, 2012; Saborowski & Weber, 2013). The interest rate channel explains how movements in the short-run interest rate, which is indirectly influenced by the monetary authority, affect real sector variables.

The aim of this paper is to investigate the feasibility of open market operations in Suriname using the interest rate channel approach. Among the different approaches to investigate OMOs, this paper focusses on the interest rate channel because it is the depository institutions (commercial banks) interest rates that investors use to determine their decisions. The other channels are data intensive and therefore excluded. Another argument for the use of the interest rate is that it is the most used approach in particularly developing countries. According to the literature OMOs are most effective in an interest rate sensitive economy (Mehran & Laurens, 1996). Kendall (2001) states that the signal to the real sector goes through the different prices (interest rates).

The methodological approach to determine whether OMOs are feasible is chosen based on the stationary of the data ranging from January 2008- February 2013. The Central Bank discount rate will be used as proxy for the policy rate. This research contributes to the discussions on whether implementation of OMOs can be conducted in developing countries characterized as small open economies. It also provides monetary authorities with insights regarding the interest rate sensitivity of the Surinamese economy to design accurate policy.

The structure of the paper is as follows. Section 2 offers a brief overview of the implemented monetary policy. Section 3 discusses the theoretical and empirical literature. Section 4 elaborates on the methodological aspects such as the econometric approach, data collection and interpretation of parameters. Next, the results are shown and discussed in section 5. Finally, section 6 presents the conclusions and policy recommendations.

[3] Money channel, credit channel, interest rate channel, exchange rate channel

2. Institutional Framework

2.1   Monetary policy and interest rates in Suriname

The CBvS has traditionally employed direct instruments of monetary policy managing credit growth. The two main instruments used were credit ceilings (1957 - mid-2001) and reserve requirements (May 2001 – present) (see Annex 1). Monetary targeting of variables such as inflation, interest rates and exchange rates were not utilized by the CBvS. The CBvS manages credit growth and interest rate through its cash reserve ratio and discount rate.

During the credit-ceiling period, excess above the implied credit ceiling still remained in the financial system from time to time (see figure 1), particularly in low inflation periods. The administrative time-consuming process and the inefficiency are, among other things, the factors enabling depository corporations to circumvent, which limited the efficacy of this monetary instrument. In addition the lending rate seems to be more responsive to the trend of the inflation rate (Central Bank of Suriname, 2012), as they are moving together.

Figure 1: Impact credit ceiling as monetary policy (1982- June 2001)
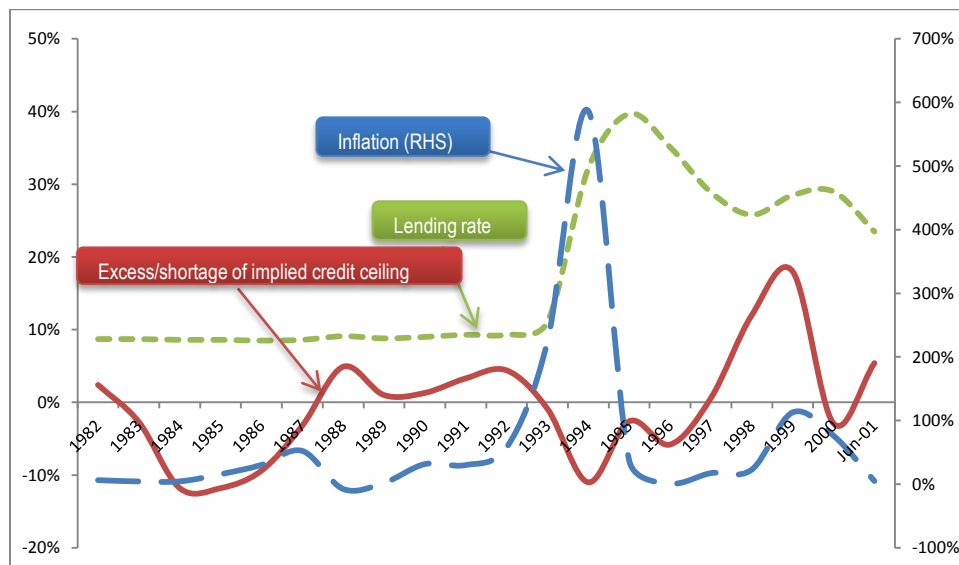
Source: Central Bank of Suriname

The CBvS introduced reserve requirements in May 2001 as a more modern monetary policy instrument, replacing the credit ceiling system. The change of instrument has contributed to a more effective monetary policy of the CBvS, due to the relatively simple administration and easy availability of crucial monetary information. Furthermore, there was a decline in domestic lending rates and interest on demand deposits were introduced (Cental Bank of Suriname, 2005).

Reserve requirements did not always have the desired effect on the monetary aggregate (M2). When reserve ratio is lowered in order to stimulate economic activity, the

outstanding credit should increase with a fall in the lending rate. This development was indeed the case during the years 2003-2007 (see figure 2). After 2007 the reserve ratio was kept on a more or less steady rate with a similar pattern of the lending rate, but growth in outstanding credit dropped except for 2010. The inflation during this period was relatively higher than in the preceding years. The sharp rise of the change in outstanding credit in 2010 can be ascribed to the large increase of credit to the private and public sector for the general elections.

Figure 2: Impact reserve requirement as monetary policy (2001-2012)
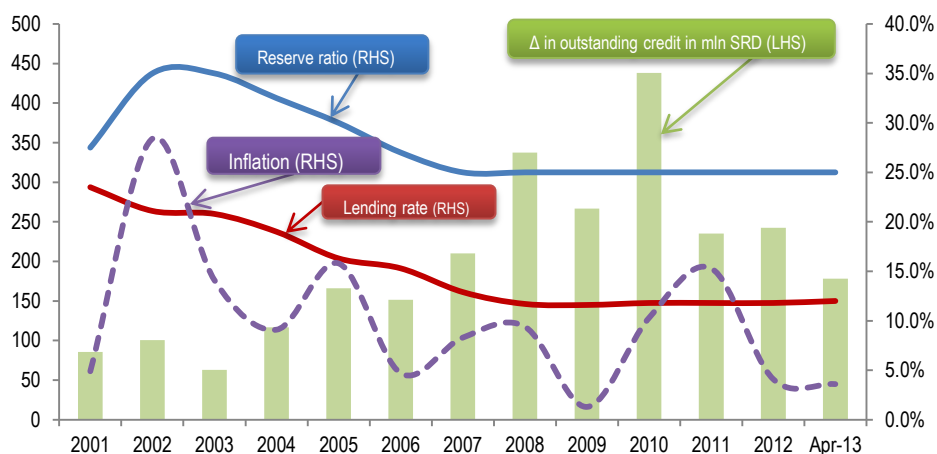
Source: Central Bank of Suriname

The CBvS introduced reserve requirement on foreign currency deposits, as a prudential liquidity buffer to minimize the risk of foreign exchange being available to meet the demand of clients, in February 2003. Underlying reasons are the further liberalization of trade, discontinuing of surrender requirements of export proceeds and an increase in credit dollarization. Local residents were allowed to open and maintain foreign currency deposits at commercial banks and to receive foreign currency loans from commercial banks. This established foreign interest rates which are parallel with the rate in SRD.

Other monetary policies which were implemented include discount policy, foreign currency intervention and open market type operations. In Suriname, the use of the discount policy was not intended to influence economic activity, but specifically to improve the liquidity position of the banks. Through a discount window at the CBvS, advances at a discount rate and under certain conditions, are provided to banks. The discount rate is also used as a policy rate.

In 1995 the CBvS started open market type operations by issuing gold certificates, better known as 'Powisie'[4] gold certificates. This contributed to restoring the confidence in the Surinamese currency and provided an investment instrument to the public as an alternative against flight in foreign currency. It should also be seen as a tool for mopping up excess liquidity from the system and setting a minimum rate for commercial banks. The gold certificates were tradable securities with a nominal value expressed in grams of refined gold. The value was linked to the international gold price in US dollars and to the exchange rate of the US dollar relative to the SRD and thus dependent on the variation of changes in the international price of gold and the official exchange rate. The sale of gold certificates was discontinued in 2001. The lending rate was very high and reached its peak due to inflationary pressure and compensation for negative real interest rates.

The CBvS started to intervene in the foreign exchange market in 1992 with foreign currency auctions, in an effort to allocate foreign exchange to the private sector. The foreign exchange auctions succeeded to facilitate in the process of determining a realistic exchange rate. Furthermore stimulating export production sectors and absorbing excess liquidity (Centrale Bank van Suriname, 1993).

2.2 Overview of government securities

As an indirect monetary instrument, OMOs in Suriname have not really been employed since capital markets in Suriname are in an infant stage. As in most Caribbean economies, the Surinamese economy has a less developed money and capital market. The instruments of government securities (see table 2) in Suriname consist of government bonds with maturities of five years and Treasury bills with maturities of six months and one year.

Table 1: Types of government securities

Instrument	Maturity
Treasury Bills	6 months (180 days)
	1 year (360 days)
Bonds	5 years

Source: Central Bank of Suriname

Government bonds have only been issued twice with fixed rates. In 1990 and 1992, bonds with a maturity of 5 years and an annual interest rate of 6% were introduced. With the issuance of the first 6% government bond, the public had a long-term investment opportunity. Due to its success, the government was able to repay part of its debt and saved the remaining part at the CBvS. To finance government expenditure a second 6% government bond was floated in 1992. The revenue of the bond placement was significantly less. Because of high inflation, the rate received did not reflect the market interest rate and the public consequently lost interest in these investment vehicles.

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[4] Local bird that swallows shiny objects, including gold.

In the year 2000, the government started with the issuance of Treasury bills, which have increased from SRD 28.6 million in 2000 to SRD 303.4 million in 2013. Treasury bills are issued on a regular basis as zero coupon bonds. They are sold at respectively a 7.5 percent and an 8 percent discount rate and repaid at face value at maturity. The rates are determined by monetary authorities (see figure 3).

Figure 3: The development of the Treasury bill rates 2000-2012

**Treasury Bill Rates
(in percent)**
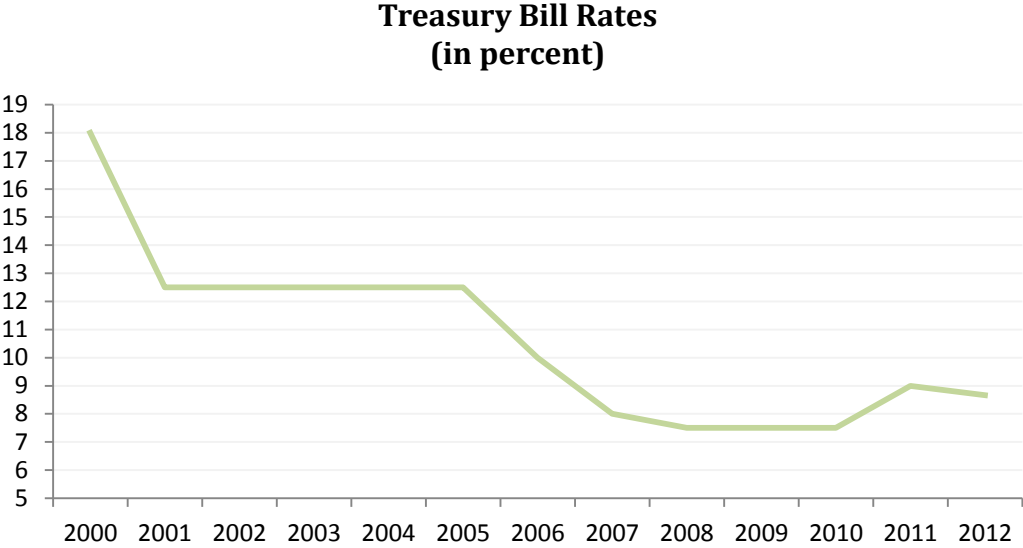
Source: Central Bank of Suriname

The CBvS acts as an intermediary between the Ministry of Finance and the financial sector. Treasury bills are sold upon the request of market participants. Because there are no formal auctions of Treasury bills the CBvS inquires about possible demand for Treasury bills among market participants. The amounts of treasury bills and timing of primary issues are more driven by liquidity shortages of the Government rather than by monetary policy purposes (Fritz-Krockow, 2009). Currently the amount outstanding due to mature in 2013 is SRD 303.4 million, a 25% growth compared to 2012. The market consists of few participants and includes commercial banks insurance companies and pension funds. Commercial banks are the major holders of those T-bills (80%). The mutual ratio between holders remained the same from 2000 until 2012 (see annex 2).

3. Literature review

3.1   Theoretical literature

The general goals of macroeconomic stabilization policy such as price stability, economic growth, balance of payment equilibrium or exchange rate stability can be achieved through the conduct of monetary policy performed by central banks. To achieve aforementioned

goals central banks can use direct- or indirect instruments to affect its intermediates targets that serve as a transmission mechanism affecting the economy.

Indirect instruments, however, tend to have greater power and impact on the economy than direct instruments. The indirect monetary instruments affect the final monetary objective through changes in the liquidity of the banking system or other financial institutions. According to Alexander *et al* (1996) the impact of the direct instruments is less effective, particularly, in the increased degree of openness of the economy, because economic agents find ways to evade them. Furthermore, these direct instruments have, in the past, led to inefficiency and resource misallocation. They have limited competition among banks (Caprio & Honohan, 1990) and lead to overhang of liquidity and disintermediation thereby decreasing the liquidity central banks can influence. This made them widely discredited. Hence, since the late 70s, developed economies have considerably changed their monetary policy formulation towards the use of more indirect instruments, which tend to be more effective in the globalized environment.

The most common indirect instruments are open market operations (OMOs), reserve requirements and standing facilities, of which the first had gained wide acceptance. This acceptance is derived from, among other, the flexibility and effectiveness it offers central banks. OMOs can also be implemented in a step-by-step manner, making it easier to modify and reverse. It thereby creates possibilities for monetary authorities to respond expeditiously to shocks and correct policy (San Jose, 1990; Axilrod, 1996; Alexander et al., 1996; Justilien & Adderley, 1998; Toporowski, 2006). Moreover, they can strengthen the degree of initiative and management of central banks. The implementation of OMOs tend to come in two stages where countries first shift to the use of the indirect instrument issuing new papers on the primary market and, at a later stage, develop a secondary market where second handed paper is traded.

The literature suggests that due to the lack of well-developed financial markets and the complexity of the channels through which monetary policy works in developing countries, it is therefore difficult to implement OMOs in these countries (Boyd & Smith, 2003). Proponents of the implementation of OMOs in Less Developed Countries (LDCs) suggest the use of the active approach of OMOs to cope with the inadequacy, particularly, the underdeveloped financial market. This approach aims at achieving a certain level of bank reserves therefore leaving the price of reserves to fluctuate freely (Toporowski, 2006; Axilrod S, 1996). The active approach is based on the notion that the rate of interest is less susceptible due to the underdeveloped financial market, making it therefore difficult to transmit the impact of monetary policy. Also, because operation of OMOs concentrates on the excess liquidity in the system, which is partly controllable by the central banks through its balance sheet, it is therefore easier for the central banks to affect the quantity instead of

the price of the reserves. However, it is well known that in small open economies there exists a high and variable amount of excess cash outside the sphere of influence of central banks management. Also, there is inflexibility in the approach, in the sense that it cannot be adjusted frequently on short notice and its impact on monetary targets comes with a delay (Caprio & Honohan, 1990; Yilmaz, 2002).

There is also a widely-held view that the development of government security market lies at the core of financial markets development. This market would complete the financial market by inducing a market interest rate that reflects the opportunity cost of capital to any maturity, contributing therefore in making the right investment and financing decision (Turner, 2002). Another reason for the development of the government security market is to spread the intermediation commercial banks (Turner, 2002). According to Worrell (1994) it can function as a catalyst for the widening and deepening of the financial market. In the literature the securities traded on the financial market should be government securities due to the fact that these securities are highly liquid and risk-free, thereby increasing the credibility of market participants (Toporowski, 2006) (Yilmaz, 2002) (Axilrod S., 1996) (Turner, 2002).

Worrel (1994), however, argued that the kind of securities traded on the financial market is less important and the emphasis should be on the characteristics of the securities. The development of the government securities market has gained increased attention as it is being utilized widely to meet the financing requirement of the government, especially during World War 1. However, this should not be the primary focus, as it can lead to financial repression and can crowd out private investment by competing for the scarce available resources. Therefore, according to the real bills doctrine[5] the purpose of securities exchange should be to finance trade directly (Marshall, 2002). Nevertheless, countries have deviated from the real bills doctrine, because there is evidence that in addition to the negative effects, it has important positive externalities that can help in reaching the monetary policy objective. Firstly, it can reduce the stock on foreign government debt, especially, when there is a wide range of participants and provide a bench mark for pricing private securities (Sidaoui, 2002). Secondly, evidence in emerging economies shows that it avoids monetary financing by the central banks. Thirdly, it minimizes the borrowing cost of the government, particularly, when using the auction system. The popularity for adopting the auction technique is the advantage it creates for the government to borrow at the lowest cost and allows the government to assess the suitability of the borrowing costs (Al-Jassar & Banafe, 2002).

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[5] Central banks should merely inject liquidity in the economy in exchange for securities which directly finance trade (Marshall, 2002).

The theoretical literature reveals that there is a broad acceptance of the impact of indirect instruments on the economy. Consequently, countries resort to these instruments. The predominant precondition for success of OMOs is a well-developed financial market with the development of the government market as a foundation. Utilization of government securities for OMOs remains the widespread type in less developed countries. Importantly, OMOs can be performed in markets that are not completely perfect and that are at different stages of development toward a deregulated, competitive system.

3.2   Empirical literature

Quantitative studies on the implementation and effect of OMOs have focused mostly on developed countries. Open and small developing countries have lot of constraints and difficulties such as the restricted degree and small scale of the financial sector. Also availability of data and short samples constitute a problem. Authors that have attempted to do quantitative analysis have concentrated mainly on the interest rate, the exchange rate, inflation and the amount of excess liquidity. Considerable attention has also been paid to the transmission mechanism in order to determine the implementation and effect of OMOs.

Worrell (1994), who focused on the determination of the scope of capital market imperfection provide for autonomous monetary policy, argues that small open market economies should try to define the autonomous monetary zone which creates room for domestic monetary discretion. According to Worrell it is capital market imperfection that enables implementation of monetary policy in these countries, so therefore it should be included when assessing the effectiveness of OMOs. He used Jamaican and Barbadian data for analysis. The author further highlighted the importance of the exchange rate regime which can impede the effect of OMOs in the sense that within a fixed exchange regime and free movement of capital central banks cannot determine the domestic rate of interest independent from the foreign interest rate. He employed the ordinary least square method. Also the Wald test was used to identify structural breaks. The empirical results revealed that OMOs can be implemented in both countries, therefore concluding that OMOs are effective in small open economies if implemented in a defined zone.

Guender et al. (2007) examined the effect of monetary policy on the bank bill rate for the period 1999-2005 in New Zealand. In 1999 New Zealand switched to the implementation of OMOs and standing facilities. They developed two variables (allotment ratio[6] & maturity spectrum[7]) that cover the characteristics of the structure of OMOs in this country. Based on a panel analysis (United States, Australia and New Zealand) the results revealed that the structure of OMOs does not impact the variability of the market-determined interest rate in

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[6] It measures to what extent the bank accommodates the bids submitted by trading banks in the daily auctions

[7] It reflects primarily the importance of the provision of overnight liquidity in the transactions entered into by the Bank of New Zealand with the registered participants.

New Zealand. What was also evident is that due to the openness of the country it is subject to factors abroad such as conditions of external financial markets. The interest rate in New Zealand is more responsive to the rate of Australia, however, at a slow adjustment speed.

Alternatively, Jordan et al (2012) concentrated on excess liquidity in the banking system as part of the emphasis of OMOs. The focus of their study was on the liquidity trend in the Bahamas over an eleven year period starting from 2001. The country has a slow credit growth but the government borrowing was high which consequently increased liquidity. The authors used two models covering the excess reserves and excess liquid assets and used quarterly data to employ the ARDL model. The surge in liquidity was due to several economic factors complemented by contraction in credit growth. They concluded that indirect instruments will be of a great use to manage the banking sector liquidity with the assumption that economic growth will accelerate.

The various channels of monetary transmission mechanism were also studied within the scope of implementation of OMOs, of which the interest rate channel received keen attention. The effectiveness of the interest transmission channel in developed countries has been examined thoroughly, while contrary to the case for developing countries. Berument and Malatyali (2001) analyzed monthly data to explain the behavior of the interest rate in Turkey by expressing it as a function of expected inflation and the uncertainty associated with inflation. The so-called Fisher model[8] has been augmented with the number of days to maturity as an explanatory variable to control the liquidity premium. The results indicated that interest rate, as well as the maturity, decrease with high inflation. Therefore these variables are used as monetary tools in Turkey. However, Morais (2008) who also studies the determinants of interest rates, but in Brazil, concluded that interest rate is endogenous and cannot be altered freely by monetary authorities.

Gigineishvili (2011) examined the determinants of the interest rate pass-through covering a wide range of countries, including developing, emerging and developed countries. By analyzing an extensive set (see table 3) of macroeconomic - and financial sector variables over de period 2005:12-2010:3, his results revealed that the interest rate pass-through is weak in small island economies due to the shallowness and underdevelopment of the financial market. The results also provide evidence that the pass-through is more substantial in countries with a flexible exchange rate. Furthermore, the results demonstrated that the pass-through is more powerful in the long run than in the short run in the advanced economies. The strength of the pass-though is stimulated by variables such as GDP per capita, inflation, interest rates, credit quality, overhead costs and competition among banks. In countries with high inflation and higher market rates, the lending rates tend to adjust vigorously to changes in the market rate. Homogenous results were provided

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[8] The Fisher hypothesis states that if inflation increases by one percent the interest rate will increase by also one percent((Berument & Malatyali, 2001)

by Saborowski and Weber (2008) for another selected group of countries. With the augmentation of dollarization in the model and only financial variables their results were similar to Gigineishvili. Using a panel VAR they additionally suggested that lack of flexibility of the exchange rate regimes, higher liquidity ratios, poor asset quality and less developed financial systems are key for the ineffectiveness of the interest pass-through in developing countries, causing implementation of OMOs to be difficult.

Although it has been demonstrated empirically that the interest rate pass-through is weak in small open economies, still some authors have proven that, at least in the long-run, the pass-through holds. Among these authors are Mamingi, Boamah & Jackman (2008) whose research uncovered that for small open economies such as Barbados, monetary authority action tends to be transmitted in the long run to the financial sector, while in the short run the pass-through is non-existent. Though Barbados has a fixed exchange rate regime, this study also refuted the substantial power of the pass-through within a flexible exchange rate regime. Their conclusion was drawn up by analyzing quarterly data over de period 1980-2007 with an autoregressive distributed lagged model. Accordingly, it takes more or less two quarters for the commercial banks to adjust to interest rate changes made by the central bank. However, the authors have employed the same exercise for Bahamas in 2011 and found that both the short-run and the long-run pass-through exist. The transmission takes half a quarter before commercial banks adjust accordingly.

The study of Kendall (2001) about the determination of interest rate in the Caribbean had a different focus. Using the VAR and Granger causality analysis with inclusion of the impulse responses function, the study investigated the dynamic interactions between the policy action and the various interest rates. The analysis was done for six Caribbean countries (Bahamas, Barbados, Belize, Guyana, Jamaica and Trinidad & Tobago) with a flexible and fixed exchange rate regime. Basing his analysis on quarterly data for the period 1991-1998, Kendall found that the lending rate responses differ across countries and that the direction of changes in this rate can also be different per country. The study furthermore revealed that the response to a discount rate shock fizzled within three to five quarters. The impact of this rate was substantially greater in Jamaica, accounting for 22% of the variations in the lending rate.

Summing up we can conclude that quantitative estimates of pass-through coefficients differ significantly from country to country, markets and periods, suggesting that banks rates in different markets and countries responds diversely to monetary policy action. What can also be highlighted is that the Caribbean studies have proven the applicability of the interest rates as transmitter of monetary policy in small open economies. Table two summarizes the outcome of selected empirical studies on open market operations.

Table 2: Selected empirical evidence by country

Reference	Period	Country	Methodology	Determinants	Results
Worrel, D. (1994)	1983.7-1992.12 (Barbados/monthly) 1980.1-1994.5 (Jamaica/monthly)	Barbados & Jamaica	OLS	Net foreign exchange holdings; TB rate differentials; Inflation differentials; Δnet advances of government to GDP	OMOs can be implemented in both countries, therefore concluding that OMOs is effective in open small economies if implemented in a defined zone
Beremunt, H. & Malatyali, K. (2001)	1989.11-1990.6 (monthly)	Turkey	VAR/GARCH	TB rate; inflation risk; expected inflation & days of maturity	Steady relation between interest rate and expected inflation; real interest declined with high inflation; governmnet uses both auction rate as maturity as monetary policy
Kendall, P. (2001)	1991-1998 (quaterly)	Bahamas,Barbados, Belize, Guyana, Jamaica & Trinidad	VAR	Lending - & deposit rate; reserve ratio; discount rate; TB rate & US TB rate	Different reaction of the variables, but in general the lending rate tends to response fast to the policy rate.
Guender, A. & Rimer, O. (2007)	1999-2005 (yearly)	'New Zealand	'Panel	TB & repo rate local; TB & repo rate foreign(Australia & USA); volume of both local securities; allotment ratio; marurity spectrum	OMOs structure does not impact the variability of the market determined interest rate in New Zealand. Also the interest rate in New Zealand is more responsive to the rate of Australia, however, at a slow adjustment speed
Mamingi N., Boamah D. and Jackman N. (2008)	1980-2007 (quaterly)	Barbados	ARDL	Dminimum deposit rate & lending rate	The response of the lending rate on changes in the policy rate exists only in the long run.
Saborowski, C. & Weber, S. (2008)	2000.1-2011.2 (monthly)	Set of developed & developing countries	Panel VAR	Indicators of regulatory quality; inflation; financial development and dollarization; exchange rate flexibility; banking sector competition; asset quality and liquidity	Industrial countries have a higher pass-through than developing countries on the account of a flexible exchange rate and a developed financial market.
Gigineishvili, N. (2011)	2005.12-2010.3 (monthly)	Set of developed & developing countries (70 countries)	Panel VAR	GDP per capita; inflation; interest rates; credit quality; overhead costs and competition among banks	Industrial countries have a higher pass-through than developing countries on the account of a flexible exchange rate and a developed financial market.
Boamah, D., Jackman, M. & Mamingi N. (2011)	1995-2007 (quaterly)	Barbados & Bahamas	ARDL	Minimum deposit rate & lending rate	Both short- run as long run pass-through exists in Bahamas, while for Barbados only the long-run pass-through exists.
Jordan, A., Branch, S.,McQuay,A., Cooper,Y. & Smith,L. (2012)	2001-2012 (quaterly)	Bahamas	ARDL	Net domestic assets; real GDP; real GDP/Trend GDP; private sector credit; external reserves; TB rate & credit ceiling	Indirect instruments are of great use in the Bahamas

Source: Authors

4. Empirical model

4.1   Model specification

The focus of this research is to investigate whether the implementation of OMOs is feasible in Suriname. In the literature different approaches have been used to examine OMOs. However, for OMOs to be effective the different market rates should be sensitive to the discount rate. In this regard the interest rate channel approach will be applied to evaluate the first step of monetary transmission, i.e., the pass-through of the policy interest rate to bank lending and deposit rates. Based on the findings in the empirical literature we proceed to examine the effectiveness of the policy rate pass-through, using the following model:

$$Ln(DDR_t) = Ln(DR_t) + \epsilon_t \qquad (1)$$

where, DDR_t represents the different interest rates in the market and DR_t is the policy rate of the CBvS. Thus, the model estimates a relationship between the discount rate of the CBvS and the lending and deposit rates in the banking system. ε_t is the error term which follows the classical assumptions of zero mean and constant variance.

In most empirical studies the interbank interest rate, T-bill rates, overnight rate, or other types of interest rate on securities have been used as policy rate. However, since in Suriname the T-bill rate is tied to the discount rate, we use the latter as a proxy for the monetary policy rate in an open market operations framework, due to the absence of an inter-bank rate. Moreover, in LDCs, such as Suriname, the Central Bank lending rate is likely to be the prevailing interest rate to transmit the effect of monetary policy. The theoretical underpinning here is that there is a link from monetary policy action to the availability and cost of bank credit which is dominant in these countries (Mishra, Montiel, & Spilimbergo, Monetary transmission in low-income countries; Effectiveness and policy implications, 2012).

4.2   Data analysis

The sample covers monthly observations for the period 2008m1-2013m2. The variables are expressed in real terms by adjusting them for inflation. The data is also transformed into natural logarithms. Since the interest rate contains negative values we transform them into logarithmic values using the formula $\log R_t = \log\left(1 + \frac{R_t}{100}\right)$. All data originates from the Statistics Department of the Central Bank of Suriname.

The change in the policy interest rates should directly affects money-market interest rates such as inter-bank rates, T-bill rates, lending rates and deposit rates, which are set by banks. To analyze the policy pass-through the deposit and lending rates of the depository

corporations in Suriname were considered as dependent variables, namely the domestic lending rate (*DLR*) and deposit rate (*DDR*)

The T-bill rate is excluded in the empirical research as it is strongly correlated with the discount rate. Traditionally, the interest rate channel primarily focused on bond rate, because it directly affected the investment in industrial countries. However, in small countries such as Suriname, funds for investments financing are obtained via borrowing from the depository corporations instead of issuing equity and bond.

Figure 4 displays the development of the different interest rates during 2008m1-2013m2. Overall, the real variables have similar patterns which mean that there exists some relationship between them. The year 2008 shows an upward trend, which is followed by a downward swing. After the third month of 2009 the variables were less volatile, but trended upward.

**Figure 4: The developments of the different interest rates**
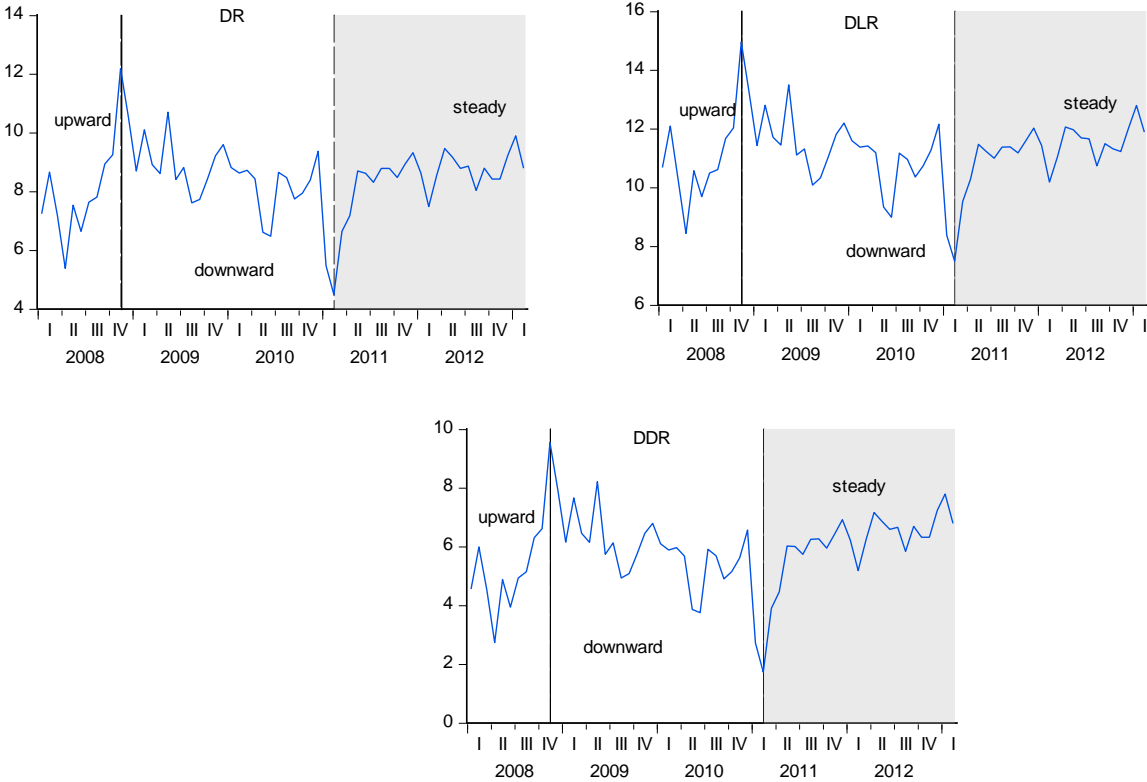
Source: Central bank of Suriname

The development of the real interest rates was influenced mainly by the development of the inflation. The downward period of the real variables was accompanied by rising rate of

inflation (see figure 5). Economic growth in 2007 was strong due to high commodity prices. The strong growth improved the current account, but inflation increased to almost 14 percent in 2008. However, during this period the Surinamese economy was relatively strong and experienced increases in real economic growth that was on the one hand fueled by the increase of the commodity prices and on the other hand the fall in interest rate. Nevertheless, in January 2011 inflation increased again, due to monetary and fiscal policy. First, in January the Surinamese dollar was devalued by 20%, eliminating the overvaluation measures implemented on local currency. As a result unification of the exchange rate in the economy was achieved. Consequently, the real exchange rate increased. Secondly, the tax on fuel was increased. Both of these developments pushed the domestic price level upward in the first months of 2011. The real interest rates have dropped, but increased gradually afterward. To counteract further inflation supportive fiscal and monetary policies were implemented.

Figure 5 shows the inverse relationship between the real lending interest rate and inflation. The Fisher hypothesis suggested that there is a one–to-one relation between the real interest rate and inflation. This link has been challenged in various discussions. Some studies tested a positive relationship (Mishkin and Simmons, 1995), while others have found a negative relationship (Berument & Malatyali, 2001). In periods of high inflation, saving is less attractive because the real return of economic agents' holdings decreases.

Figure 5: Relation between the real interest rate and inflation
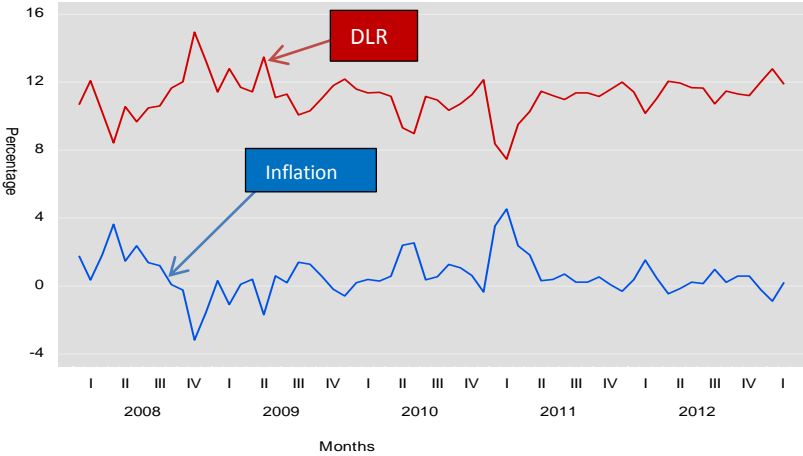
Source: Central bank of Suriname

Additional information on the statistical properties of the variables is presented in table 3. The low divergence of the standard deviation of *DR, DDR* and *DLR* with respect to their mean value indicates that a large portion of the observations are close to the center of the data.

	DR	DDR	DLR
Mean	8.379	5.826	11.156
Std. dev.	1.240	1.326	1.198
Skewness	-0.434	-0.512	0.295
Kurtosis	5.042	4.450	5.038
Jarque-Bera	12.717	8.136	11.631
Probability	0.002	0.017	0.003

Source: Authors using Eviews 7.0

4.3 Methodology

The structure and properties of the variables are investigated to determine the most suitable empirical approach for Suriname. The selection criteria of the most appropriate econometric model are the order of integration and whether the data series co-integrate or not. The Augmented Dickey-Fuller (ADF) test (1981) and the Phillips-Perron (PP) test (1988) are applied to trace the presence of unit roots in the data and to establish the order of integration of the variables, I(0) or I(1). All variables appear to contain no unit root as assesses from both the ADF and PP test. This means that the series are I(0) (see Table 4). For ease of interpretation of the estimated coefficients the variables are transformed into natural logarithmic form. The coefficients can then be interpreted as elasticity's.

Table 4: ADF & PP Test statistics

		DR	DDR	DLR
ADF	Level	-4.339***	-3.980***	-4.379***
	1st Differences			
PP	Level	-4.380***	-3.926***	-4379***
	1st Differences			

Source: Authors using Eviews 7.0; *, **&*** denote variables at 10%, 5% and 1% levels of significance. ADF & PP tests represent t-values

Since all the variables are I(0), OLS estimation of equation 1 is appropriate. However, the introduction of a new monetary policy instrument will bring about changes (dynamics) in the transmission mechanism, especially with respect to the interest channel. A VAR mechanism will proof to be superior to an OLS system in capturing the dynamics. The added advantage of a VAR approach is that it accounts for endogeneity issues and also allows us to conduct impulse response analysis. The impulse response function of VAR is to analyse the response of the regressand to changes in the regressor. It will therefore give an idea of what the effect of the discount rate will have on the other variables in the model. The procedure is therefore to choose an appropriate lag length for the VAR to ensure data congruence. For this we rely on the Akaike's criterion (AIC), Hannan-Quinn (HQ), Schwartz

(SC) criteria in conjunction with the standard residual tests (serial correlation, normality, heteroskedasticity and stability). The general unrestricted VAR model is therefore formulated as:

$$\gamma_t = \varphi + \sum_{i=1}^{n} \pi\ \gamma_{t-1}\ + \varepsilon_t \qquad (2)$$

Where, φ is a 2 x 1 vector of deterministic variables, π is a 2 x 2 coefficient matrix and ε is a 2x1 vector of disturbances with normal properties.

4.4   Results

In this subsection the results of the unrestricted VAR are presented. First of all the analysis started with the unit root tests (section 4.3). The ADF and PP test reveals stationary of the estimated variables in level, thus the variables entered the model as I(0) data. The lag order criteria suggested 1 lag to be used in the model with *DLR* as the regressand, therefore 1 lag was selected (see annex 4). The VAR model is then re-estimated with 1 lag. A structural break was observed in the periods 2008m11 and 2011m1. The first period can be ascribed to the effect of double digit inflation triggered by increased import prices. Global conditions affect small, open economies through various channels including financial linkages. The second period reflects the shift in monetary and fiscal policy (see section 4.2). The model was corrected for the structural break by inclusion of a two pulse dummy. The dummy variables have the value of 1 in the periods where the structural break was identified and the remaining periods have the value zero. Finally, the residuals diagnostics test are applied and the model passed these tests (see table 5). According to the coefficient of determination (R^2), which measures the power of the regression relationship, the regression line fits the data. The model suggests that 76% of the variation in the lending rate on local currency is explained by the regression model, which uses the discount rate as the explanatory variable.

Table 5: Model specification & residual test

Model Specifications		Residual test	P-value
R-Squared	0.762	Normality test	0.214
Adjusted R-Squared	0.745	Serial correlation ($\chi2$)	0.266
F-statistics	44.753c	Heteroskedasticity ($\chi2$)	0.209

Source: Authors using Eviews 7.0

The results of the model are presented in equation 3.

$$Ln(\ DLR_t\ ) = 0.62 \cdot Ln(DR_{t-1}) - 0.52\ \cdot Ln(\ DLR_{t-1}\ ) - 0.23\ \cdot dum11\ + 0.21 \cdot dum08 + 2.35 \qquad (3)$$

$$2.233*** \qquad -1.287 \qquad -8.686*** \qquad 6.366*** \qquad 5.864***$$

The t-statistics are below the model, while *, ** and *** denote variables at 10 percent, 5 percent and 1 percent level of significance respectively.

The result suggests that a 1 percent-rise of the real policy rate increases the real lending rate by about 0.62 percent in the following period. The estimated pass through is high which implies that the Central Bank of Suriname passes on a large impact of a change in discount rate to the lenders. It also implies that the effectiveness of monetary policy is extensive in the lagged first month. Even if compared to other Caribbean countries this coefficient proofs to be high. In most of the studies the coefficient lies between 0.10- 0.40 (Mishra *et al.,* 2010; Cheong et al., 2008; Mohsin, 2011).

The positive sign of the lending rate indicates that an increase in the policy rate is transmitted to the lending rate on local currency. This is in line with economic theory that suggests that an increase in the policy rate increases the cost of fund and consequently increases the lending rate. The lagged lending rate has a negative relation with the lending rate in current period. This means that a 1 percent rise of the lending rate in the preceding month leads to a fall of the lending rate in the next month, because of declining credit demand.

The pass-through of the discount rate to the deposit rate on domestic currency was also estimated, but the results were not realistic. Firstly, the expected sign was contrary to the theory. Theory suggests a positive relation between these two variables (Gigineishvilli, 2011). Secondly, the coefficient of the discount rate was too high and finally, the t-statistic was not significant.

The impulse response function which provides information about the strength of the interest rate and the time it takes for the interest rate policy to effect the target interest rate revealed that the shock disappears in the 9-10 months with regard to the lending rate(see figure 6).

Figure 6: Impulse response function

Response of DLR to Generalized One
S.D. DR Innovation
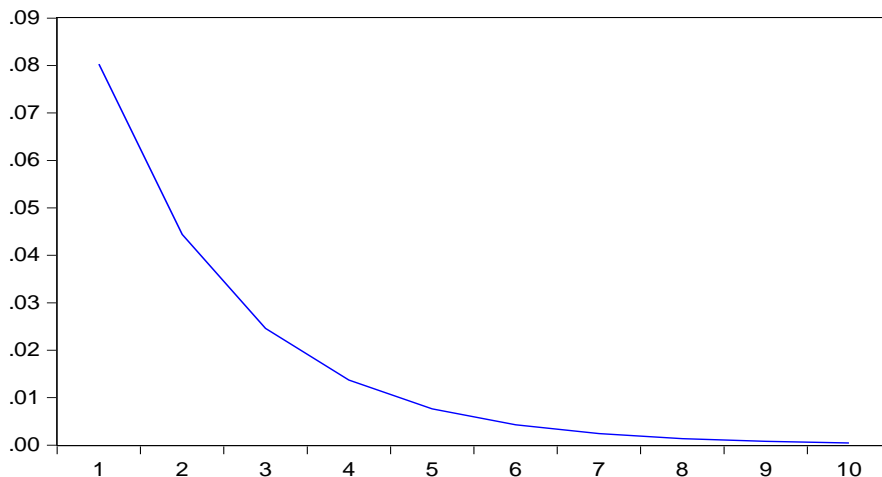
5. Conclusions and Recommendations

The preceding analysis points to a process in which the possibility to use OMOs as monetary instrument in order to achieve the central banks objective has been studied. In order to make a statement the interest channel has been analyzed. The Central Bank discount rate represents the monetary policy rate which is the explanatory variable. After determination of the appropriate methodology given the stationary characteristics of the Surinamese interest rates, the vector autoregressive model (VAR) was applied.

According to the model there exists a pass-through of the discount interest rate in Suriname. The results revealed high coefficients of the lending rate reflecting therefore the magnitude of the impact. However, a shock to the system fades away after nine to ten month which implies that the pass-through is incomplete. The limited financial instruments, lack of participants on the market and the smallness of the economy may underlie this result. The results of impact of the discount rate on the deposit interest rate were not realistic and therefore excluded in this study. Maybe there is no link between these variables, but further analysis is needed to confirm this.

It is well known that in developing countries the underdevelopment of the financial market can hinder its effectiveness. But nevertheless the analysis was carried out and the empirical results of the paper suggest that there is indeed potential opportunity for the implementation of OMOs in Suriname.

However, the conduct of OMOs solely as a monetary policy instrument will probably not achieve the desired objective. Reserve requirements can be regarded as an alternative to OMOs. A more flexible system of reserve requirements, where commercial banks only have to comply every two weeks instead of 24/7 to the reserve requirement may be useful in helping to gauge the impact of open market operations on interest rates. The Central Bank can provide lending facilities, to collateralized borrowing options for commercials banks in case of liquidity shortages. Also standing facilities can provide the banks with more investment options and at the same time the Central Bank can still manage excess liquidity.

Monetary policy has to evolve from passive to active, triggering also the rest of the financial sector to make that shift. Invariably, an auction-based system for tendering short term government securities would also assist the Surinamese authorities in fostering better overall monetary policy. These short-term securities can form the basis for the development of a secondary market with support of the increase of the number of market participants.

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Annex

Annex 1: Monetary policy instruments used by the CBvS 1957 – 2012

| Monetary policy instruments	Actions	Commence-end dates
1. Credit ceilings	Several adjustments in the components of the credit ceiling have taken place during the time period: - During the first ten years there were only informal agreements between the CBvS and the commercial banks; - From 1968 on, a more formal credit ceiling was established.	1957 - mid 2001: 1957 - 1968 1968 - May 14th 2001
2. Reserve requirements	A required reserve system for local currency liabilities (reserve base) for the commercial banks, initial ratio was set at 27½ , several adjustments have taken place, currently set at 25%; A required reserve for foreign currency deposit liabilities for the commercial banks, initial ratio was set at 17½%, several adjustments have taken place, currently set at 40%.	May 15th 2001 - Present February 12th 2003 - Present
3. Discount policy	Discount window available for commercial banks only, where the CBvS sets its interest rate.	1957 - Present
4. Open market type operations	Powisie' gold certificates, to provide an investment instrument to the public as an alternative against flight in foreign currency, discontinued after 9/11.	March 1995
5. Foreign Exchange market intervention	Foreign Exchange auctions; Outride interventions; Foreign Currency Swaps.	1992 - mid 1994 1996 - 2000 2010 - Present 2007
Source: Central Bank of Suriname 2011		

Source: Central Bank of Suriname

Annex 2: Domestic debt ceiling and ratio domestic debt /GDP (2006-2012)
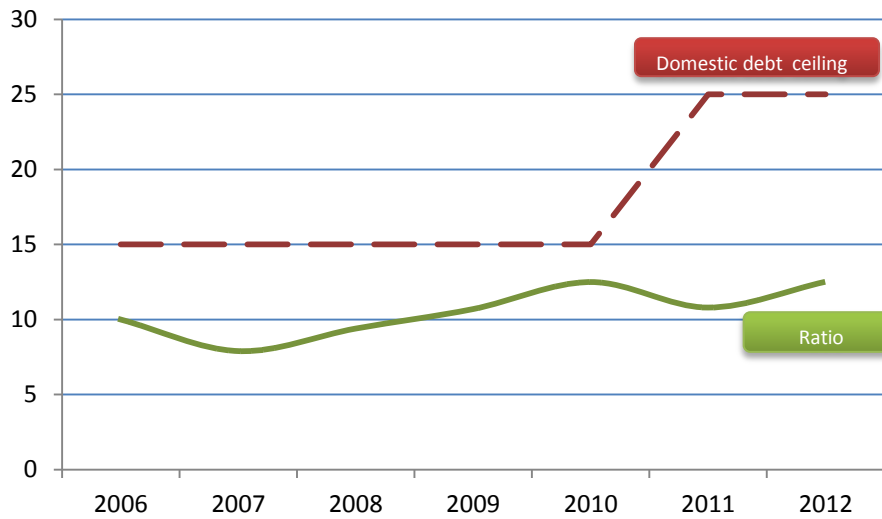
Source: Central Bank of Suriname

Annex 3: Holdings of Treasury bills in mln SRD (2000-2012)
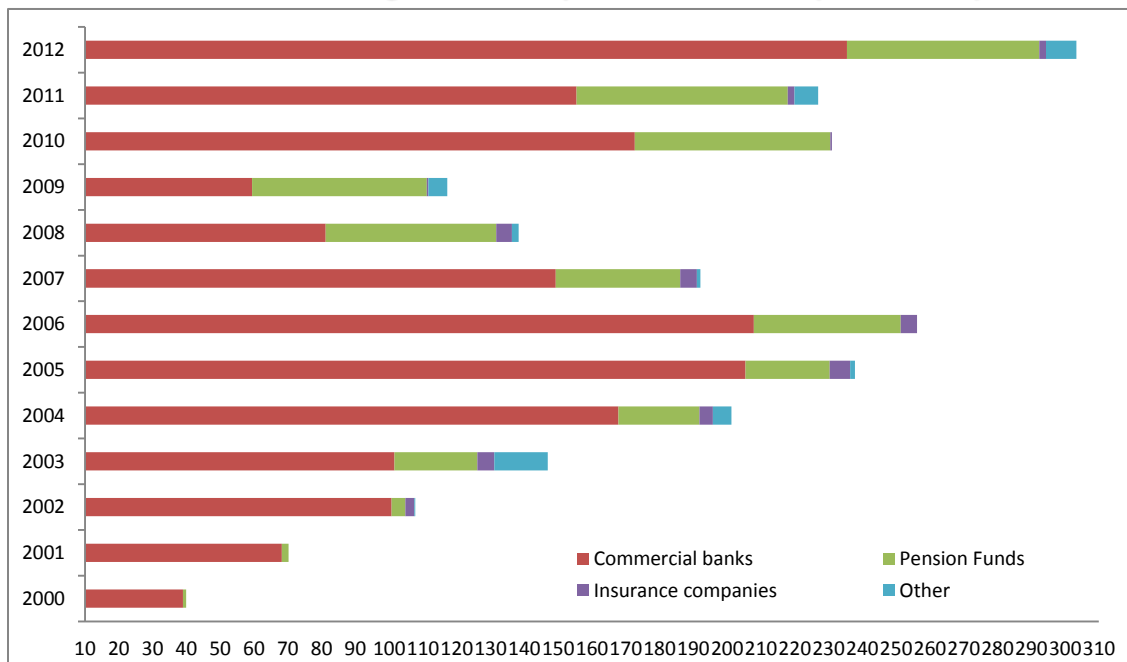
Source: Central Bank of Suriname

Annex 4: Optimal lag length test results

Lag	Likelihood ratio	Akaike Information Criterion	Schwarz Criterion	Hannan-Quinn Criterion
0	NA	-6.598	-6.455	-6.542
1	54.735*	-7.490*	-7.204*	-7.379*
2	2.116	-7.392	-6.961	-7.224
3	0.978	-7.271	-6.698	-7.048
4	4.818	-7.233	-6.516	-6.955

* Indicates the optimal lag length based on the criterion