THE REACTION OF BANK LENDING TO MONETARY POLICY: THE CASE OF JAMAICA

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ABSTRACT

This paper examines the relevance of the bank lending channel to the conduct of monetary policy in Jamaica using disaggregated monthly bank balance sheet panel data and other macroeconomic data covering six years. The Arellano and Bond (1991) GMM approach is used to estimate the bank lending channel of monetary transmission. Findings show that the bank lending channel is impacted by informational asymmetries that exist between institutions. Specifically, asset size and liquidity influence the magnitude of the monetary policy's impact on loans issued by banking institutions. Capitalization also had a significant role in the efficacy of the monetary policy.

Keywords: Bank Lending Channel, Monetary Policy, GMM
JEL classification numbers: E5, G2

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1.0 Introduction

The aim of this research is to determine the importance of the bank lending channel to monetary policy in Jamaica and to see if this channel is impacted by institutional idiosyncrasies. It is necessary to examine the impact of bank lending on monetary transmission so that a greater appreciation is developed by the monetary authorities for the empirical trade-offs involved in the attainment of a particular target.

An important study of the monetary transmission mechanism in Jamaica was done by Robinson and Robinson (1997). This study sought to examine the transmission mechanism using Vector Autoregression (VAR) analysis. The Jamaican economy was classified as one in which aspects of both the Keynesian and Monetarist perspectives existed. The study found that shocks to monetary policy would lead to changes in bank balance sheets by influencing credit demand and supply. The results of this study supported the existence of the monetary transmissions mechanism (credit channel) in Jamaica. However, given the broad nature of the research it did not examine whether monetary policy had a heterogeneous impact on banks with differing characteristics.

The direct impact of the monetary transmissions on the bank lending system is adequately covered in a question posed by Bernanke and Blinder (1988) about the choice between stabilizing money and stabilizing credit. They also questioned whether shocks in monetary policy would have the intended impact on targets. This concern has a strong resonance in studies in this area which highlight asymmetric information as being an important factor influencing the volume of bank loans.

By specifically examining bank panel data it will be easier to understand the effects monetary policy will have on not only the behaviour of the aggregate banking sector but also on individual bank behaviour. In this vein, the Arellano and Bond (1991) Generalized Method of Moments (GMM) approach adopted in this study should prove useful. GMM estimates provide optimal results for models in which there exists serial correlation in the errors, individual effects, lagged dependent variables, and no strictly exogenous variables. The panel

GMM estimates are also consistent and efficient in the presence of exogenous explanatory variables.

The rest of the paper is divided into five sections. Section 2 offers a review of some of the literature on bank lending and monetary policy transmissions. The third section presents a description of the data used in the analysis. The fourth section discusses the methodology and the model used. The fifth section presents the empirical results. The final section concludes with some recommendations for policy.

2.0 Literature Review

The bank lending channel is an extension of the theory of monetary policy transmission that seeks to explore the causes and effects of monetary policy on the behaviour of banks. In recent times much work has been done on the relevance of the bank lending channel. Gambacorta (2001) highlighted the implication of this mechanism on the real economy by drawing attention to the fact that monetary tightening will cause overall investment, and thus productivity as well as consumption, to decline.

The theoretical framework of the bank lending channel is commonly referred to in the literature as the *lending view* (Romer et al. 1990). The lending view describes how monetary policy can affect the amount of loans supplied by banks. For example, any tightening in monetary policy is expected to lead to a decrease in the amount of loans provided by banks. The flow of the bank lending channel begins with the tightening of monetary policy which causes an increase in deposits, as a result of an increase in interest rates, causing banks' loans to deposit ratios to decline. The decline in bank loans occurs at a lag following the tightening of monetary policy. This was found to be true for Germany where for monthly time series data the decline lasted for 16 periods (see Hulsewig et al. 2004). This observation seemed to be similar across various studies (see, for example, Kashyap and Stein, 1995).

A good indicator of the existence of the bank lending channel is lagged changes in the amount of loans offered by a bank following a monetary shock. Having determined the existence of this mechanism,

previous studies on the bank lending channel have sought to determine whether there were certain bank characteristics that would influence the magnitude of monetary policy shocks on bank lending. Many of these studies posited the defining characteristics of the bank to include size, liquidity and capitalization. These characteristics are referred to as proxies for "informational asymmetries" (Coll et al. 2005)[2]. The expected differences in the impact of monetary policy caused by bank characteristics are often attributed to the balance sheet composition differences that tend to exist between banks. Banks with a larger asset base tend to provide more credit than their smaller counterparts. Also, less liquid banks will find it difficult to protect their loan position from monetary policy changes, while the less capitalized banks have limited "free access to funds" (Gambacorta 2001). Hence, the hypotheses to be examined in this study are whether: i) smaller banks are most affected by changes in monetary policy; ii) less liquid banks are impacted more greatly by monetary shocks; and iii) less capitalized banks experience greater changes in the amount of loans that they offer given a change in monetary policy.

There is some disagreement within the lending view as to whether the amounts of loans provided by banks decline following contractionary monetary policy because the banks decrease the supply of loans or because borrowers' demand for loans decreases. Coll et al. (2005) suggested that the decrease in loan supply is due to the imperfect information problem. Kashyap and Stein (1995), on the other hand, suggested that the changes observed through the bank lending channel are not caused by a shift in loan supply but rather a change in the demand for loans. The intuition behind this suggestion is that contractionary monetary policy is aimed at decreasing credit demand. Other findings suggest that banks decrease loan supply in anticipation of a fall in the credit margin

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[2] Informational asymmetries refer to imperfect information and moral hazard problems that exist between borrowers and lenders due to differing characteristics of the financial institutions that result in varying levels of difficulties in sourcing external funds. The idea is that banks with different characteristics have differential access to external finance (Coll et al. 2005).

following monetary tightening, while loan demand decreases due to declines in output level and increases in the loan rate (Hulsewig et al. 2004).

Previous studies have also undertaken regional and country examinations of the existence of the bank lending channel. Factors that appeared to be of paramount importance included the general composition of bank assets, the relationships that exist between the banks and their clients, the reliance of customers on banks for financing and the role of the banks within the financial system.

Even in light of the various studies undertaken to determine the path of the bank lending channel, there is no definitive answer to its general existence. Furthermore, there is currently no consensus on how to estimate the magnitude of the relationship if the lending channel does in fact exist. Studies have used both aggregated and disaggregated data to determine whether the bank lending channel exists. More recent studies tend to disaggregate data to the individual bank level in order to capture any of the market imperfections that affect the transmission mechanism (Coll et al. 2005).

Various econometric methods have also been employed in the literature. These include co-integration techniques, Vector Autoregression [VAR] (see Table 2 in Gambacorta 2001), Vector Error Correction Models [VECM] (see, for example, Hulsewig et al. 2004) and Generalized Moments of Methods [GMM] (see, for example, Coll et al. 2005; Ehrmann et al. 2001; Gambacorta, 2001; Takeda et al. 2003). However, based on the observations of the lagged effect of monetary policy on bank lending and the benefits to disaggregating data, the GMM approach as described by Arellano and Bond (1991) is often used. The latter method is appropriate as the data are not normally characterized by strictly endogenous variables and individual effects.

Ehrmann et al. (2001) examined the existence of the bank lending channel in European countries and found that there were differences in how much banks were relied on for financing in various countries. Liquidity was found to capture the most significant aspects of the informational asymmetry between banks while size and capitalization were

generally not as important. Coll et al. (2005) determined that bank characteristics were not responsible for differences in the impact of monetary shocks on loans. Hernando and Martinez-Pages (2001) found that, in Venezuela, less liquid banks displayed a stronger response.

Looking at the Jamaican case, Robinson and Robinson (1997) concluded that both the money and credit channels exist and the most powerful policy instrument at the time was the reverse repurchase rate. However, they noted that the impact of monetary policy may be dampened because of the significance of foreign currency credit. This suggested that a more in-depth analysis of the relevance of the bank lending channel was necessary. Further, Coll et al. (2005) suggested that "information problems may be of particular importance in emerging economies where capital markets are not well developed, and firms and consumers have limited sources of external funding." Thus, it is not unreasonable to think that asymmetric information may play a large role in the impact of monetary policy in Jamaica.

3.0 Data Description

The data set collected for this research spans January 2000 to December 2005. This information was collected monthly for the individual banking institutions involved in lending activities. The banking system in Jamaica includes commercial banks, merchant banks and building societies. There are currently six commercial banks, five merchant banks and four building societies. Two of the six commercial banks account for 75 per cent of all the assets of the deposit-taking institutions. Five of the commercial banks are owned by foreign entities. The commercial banks tend to have high interest rate spreads – since the Jamaican banking system is characterized by risky lending conditions (Baumgartner and Collyns 2006).

All commercial banks, merchant banks and building societies in operation during the period of analysis were included in the data gathering

process. The balance sheet items include liquid assets, total assets, loans and the capital base.[3] The formula for the calculation of capitalization is:

$$capitalization = \frac{capital \quad base}{assets}, \qquad 1$$

and liquidity is computed as:

$$liquidity = \frac{liquid \quad assets}{assets}. \qquad 2$$

Merged companies are included as separate institutions beginning at the date of the merger. Thus, the complete data set includes a cross-section of 26 financial institutions with unbalanced time periods. Of these financial institutions, 6 are commercial banks, 13 are merchant banks and 6 are building societies.[4] The monetary policy indicators

[3] **Total liquid assets** were calculated from totalling the values of the domestic, US, Canadian, and Sterling average liquid assets. The foreign average liquid assets were converted into Jamaican dollars using the end of month foreign exchange rates. The **capital base** was calculated by summing capital paid up & assigned, share premium, the statutory reserve fund, retained earning reserve fund and net losses, where net losses exist as negative sums of accumulated deficit and losses. In the case of building societies, the permanent capital fund is used in place of capital paid up & assigned. Also, building societies' net losses are calculated as the sum of accumulated deficit and undistributed deficit.

[4] The listed **commercial banks** are Bank of Nova Scotia, CitiBank of North America, First Caribbean International Bank, National Commercial Bank, First Global Bank Ltd (FGB), and Royal Bank of Trinidad and Tobago. RBTT took over The Union Bank of Jamaica and FGB took over CIBC. The included **merchant banks** were Capital & Credit Merchant Bank, First Caribbean International, CitiMerchant Bank, Dehring Bunting & Golding, ISSA, DB&G post merger, MF&G, PanCaribbean, PanCaribbean post merger, Manufacturers Merchant Bank Limited, Manufacturers Sigma Merchant Bank, Scotia Merchant Bank, International, and George & Branday Ltd. The operations of Scotia Merchant Bank, First Caribbean International, International, and George & Branday were suspended before June 2006. DB&G merged with Issa Trust, PanCaribbean merged with Manufacturers Sigma, which took over Manufacturers Merchant Bank. First Caribbean took over CIBC. The included **building societies** are Jamaica National Building Society, JNBS post merger,

included the reverse repurchase rates set by the Central Bank as well as the cash reserve and liquid asset ratios.[5] Macroeconomic variables included in the analysis were inflation and exchange rates, both of which have been found to have important effects on the monetary transmissions in Jamaica (Allen and Robinson, 2004).

During the sample period, total banking sector loans and the J$/US$ exchange rate increased (see Figure 1). The 30-day reverse repurchase rate declined during the same period despite a marked increase from approximately 12.9 per cent to 15.0 per cent during the first quarter of 2003. Inflation has oscillated over the period but registered higher values post 2003.

4.0 Methodology

Prior to examining the idiosyncrasies associated with the bank lending channel in Jamaica, a preliminary examination of the aggregate time series data was conducted using the Vector Autoregressive (VAR) model and Vector Error Correction (VEC) model. The lending market was aggregated over all the banking institutions. The variables used in the Vector Error Correction Model estimation were total loans and the 30-day reverse repurchase rates. As the estimations given by the VEC and VAR models are often difficult to interpret, several tools of interpretation were employed. These included impulse response function analysis, variance decomposition and the Granger Causality test.[6]

Jamaica Saving and Loan Building Society, Victoria Mutual Building Society and Scotia Jamaica Building Society. Jamaica National Building Society took over Jamaica Savings and Loans Building Society and First Caribbean International Building Society.

[5] In the case of building societies, the maximum value for the cash reserve and liquid asset ratios were used.

[6] The **impulse response function** traces the expected effects of current and future values of each of the variables to a shock in one another. **Variance decomposition** identifies the proportion of change in one variable attributed to another. The **Granger causality test** determines whether the lags of one variable determine the lags of another variable. The null hypothesis for the Granger causality test is that one variable does not Granger cause another.

Figure 1: Stylized Graphs

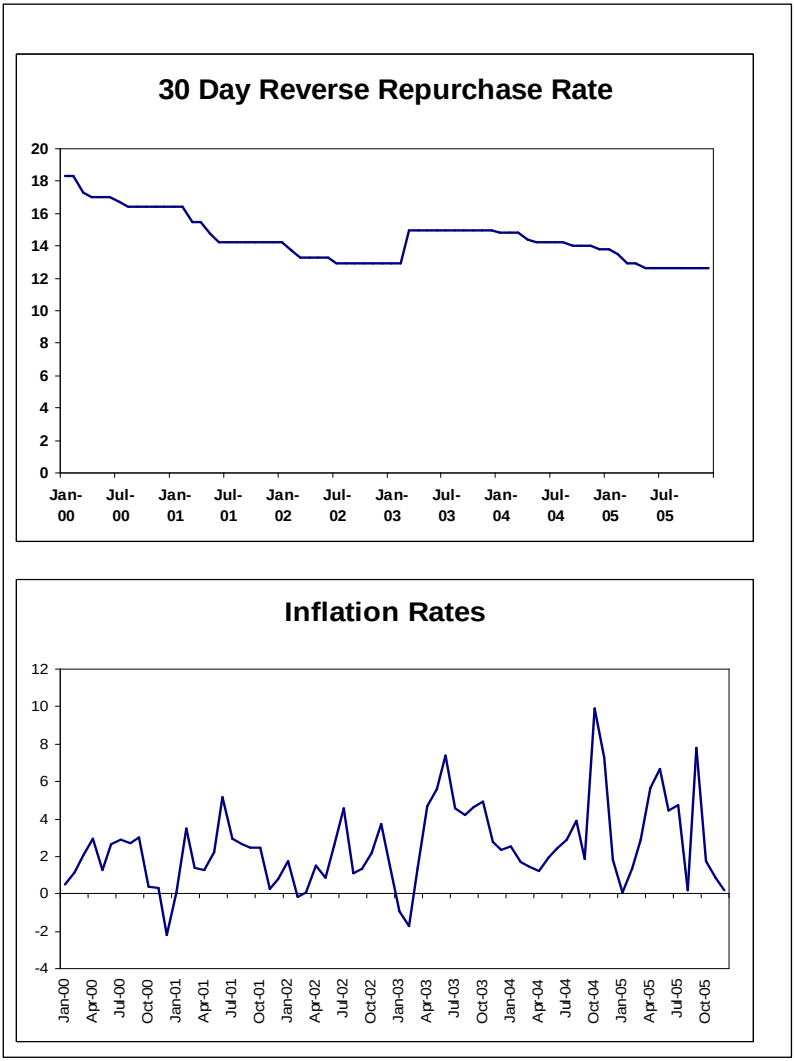
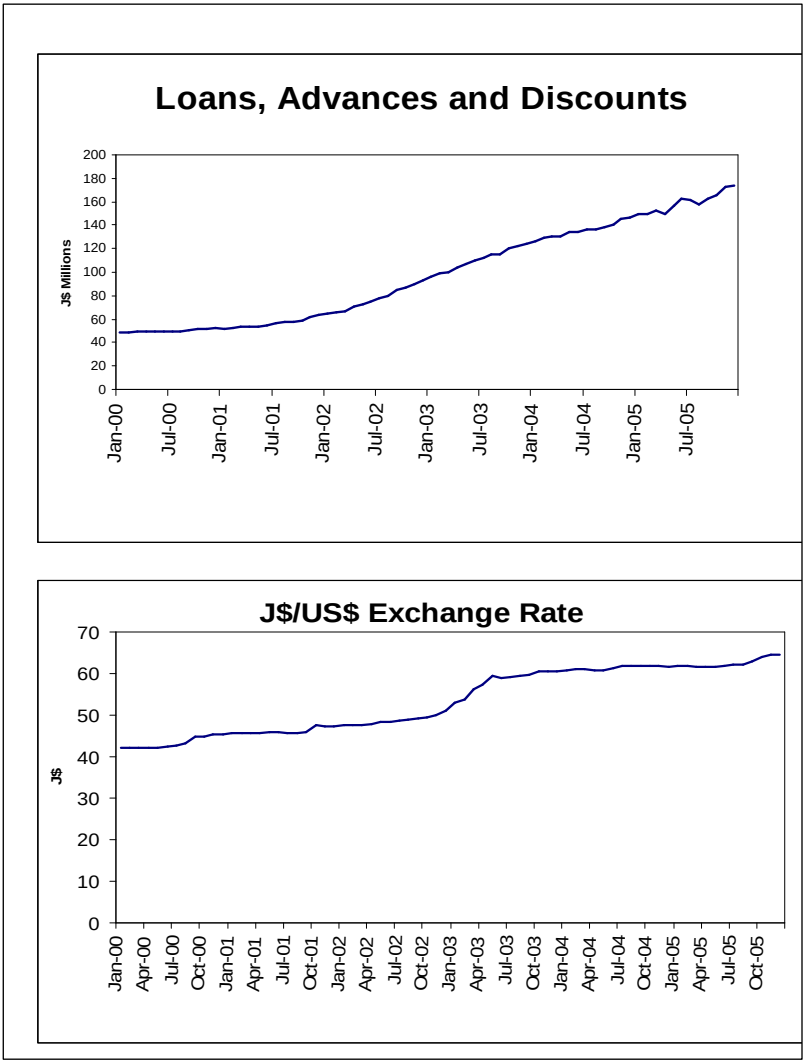


Figure 1 (Continued)



The lags used in the relevant model estimations were predetermined using the VAR results as well as the Schwartz Bayesian Selection Criterion. The optimal lag length selected was used to determine whether the variables included in the model were co-integrated. In the instance where the variables were co-integrated the VECM model was used and if not, the variables would be transformed in the stationary differenced form and estimated with the VAR model. The general model form of these estimations can be written as:

$$\log l_t = a_1 + a_{11}\log l_{t-1} + .. + a_{1n}\log l_{t-n} + b_{12}MPI_{t-1} + ... + b_{1n}MPI_{t-n} \qquad 3$$

where *logl* is the log of the total loans offered by the banking institutions and *MPI* is the monetary policy indicator. The VECM model facilitates the examination of the dynamic relationship of loans and the monetary policy indicator for the aggregated time series.

After determining a basic model of the bank lending channel in Jamaica, the panel data series utilizing institution specific data was analyzed using the GMM methods. GMM allows for consistent and efficient estimation of the bank lending channel as it incorporates the examination of dynamic movements of data that are both time series and cross-sectional.

In summary, the procedures employed for GMM involved specification of the relevant instruments, applying a weighting matrix and then estimation. The data were analyzed using cross-sectional fixed-effects and with White Cross Section GMM weights and the White Period coefficient covariance method. [7]

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[7] The **White Cross Section GMM weights** produce GMM estimates robust to any unknown heteroscedascity that may occur in the model. The **White Period coefficient covariance method** accounts for arbitrary serial correlation and time-varying variances in the disturbances.

$$\left[\left(\frac{N^*}{N^*-K^*}\right)\left(\sum_i X_i' X_i\right)^{-1}\left(\sum_i X_i' \hat{\varepsilon}_i X_i\right)\left(\sum_i X_i' X_i\right)^{-1}\right]$$

The model estimated for panel data GMM is of the general form:

$$y_{it} = \alpha y_{1(t-1)} + \beta' x_{it} * + \eta_i + \nu_{it} = \delta' x_{it} + \eta_i + \nu_{it} \quad 4$$

where $x_{it} = \left(y_{i(t-1)} x_{it}*'\right)$ is $k \times 1$ and ν_{it} are not serially correlated. To ensure that the assumptions of no serial correlation hold, the probability value of the Sargan statistic was computed. This test estimates the validity of the instruments used. The Sargan test has a null hypothesis that states that the instrumental variables are uncorrelated with the residuals and hence a rejection would indicate that the instruments are not valid.

The model used in this research is based on that of Ehrmann et al (2001) which relies on the Bernanke and Blinder (1988) model. The model was developed from an equilibrium relationship where money (*M*) is equal to deposits (*D*) which are both functions of interest rates. The relationship can be represented as:

$$M = D = -\psi i + \chi \text{, where } \chi \text{ is a constant.} \quad 5$$

Loan demand (L^d) is assumed to be dependent on the loan interest (i_L), the inflation rates (*infl*) and the J$/US$ exchange rate (*usx*). Thus, loan demand may be represented by:

$$L_i^d = \phi_i usx + \phi_2 \, inf \, l - \phi_3 i_L \quad 6$$

Loan supply (L^S) of each bank is a function of the amount of the money/deposits, loan interest rates and monetary policy (z). Thus the loan supply equation is represented as:

$$L_i^S = \mu_i D_i + \phi_4 i_L - \phi_5 i \quad 7$$

Another important assumption of the model employed in this study is that institutions in the banking sector do not depend on loan demand to

the same extent. Thus, the model includes a term (x) which accounts for the impact of informational asymmetries. This term is represented as:

$$\mu_i = \mu_0 - \mu_1 x_i \qquad 8$$

The following reduced form can be derived from the loan market clearing conditions as well as equations (5) and (8):

$$L_i = \frac{\phi_1\phi_4 usx + \phi_2\phi_4 infl - (\phi_5 + \mu_1\psi)\phi_3 i + \mu_1\psi\phi_3 ix_i + \mu_0\phi_3\chi - \mu_1\phi_3\chi x_i}{\phi_3 + \phi_4} \qquad 9$$

which can be expressed as:

$$L_i = ausx + b\,infl - c_0 i + c_1 ix + dx_i + const\ , \qquad 10$$

where $c_1 = \frac{\mu_1\psi\phi_3}{\phi_3 + \phi_4}$ describes the interaction of bank lending and monetary policy.

Assuming that all institutions have the same interest rate loan demand elasticity (ϕ_3 is the same for all banks so that it is independent of bank characteristics), then the statistical significance of this coefficient would indicate that monetary policy affects bank lending.

Given that the empirical model allows for dynamic movements and informational asymmetries, the regression model is written as:

$$\Delta log(\ L_{it}\ ) = \sum_{j=1}^{m} a_j \Delta log(\ L_{it-j}\ ) + \sum_{j=0}^{m} b_j MPI_{t-j} + \sum_{j=0}^{m} c_j \Delta usx_{t-j} +$$
$$\sum_{j=0}^{m} d_j\ infl_{t-j} + e_j x_{it-1} + \sum_{j=0}^{m} f_{1j} x_{it-1}\Delta MPI_{t-j} +$$
$$\sum_{j=0}^{m} f_{2j} x_{it-1}\ infl_{t-j} + \sum_{j=0}^{m} f_{3j} x_{it-1}\Delta usx_{t-j} + \varepsilon_{it} \qquad 11$$

where $i = 1,\ldots,N$ institutions, $t = 1,..,T$ periods, m is the number of lags, L is the value of the loans; and MPI is the monetary policy indicator. The monetary policy indicator used was 30-day reverse repurchase rate.

Following the procedure in Ehrmann et al. (2001), the bank characteristics used to estimate Equation (11) are normalized with respect to averages across all banks. The size characteristic, however, is normalized with respect to each month to remove nominal trends. The formulae for the normalized bank characteristics are as follows:

$$Size = log(assets)_{it} - \frac{1}{N_t}\sum_i log(assets)_{it} \qquad 12$$

$$Liquidity = \frac{total\quad liquid\quad assets_{it}}{total\quad assets_{it}} - \frac{1}{T}\sum_t \left(\frac{1}{N_t}\sum_i \frac{total\quad liquid\quad assets_{it}}{total\quad assets_{it}} \right) \qquad 13$$

$$Capitalization = \frac{capital\quad base_{it}}{total\quad assets_{it}} - \frac{1}{T}\sum_t \left(\frac{1}{N_t}\sum_i \frac{capital\quad base_{it}}{total\quad assets_{it}} \right) \qquad 14$$

5.0 Empirical Results

5. 1 An Aggregated Approach

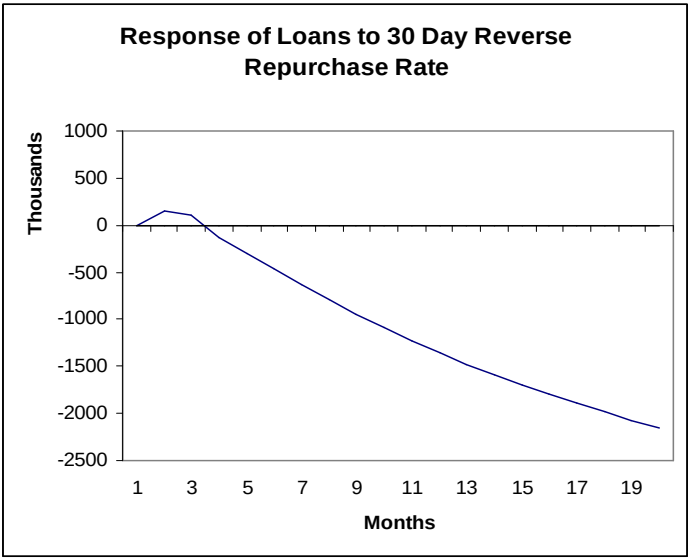
To compute the preliminary test of the reaction of bank lending to monetary policy, the primary monetary indicator was examined against total bank loans. The experimental results of the VEC models show total loans distributed by the sector were most responsive to changes in the 30-day reverse repurchase rate.[8] The VEC model was the appropriate model

[8] It is not unrealistic that loans would be most responsive to the 30-day reverse repurchase rate as the reverse repurchase rate is the Bank of Jamaica's dominant indirect policy tool.

as both of the variables were nonstationary and when tested were cointegrated to the order of one. The impulse response functions for this model show that, as expected, the value of loans will decrease significantly after two periods following a positive shock in the 30-day reverse repurchase rate (see Figure 2[9]).

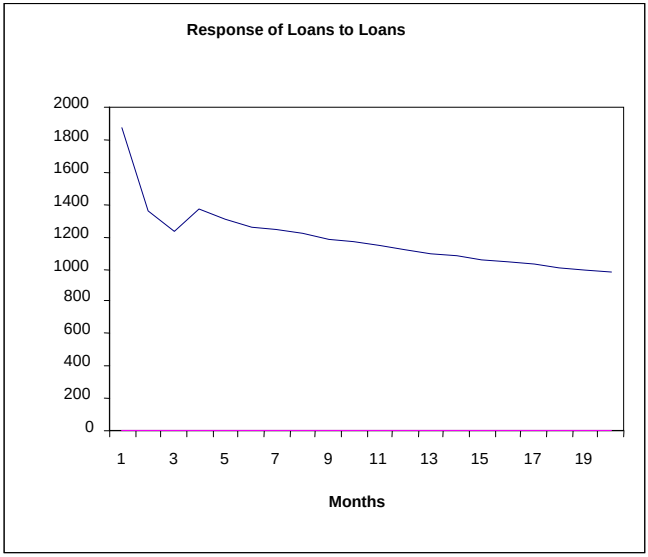
The variance decomposition of the VEC model shows that the shocks to the 30-day reverse repurchase rate begins to contribute significantly to an increase in the value of loans after the fourth month (Figure 4[10]). Loans increase steadily to approximately sixty per cent within 20 months following the shock. Further, the results of the Granger causality test reject the null hypothesis that the 30-day reverse repurchase rate does not Granger-cause the change in the value of loans (Table 1).

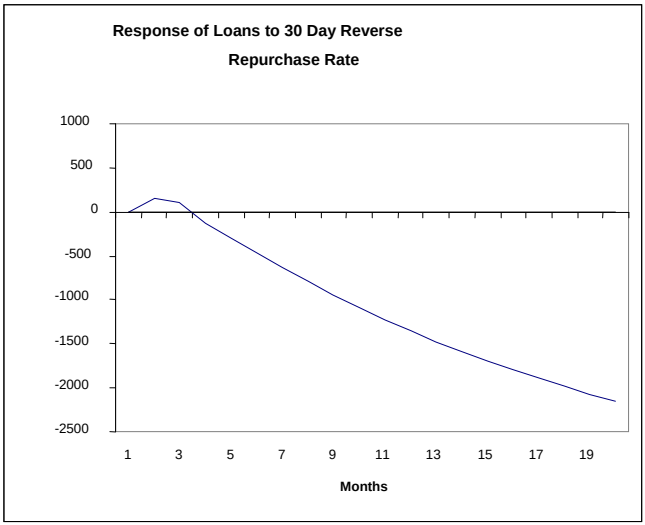
Figure 2: Impulse Response Function



[9] See Appendix for all Impulse Response Functions (see Figure 3)
[10] See Appendix for all Variance Decomposition Graphs (see Figure 5)

Figure 3: Impulse Response Functions: Loans and 30 Day Reverse Repurchase Rate





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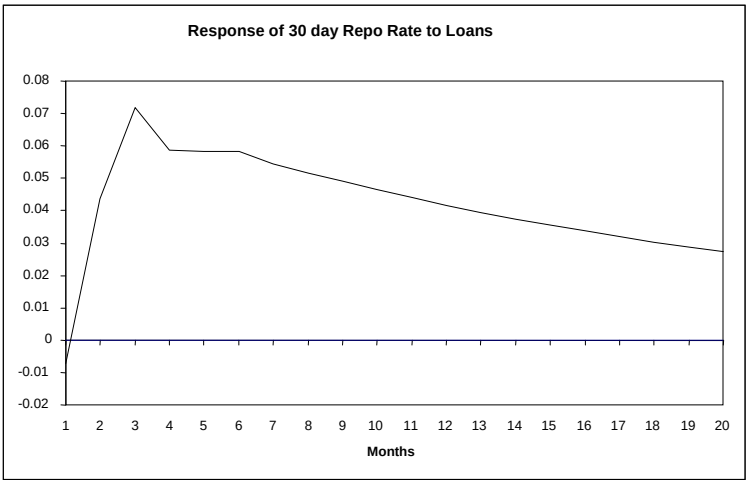


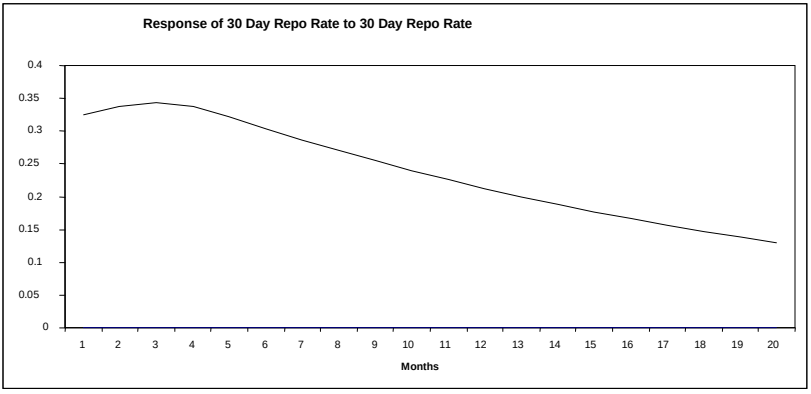


Figure 4: Variance Decomposition

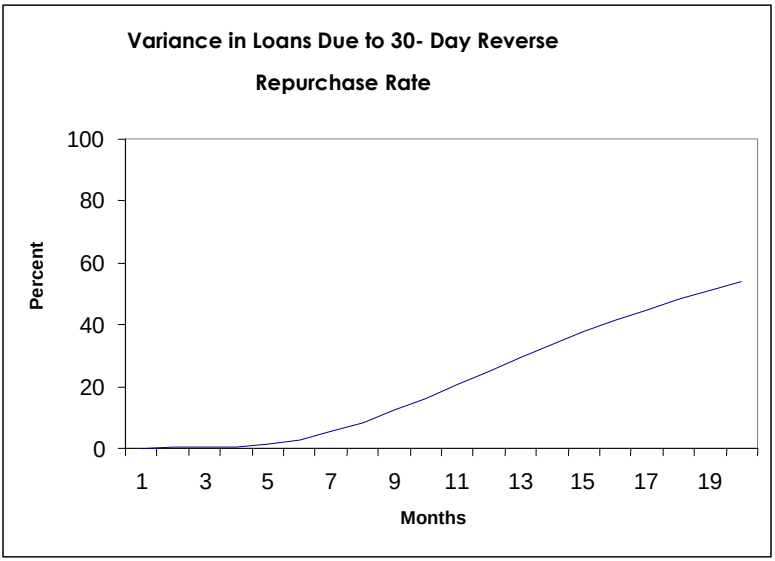
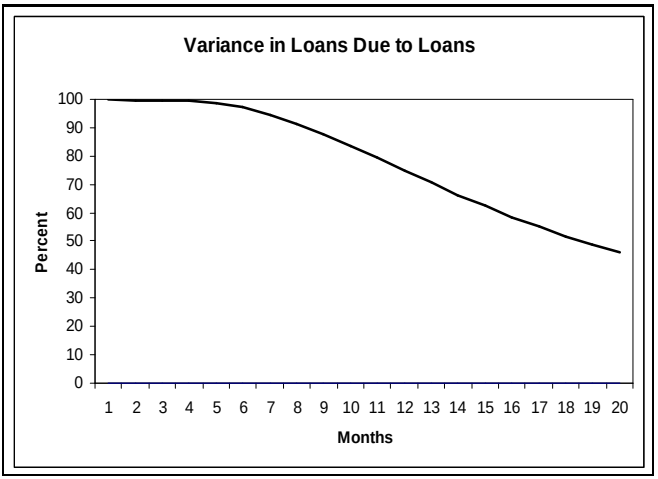


Figure 5: Variance Decomposition Graphs: Loans and 3O-Day Reverse Repurchase Rate



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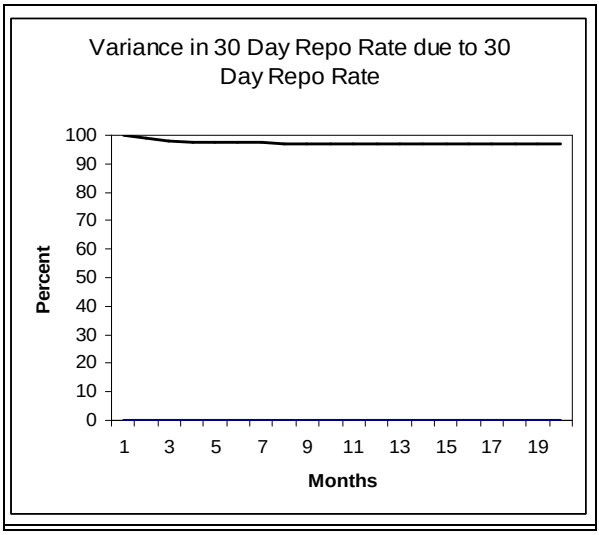

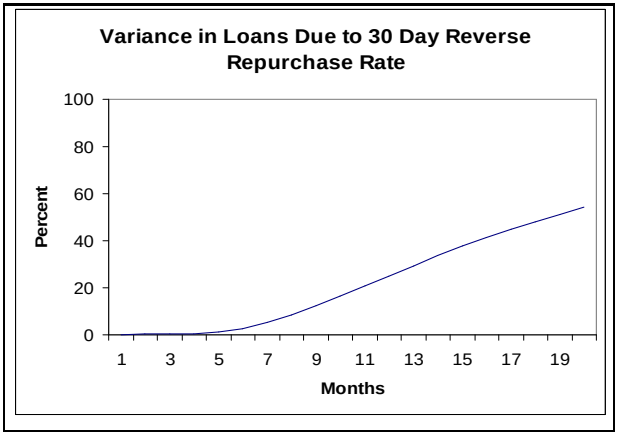

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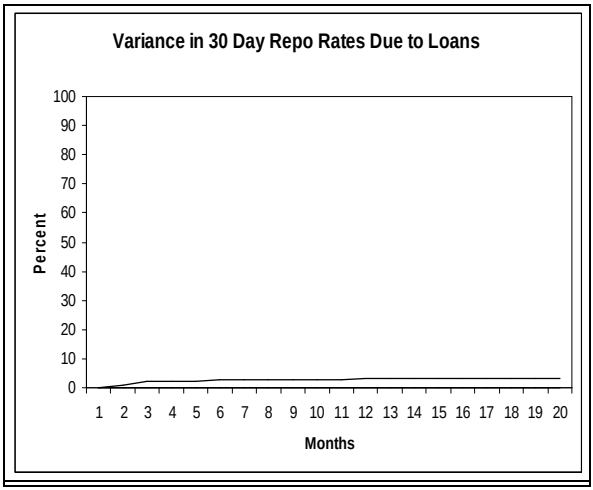

Table 1: Granger Causality Tests

	F-Statistic	P-Value
Null Hypothesis:		
30-day reverse does not Granger cause Loans	4.72691	0.01212**

**significant at the 5% level of significance

Combining the results of the variance decomposition, impulse response functions and the Granger causality test, there is demonstrated evidence that loans respond to changes in the 30-day reverse repurchase rate. Hence, it is not unreasonable to suggest the existence of the bank-lending channel in Jamaica.

5.2 Bank Lending and Bank Characteristics

Having established the relevance of the bank lending channel, the GMM method was used to examine the impact of the monetary policy in Jamaica as it relates to disaggregated bank data. For all of the models, the parsimonious lag order Schwartz Information Criterion was used to determine the appropriate number of lags to be included in the model.[11] The results revealed that the ideal number of lags to be included in the model is three (see Table 2).

The results of the GMM tests are reported in Tables 3, 4, 5 and 6. The variables used in the model were tested for stationarity using the panel unit root tests. In instances where the variables were found to be non-stationary the differences were used. The logarithm of the loans, the 30-day reverse repurchase rate and the exchange rate were first-differenced. The reported coefficients are the sum of the significant coefficients of the current variable and its lags. In the instance where one or more of the estimates for the variable and its lags were significant, or all of the coefficients were insignificant, a Wald test was performed.[12]

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[11] SIC is an appropriate criterion as there is a large number of observations and it accounts for the inclusion of variables and as such the lags are not overparameterized.

[12] The Wald statistic is calculated as $W=(Rb-r)'(Rs^2(X'X)^{-1}R')^{-1}(Rb-r)$, where the null hypothesis is written as $H_0 : R\beta - r = 0$. If all of the values in a group were insignificant, the Wald Test determines if the variable actually has an effect that was not determined to be individually significant in the model due to multicollinearity.

Table 2: Lag Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-12676.96	NA	80360.42	22.64579	22.71746	22.67288
1	-7293.319	10690.45	5.571979	13.06926	13.21261	13.12344
2	-7001.852	576.6933	3.408548	12.57779	12.79283	12.65907
3	-6908.944	183.1646	2.97153	12.44058	12.72729*	12.54894
4	-6869.155	78.15838	2.848071	12.39813	12.75653	12.53359
5	-6852.369	32.8518	2.844115	12.39673	12.82681	12.55928
6	-6834.204	35.42289	2.833193	12.39287	12.89462	12.58251
7	-6789.426	86.99981	2.691453	12.34153	12.91496	12.55826
8	-6738.48	98.62002*	2.528837*	12.27918*	12.92429	12.52300*

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

Table 3 reports the results of the model examining the effects of the size characteristic. An insignificant Sargan statistic suggests that the instruments used in the model are valid. The results of the model indicate that there is a significant negative relationship between current loan values and previous loan values. Additionally, statistically significant positive relationships exist between the dependent variable and the exchange rate, as well as the interaction terms of size with inflation and size with the exchange rate. Statistically, inflation in this model has no impact on the change of bank loans. The 30-day reverse repurchase rate, size, and interactions of the size with inflation and exchange rate have no impact on the loans, which implies that size is not significant in determining the impact of the bank lending channel.

In Table 4, the capitalization characteristic is examined. The significant variables in the model are the lag of the loans, the 30-day reverse repurchase rate, the exchange rate, as well as the interaction terms of capitalization with the 30-day reverse repurchase rate and with the exchange rate. Negative relationships are established between the lags of repurchase rate, the 30-day reverse repurchase rate and the interaction of capitalization with exchange rates. Like the previous model, this model also has valid instruments (See Appendix) as the Sargan statistic is insignificant.

Table 5 presents the results from examining the effects of liquidity on the bank lending channel. The significant values in the model are the exchange rate and liquidity, as well as the interaction of liquidity with the exchange rate. All of the significant values in the model have a positive relationship with the dependent variable. As with the previous models, the Sargan statistic is insignificant.

Table 3: Model 1

	Variables	Size		
first differences	Logl	-0.2393	*0.0000*	***
	30 Day Repo Rate	-0.2078	*0.5726*	
	J$/US$ Exchange Rate	0.0389	*0.0084*	***
	Inflation	0.0000	*0.0197*	**
	Size(-1)	-0.0026	*0.3525*	
	Size(-1)*30 Day Repo Rate	-0.0073	*0.6755*	
	Size(-1)*Inflation	0.0000	*0.0860*	*
	Size (-1)* Exchange Rate	0.0021	*0.3342*	**
	St. Err. of Regression	0.3746		
	Sargan p-value	0.9999999		

* /**/*** denote significance at level 10%/5%/1% level.

Table 4: Model 2

	Variables	Capitalisation		
first differences	Loans (lags)	-0.3855	*0.0006*	***
	30 Day Repo Rate	-0.0324	*0.0575*	*
	J$/US$ Exchange Rate	0.0513	*0.0179*	**
	Inflation	0.0000	*0.6989*	
	Capitalisation(-1)	0.9094	*0.3364*	
	Capitalisation(-1)*30day	0.0882	*0.0615*	*
	Capitalisation(-1)*Inflation	-0.0001	*0.6185*	
	Capitalisation(-1)* Exchange Rate	-0.0732	*0.0036*	***
	St. Err.of Regression	0.3574		
	Sargan p-value	0.99999999		

*/**/*** denote significance at level 10%/5%/1% level.

Table 5: Model 3

	Variables	Liquidity Sum of Coefficients	P-Value	
first differences	Loans (lags)	-0.2976	*0.4778*	
	30 Day Repo Rate	-0.0732	*0.2003*	
	J$/US$ Exchange Rate	0.0855	*0.0672*	*
	Inflation	0.0119	*0.8855*	
	Liquidity(-1)	0.9416	*0.0654*	*
	Liquidity(-1)*30 day Repo Rate	-0.2553	*0.1681*	
	Liquidity(-1)*Inflation	-0.0001	*0.5985*	
	Liquidity(-1)*Exchange Rate	0.0575	*0.0612*	*
	Sargan p-value	0.9999		
	St. Err of Regression	0.3350		

*/**/*** denote significance at level 10%/5%/1% level.

Table 6 presents the results for the model which examined the effects of all the characteristics simultaneously on the bank lending channel. The significant variables are the lagged loans, the 30-day reverse repurchase rate, exchange rate, size, liquidity, as well as the interaction terms of the characteristics with the 30-day reverse repurchase rate and the interaction terms of the exchange rate with liquidity and with capitalization. In this model, there are negative relationships between the dependent variable and the lagged loans, the 30-day reverse repurchase rate, as well as the interaction term of the 30-day reverse repurchase rate and the liquidity variable and the interaction terms of exchange rate with liquidity and with capitalization. The remaining coefficients are positive. The models all have insignificant Sargan statistics.

Table 6: Model 4

	Variables	Size, Liquidity, Capitalizaton		
first differences	Loans(lags)	-0.2801	*0.0225*	*
	30 Day Repo Rate	-0.2886	*0.0557*	***
	J$/US$ Exchange Rate	0.1652	*0.0539*	**
	Inflation	0.0200	*0.6180*	
	Size(-1)	-0.0076	*0.0557*	*
	Liquidity(-1)	0.9327	*0.0137*	**
	Capitalisation(-1)	0.4576	*0.3196*	
	Size(-1)*30 day Repo	0.0126	*0.0721*	*
	Size(-1)*Exchange Rate	0.0018	*0.1293*	
	Size(-1)*Inflation	0.0000	*0.3025*	
	Liquidity(-1)*30 Day Repo	-0.0323	*0.0209*	***
	Liquidity(-1)*Exchange Rate	-0.0687	*0.0163*	**
	Liquidity(-1)* Inflation Rate	-0.0001	*0.2063*	
	Capitalisation(-1)*30 Day Rate	0.4590	*0.0011*	***
	Capitalisation(-1)*Exchange Rate	-0.1989	*0.0000*	***
	Capitalisation(-1)* Inflation Rate	-0.0001	*0.2000*	
	St. Err. of Regression	0.3330		
	Sargan p - value	0.9987		

*/**/*** denote significance at level 10%/5%/1% level.

All of the models exhibit insignificant Sargan statistics which indicate that they have good instruments and represent legitimate models. However, the best of these models, and thus the model of choice, is the model that includes all of the characteristics. This model has the lowest standard error and although all the variables are not significant the variables that are significant tend to have good explanatory power.

Based on this model, the change in bank loans exhibits a 28.01 percentage decrease when lagged loans decrease by one percentage point and decrease by a 28.86 percentage following a positive change in the 30-day reverse repurchase rate. The negative relationship between the loans and the monetary policy indicator confirms the existence of the bank lending channel, as the tightening of monetary policy is followed by a decrease in the change of loans. The estimates of this model further suggest that the change in loans will decrease by 3.23 percentage points if the multiplicative interaction term of liquidity and the 30-day reverse repurchase rate increases by one unit. A one unit change in the interaction term of size and the monetary policy indicator will cause the change in the percentage change of loans to increase by 1.26 percent. From Table 6 it can be observed that there are negative coefficients for the exchange rate interactions with liquidity and capitalization. The coefficients for these variables suggest that there will be a 6.87 percentage decrease in loans if the interaction term for the exchange rate and liquidity unit increases, while there will be a 19.89 percentage decrease in loans for every one unit difference in the interaction term of capitalization with exchange rate. [13]

The model also holds implications for general bank behaviour. In fact the model suggests that as bank size increases by one percent, bank loans decrease by 0.76 percent. This implies that the larger banks provide less credit than their smaller counterparts. It was expected that the smaller banks would have provided less credit. This result is only significant at the ten percent level of significance; however, it could be

[13] The value of the estimates – explained for the purpose of exposition – do not carry as much importance as the signs of the coefficients.

indicative of a change in the amount of credit being provided by banks changing by smaller amounts as the size of the institution increases. The positive coefficient of the liquidity term suggests that, as expected, the more liquid banks provide more credit. The positive exchange rate coefficient was also expected. The intuition behind this expectation is that an increase in the exchange rate implies a depreciation of the Jamaica dollar which would create the need for increased amounts of domestic currency required to purchase items denominated in local and foreign currencies.

Taking into consideration the preliminary tests, performed using the VEC model, which suggested the relevance of the bank lending channel in Jamaica, the statistically significant negative coefficient on the 30-day reverse repurchase rate was expected as a tightening of monetary policy would decrease the amount of credit distributed within the economy.[14]

When size was interacted with the monetary policy indicator, the positive coefficient was also significant and shows by the relatively large coefficient that size plays an important role in the efficacy of monetary policy on bank lending. Thus banks with a larger asset base are expected to be less responsive to monetary policy changes. This implies that the tightening of monetary policy will lead to a greater decrease in loans for smaller institutions.

The results further show that more liquid banks have a larger lending portfolio, but that, contrary to expectations, less liquid banks are less responsive to monetary policy changes. Evidence of such a contradiction is suggested by the negative coefficient of the interaction term of liquidity and the 30-day reverse repurchase rate. This can be explained, in the case of Jamaica, as more liquid banks have a larger portion of their investment portfolio as Government of Jamaica (GOJ) securities. Since the less liquid banks would then have a smaller portion of their portfolio in the form of GOJ securities it is reasonable that these

[14] Contractionary monetary policy, or a tightening in monetary policy, is represented by an increase in the 30-day reverse repurchase rate.

institutions would be less prone to experience the effects of shocks in monetary policy. The positive coefficient on the capitalization interaction term suggests that, as expected, less capitalized banks are more responsive to monetary policy than their more capitalized counterparts.

Examining interaction terms of the macroeconomic variables and the bank characteristics, there is a significant negative coefficient for the interaction of liquidity with the exchange rate and a significant negative coefficient for the interaction of capitalization with the exchange rate. These values suggest that liquidity and capitalization are important factors that work together with exchange rates to influence the total value of loans that a bank supplies. Given the positive coefficient of J$/US$ exchange rate in the model, the signs of the coefficients indicate that the amount of loans provided by more liquid and more capitalized banks will respond less to changes in the exchange rate. Considering this impact that the US$ exchange rate may have on the amount of loans provided it is useful to disaggregate liquidity into domestic and foreign liquidity to observe the impact that foreign and local liquidity have on the bank lending channel.

5.3 Disaggregating Liquidity

Table 7 reports the results of the model estimated with all of the bank characteristics after disaggregating liquidity. The bank characteristics are now represented by size, capitalization, domestic liquidity, and foreign liquidity (which is the Jamaican Dollar equivalent of liquid assets held in US currency). As in the previous estimates of the models these variables were normalized. The significant variables in this model are the lags of the loan, the 30-day reverse repurchase rate, the exchange rate, the interaction terms of 30-day reverse repurchase rate with all the characteristics, and the interaction terms of exchange rate with all the characteristics. The Sargan value for this model is 1.0 which is insignificant.

Like Model 4, Model 5 accepts evidence of the existence of the bank lending channel with the negative coefficient of the monetary indicator; however, none of the bank characteristics have a direct

significant impact on the value of loans provided by the banks. The negative sign on the estimate for the size/30-day reverse repurchase rate interaction term and positive sign of the estimate for the capitalization/30-day reverse repurchase rate interaction term suggest that smaller and more capitalized banks are less impacted by shocks in monetary policy. The negative coefficient of the size and 30-day reverse repurchase rate contradicts expectations and the previous results presented in Model 4. Another interesting result is that the banks' domestic liquidity and foreign liquidity have opposite effects on the bank lending channel. From the positive coefficient for the interaction of the 30-day reverse repurchase rate and the domestic liquidity, and the negative coefficient for the interaction of the 30-day reverse repurchase rate and the US liquidity, the more domestically liquid banks and the less foreign liquid banks will be less impacted by monetary tightening shocks. The differing impacts of the domestic and foreign liquidity on the bank lending channel are not unexpected as monetary policy is designed to control domestic currency price stability. Hence, as expected, more domestically liquid banks will not be as affected by tightening in monetary policy as their less domestically liquid counterparts since they will be better able to protect their loan position from monetary policy shocks. Further, the more foreign liquid banks may respond more to the monetary tightening as they may find it more difficult to access these foreign funds at the time of the shock.

In this model, the exchange rate also plays an important role in the bank lending channel by both impacting directly on loans and having this impact being influenced by the bank characteristics. The direct impact of the J$/US$ exchange rate in this model is positive, which is in line with expectations and the results of Model 4. There is also a positive impact on bank loans from the interaction of the specified exchange rate and size, US liquidity and capitalization. Given the positive direct impact of exchange rates on bank loans, the signs of the positive coefficients suggest that larger, more capitalized banks will be more impacted by changes in the exchange rates. The impact of size could simply be that larger banks hold more foreign exchange. Also, it is for obvious reasons that banks

Table 7: Model 5

	Variables	Size, Liquidity, Capitalization	P- Value	
first differences	Loans(lags)	-0.5729	*0.0000*	***
	30 Day Repo Rate	-0.1663	*0.0332*	**
	J$/US$ Exchange Rate	0.1712	*0.0687*	*
	Inflation	0.0001	*0.4705*	
	Size(-1)	-0.0021	*0.5107*	
	Domestic Liquidity(-1)	0.2311	*0.1644*	
	US Liquidity(-1)	0.2534	*0.4484*	
	Capitalisation(-1)	0.1153	*0.5922*	
	Size(-1)*30 day Repo	-0.0135	*0.0101*	**
	Size(-1)*Exchange Rate	0.0009	*0.0868*	*
	Size(-1)*Inflation	0.0000	*0.9294*	
	Dom. Liq.(-1)*30 Day Repo	0.3038	*0.0922*	*
	Dom. Liq.(-1)*Exchange Rate	-0.3063	*0.0312*	**
	Dom. Liq.(-1)* Inflation Rate	-0.0001	*0.2646*	
	US Liq(-1)*30 Day Repo Rate	-3.8717	*0.0036*	***
	US Liq(-1)*Exchange Rate	0.4424	*0.0641*	*
	US Liq(-1)* Inflation Rate	-0.0004	*0.1567*	
	Capitalisation(-1)*30 Day Rate	0.3763	*0.0054*	***
	Capitalisation(-1)*Exchange Rate	0.1363	*0.0000*	***
	Capitalisation(-1)* Inflation Rate	0.0000	*0.7923*	
	St. Err. of Regression	0.3173		
	Sargan p - value	1.0000		

*/**/*** denote significance at level 10%/5%/1% level

that are more foreign liquid would be more influenced by exchange rates. There is a negative coefficient for the interaction terms of the exchange rate and the domestic interest rates. This coefficient provides evidence to suggest that the more domestically liquid institutions will be less impacted by the exchange rates.

The results of the estimates in this model that correspond to the signs of the estimate in Model 4 are the lags of loans, the 30-day reverse repurchase rate, the exchange rate, and the capitalization and 30-day reverse repurchase rate interaction term. Contrary results exist between the two models for size, capitalization, the size and 30-day reverse repurchase rate interaction term, the size and exchange rate interaction term, and the capitalization and exchange rate interaction term. Thus certain conclusions based on these variables cannot be definitely extracted from examining both of these models.

The inferences that are clear from examining Models 4 and 5 are that the lags of loans and monetary policy impact bank loans negatively. Thus the bank lending channel exists in Jamaica. Exchange rates have a positive impact on bank loans. Size, liquidity, and capitalization all have an impact on the bank lending channel, even if the direction of the impact is ambiguous. Also, capitalization and liquidity affect the impact that the exchange rates will have on the bank lending channel. Further these models do not show evidence that inflation plays a significant role in the bank lending channel in Jamaica.

6.0 Conclusion

This paper seeks to establish the relevance of the bank lending channel in Jamaica, as well as determine how individual bank lending characteristics affect the efficacy of this channel. The results suggest that the bank lending channel exists as tightening monetary policy leads to a reduction in the loan portfolio. This channel works through the 30-day reverse repurchase rate. Importantly, however, bank characteristics such as size, liquidity and capitalization influence the efficacy of the transmission

process. In other words, banks do not react homogeneously to monetary policy changes, given the informational asymmetries that they face.

The results of this paper are useful to the monetary authorities as the implications are that size, liquidity and capitalization affect the lending channel. Direct implications also relate to the maintenance of stability within the banking sector. While the monetary authorities seek to influence price stability, their policy actions can and do affect the financial system's stability. Given the relatively recent financial sector crisis, more attention must be given to the impact of monetary policy on the balance sheets of individual banks. Thus it is recommended that keen attention be paid to the idiosyncrasies presented by the structure of the banking sector and the movements in the value of the local currency.

Currently the Bank of Jamaica has set different liquidity requirements for commercial banks, merchant banks and building societies. This suggests that monetary policy authorities are aware of the possibility that bank characteristics may have on the impact of the policies they implement; therefore, policy might be improved by having different liquidity requirements for institutions based on bank characteristics such as size and capitalization. This would help prevent vulnerable banks exposure to the negative, unintended effects of monetary policy. Implementing policy at strategic moments in the fluctuations of the Jamaican Dollar is another objective that is recommended for policy makers. For example, implementing contractionary monetary policy during a period of depreciation may buffer the impact of depreciation on the less liquid banks.

Although it will be useful for monetary authorities to improve the individual characteristic regulations, the onus to protect the institution must not be placed squarely on the shoulders of policy makers. In fact, it is necessary for the managers of the individual organizations to have systems in place to manage their balance sheets so that they can withstand the damaging unplanned effects of monetary policy shocks. Thus arbitrage is prevented by aiming to regulate all banking institutions in a way that will protect against the harmful impacts of monetary policy without making the policy ineffective.

The overall implication of this study is that monetary policy is most effective on smaller, less capitalized banks rather than large, more capitalized banks. Additionally, less liquid banks were found to be less responsive to monetary policy changes. Other results highlight the importance that the exchange rate has on the size and liquidity of banks as it relates to loan supply. Future research can seek to determine how bank characteristics in Jamaica influence one another in the bank lending channel mechanism. Further, it may be insightful to disaggregate bank loans into their foreign and domestic components, as monetary policy is directed at the local currency stability.

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APPENDIX
Instrument List

MODEL 1
Logl (-1)
Logl(-2)
Log(-3)
30 Day Repo Rate
30 Day Repo Rate(-1)
30 Day Repo Rate(-2)
30 Day Repo Rate(-3)
J$/US$ Exchange Rate
J$/US$ Exchange Rate (-1)
J$/US$ Exchange Rate (-2)
J$/US$ Exchange Rate (-3)
Inflation
Inflation (-1)
Inflation(-2)
Inflation(-3)
Size (-1)
Size(-1)*30 Day Repo Rate
Size(-1)*30 Day Repo Rate (-1)
Size(-1)*30 Day Repo Rate (-2)
Size(-1)*30 Day Repo Rate (-3)
Size(-1)* J$/US$ Exchange Rate
Size(-1)* J$/US$ Exchange Rate (-1)
Size(-1)* J$/US$ Exchange Rate (-2)
Size(-1)* J$/US$ Exchange Rate (-3)
Size(-1)*Inflation
Size(-1)*Inflation(-1)
Size(-1)*Inflation(-2)
Size(-1)*Inflation(-3)

MODEL 2
Logl (-1)
Logl(-2)
Log(-3)
30 Day Repo Rate
30 Day Repo Rate(-1)
30 Day Repo Rate(-2)
30 Day Repo Rate(-3)
J$/US$ Exchange Rate
J$/US$ Exchange Rate (-1)
J$/US$ Exchange Rate (-2)
J$/US$ Exchange Rate (-3)
Inflation
Inflation (-1)
Inflation(-2)
Inflation(-3)
Capitalisation(-1)
Capitalisation (-1)*30 Day Repo Rate
Capitalisation (-1)*30 Day Repo Rate (-1)
Capitalisation (-1)*30 Day Repo Rate (-2)
Capitalisation (-1)*30 Day Repo Rate (-3)
Capitalisation (-1)* J$/US$ Exchange Rate
Capitalisation (-1)* J$/US$ Exchange Rate (-1)
Capitalisation (-1)* J$/US$ Exchange Rate (-2)
Capitalisation (-1)* J$/US$ Exchange Rate (-3)
Capitalisation (-1)*Inflation
Capitalisation (-1)*Inflation(-1)
Capitalisation (-1)*Inflation(-2)
Capitalisation (-1)*Inflation(-3)

MODEL 3
Logl (-1)
Logl(-2)
Log(-3)
30 Day Repo Rate
30 Day Repo Rate(-1)
30 Day Repo Rate(-2)
30 Day Repo Rate(-3)
J$/US$ Exchange Rate
J$/US$ Exchange Rate (-1)
J$/US$ Exchange Rate (-2)
J$/US$ Exchange Rate (-3)
Inflation
Inflation (-1)
Inflation(-2)
Inflation(-3)
Liquidity(-1)
Liquidity (-1)*30 Day Repo Rate
Liquidity (-1)*30 Day Repo Rate (-1)
Liquidity (-1)*30 Day Repo Rate (-2)
Liquidity (-1)*30 Day Repo Rate (-3)
Liquidity (-1)* J$/US$ Exchange Rate
Liquidity (-1)* J$/US$ Exchange Rate (-1)
Liquidity (-1)* J$/US$ Exchange Rate (-2)
Liquidity (-1)* J$/US$ Exchange Rate (-3)
Liquidity (-1)*Inflation
Liquidity (-1)*Inflation(-1)
Liquidity (-1)*Inflation(-2)
Liquidity (-1)*Inflation(-3)

MODEL 4
Logl (-1)
Logl(-2)
Log(-3)
30 Day Repo Rate
30 Day Repo Rate(-1)
30 Day Repo Rate(-2)
30 Day Repo Rate(-3)

J$/US$ Exchange Rate
J$/US$ Exchange Rate (-1)
J$/US$ Exchange Rate (-2)
J$/US$ Exchange Rate (-3)
Inflation
Inflation (-1)
Inflation(-2)
Inflation(-3)
Liquidity(-1)
Liquidity (-1)*30 Day Repo Rate
Liquidity (-1)*30 Day Repo Rate (-1)
Liquidity (-1)*30 Day Repo Rate (-2)
Liquidity (-1)*30 Day Repo Rate (-3)
Liquidity (-1)* J$/US$ Exchange Rate
Liquidity (-1)* J$/US$ Exchange Rate (-1)
Liquidity (-1)* J$/US$ Exchange Rate (-2)
Liquidity (-1)* J$/US$ Exchange Rate (-3)
Liquidity (-1)*Inflation
Liquidity (-1)*Inflation(-1)
Liquidity (-1)*Inflation(-2)
Liquidity (-1)*Inflation(-3)
Capitalisation(-1)
Capitalisation (-1)*30 Day Repo Rate
Capitalisation (-1)*30 Day Repo Rate (-1)
Capitalisation (-1)*30 Day Repo Rate (-2)
Capitalisation (-1)*30 Day Repo Rate (-3)
Capitalisation (-1)* J$/US$ Exchange Rate
Capitalisation (-1)* J$/US$ Exchange Rate (-1)
Capitalisation (-1)* J$/US$ Exchange Rate (-2)
Capitalisation (-1)* J$/US$ Exchange Rate (-3)
Capitalisation (-1)*Inflation
Capitalisation (-1)*Inflation(-1)
Capitalisation (-1)*Inflation(-2)
Capitalisation (-1)*Inflation(-3)
Size (-1)
Size(-1)*30 Day Repo Rate
Size(-1)*30 Day Repo Rate (-1)
Size(-1)*30 Day Repo Rate (-2)
Size(-1)*30 Day Repo Rate (-3)
Size(-1)* J$/US$ Exchange Rate
Size(-1)* J$/US$ Exchange Rate (-1)
Size(-1)* J$/US$ Exchange Rate (-2)
Size(-1)* J$/US$ Exchange Rate (-3)
Size(-1)*Inflation
Size(-1)*Inflation(-1)
Size(-1)*Inflation(-2)
Size(-1)*Inflation(-3)

MODEL 5

Logl (-1)
Logl(-2)
Log(-3)
30 Day Repo Rate
30 Day Repo Rate(-1)
30 Day Repo Rate(-2)
30 Day Repo Rate(-3)
J$/US$ Exchange Rate
J$/US$ Exchange Rate (-1)
J$/US$ Exchange Rate (-2)
J$/US$ Exchange Rate (-3)
Inflation
Inflation (-1)
Inflation(-2)
Inflation(-3)
US Liquidity(-1)
US Liquidity (-1)*30 Day Repo Rate
US Liquidity (-1)*30 Day Repo Rate (-1)
US Liquidity (-1)*30 Day Repo Rate (-2)
US Liquidity (-1)*30 Day Repo Rate (-3)
US Liquidity (-1)* J$/US$ Exchange Rate
US Liquidity (-1)* J$/US$ Exchange Rate (-1)
US Liquidity (-1)* J$/US$ Exchange Rate (-2)
US Liquidity (-1)* J$/US$ Exchange Rate (-3)
US Liquidity (-1)*Inflation
US Liquidity (-1)*Inflation(-1)
US Liquidity (-1)*Inflation(-2)
US Liquidity (-1)*Inflation(-3)
Capitalisation(-1)
Capitalisation (-1)*30 Day Repo Rate
Capitalisation (-1)*30 Day Repo Rate (-1)
Capitalisation (-1)*30 Day Repo Rate (-2)
Capitalisation (-1)*30 Day Repo Rate (-3)
Capitalisation (-1)* J$/US$ Exchange Rate
Capitalisation (-1)* J$/US$ Exchange Rate (-1)
Capitalisation (-1)* J$/US$ Exchange Rate (-2)
Capitalisation (-1)* J$/US$ Exchange Rate (-3)
Capitalisation (-1)*Inflation
Capitalisation (-1)*Inflation(-1)
Capitalisation (-1)*Inflation(-2)
Capitalisation (-1)*Inflation(-3)
Size (-1)
Size(-1)*30 Day Repo Rate
Size(-1)*30 Day Repo Rate (-1)
Size(-1)*30 Day Repo Rate (-2)
Size(-1)*30 Day Repo Rate (-3)
Size(-1)* J$/US$ Exchange Rate

Size(-1)* J$/US$ Exchange Rate (-1)
Size(-1)* J$/US$ Exchange Rate (-2)
Size(-1)* J$/US$ Exchange Rate (-3)
Size(-1)*Inflation
Size(-1)*Inflation(-1)
Size(-1)*Inflation(-2)
Size(-1)*Inflation(-3)
Domestic Liquidity(-1)
Domestic Liquidity (-1)*30 Day Repo Rate
Domestic Liquidity (-1)*30 Day Repo Rate (-1)
Domestic Liquidity (-1)*30 Day Repo Rate (-2)
Domestic Liquidity (-1)*30 Day Repo Rate (-3)
Domestic Liquidity (-1)* J$/US$ Exchange Rate
Domestic Liquidity (-1)* J$/US$ Exchange Rate (-1)
Domestic Liquidity (-1)* J$/US$ Exchange Rate (-2)
Domestic Liquidity (-1)* J$/US$ Exchange Rate (-3)
Domestic Liquidity (-1)*Inflation
Domestic Liquidity (-1)*Inflation(-1)
Domestic Liquidity (-1)*Inflation(-2)
Domestic Liquidity (-1)*Inflation(-3)