THE IMPACT OF REGULATORY MEASURES ON
COMMERCIAL BANK INTEREST RATES:
A MICRO ANALYSIS OF THE BARBADOS CASE

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Abstract

Since the establishment of the Central Bank of Barbados in 1972, commercial banks have been subjected to a wide variety of regulatory controls. In this study, we estimate the impact, on commercial banks' interest-rate behaviour, of the more pervasive regulatory measures adopted by the Central Bank. We present a model of commercial banking interest rate behaviour and estimated the system of the reduced form equations derived therefrom. The policy variables included in the system are: the bank rate, the average lending rate ceiling, the cash reserve ratio, the stipulated government securities ratio, and the savings deposits rate floor. The results indicate that the cash ratio, the stipulated government securities ratio and the savings deposits rate floor impacted significantly on the loan rate for every bank. However, these three measures had a less pervasive influence on the deposit rate. In general, the deposit rate for any given bank has been responsive to fewer policy variables than the loan rate. The loan rates, though generally responsive to all policy variables other than the bank Rate, has exhibited very low elasticities. The loan and deposits rates have been most responsive to changes in the stipulated government securities ratio. The cash reserve ratio has had the second strongest effect. The results indicated that the ceiling on the average lending rate, when it existed, depressed loan rate by less than one per cent, on average. This is largely attributable to the Central Bank's policy of adjusting the ceiling in line with market trends.

Introduction

Since the establishment of the Central Bank of Barbados in 1972, commercial banks have been subjected to a wide variety of regulatory controls.[1] From August 1978 until the present, the Central Bank has prescribed the minimum interest rate payable by commercial banks on savings deposits. This interest rate floor has been applied to every class of deposit, from March 15, 1994. Ceilings were imposed on deposits, in accordance with maturity and size of deposit, during the period October 1973 to October 1982. A ceiling was also imposed on the average loan rate, during the period May 1976 to August 1991. There was a floor on the Prime Lending Rate, during the period May 1976 to June 1984.

Several restrictions have also been imposed on the composition of the assets portfolio of commercial banks. In addition to a minimum cash reserve ratio, commercial banks are required to hold a stipulated minimum amount of government securities, expressed as a proportion of deposits. Sectoral restrictions and other specific restrictions, targeted at the personal and distributive sectors, have frequently been imposed. Commercial banks have also been subjected to foreign exchange restrictions, including Central Bank directives regarding the holding of foreign assets.

The impact and efficacy of these regulatory measures have been investigated in Williams (1996) and Worrell (1997). The former focused on bank performance, as measured by profitability and market share, vis-a-vis other financial institutions. The latter addressed the impact of regulation on commercial bank interest rate and portfolio decisions. However, that study was based entirely on hypothetico-deductive reasoning, rather than econometric analysis. In this study, we estimate the impact, on commercial banks' interest-rate behaviour, of the more pervasive regulatory measures adopted by the Central Bank of Barbados. The paper is organized as follows: In section 1, we discuss the theoretical perspective that has informed the study and present a model of the banking firm. In section 2, we describe our data set and present the results of unit root tests and pair-wise Granger causality analysis. The results obtained from a system of reduced form equations that accord with our theoretical model are reported in Section 3. The study concludes, in Section 4, with some evaluative comments on the efficacy of Central Bank Regulation of commercial banking activity in Barbados.

1. Theoretical Perspective

There are two approaches that have been used extensively in the literature to model commercial-bank behaviour. The earlier and still more widely-used approach is rooted in Markowitz-Tobin portfolio theory. This approach has been adopted by such writers as Hyman (1972), Parkin (1970), Pyle (1971), Hart and Jaffee (1974), Kane and Malkiel (1965). Proponents of the portfolio-theoretic approach generally assume that assets and deposits markets are perfectly competitive. This assumption, in turn, implies that the relevant behavioural mode in both of these markets is quantity setting.

It has been argued that the quantity setting assumption is not generally applicable to deposit markets. Sealey (1980) has contended that deposit markets are virtually always highly concentrated and that, under such conditions, it is normal for commercial banks to set interest rates. Klein (1970) and (1971) questioned the portfolio approach on the grounds that financial intermediaries operated in imperfectly competitive markets. He showed that some basic theorems of portfolio theory are not applicable to imperfect market structures. Sealey and Lindley (1977) have asserted that "The inadequacy of this approach stems from the total omission of production and cost constraints in determining the equilibrium output mix and scale size of the financial firm."

Hart and Jaffee (1974) have acknowledged that rate-setting behaviour cannot be adequately treated within a portfolio model. We, therefore, submit that the portfolio approach is especially inappropriate in the context of Barbados, with its underdeveloped financial markets and oligopolistic commercial banking system.

The alternative approach adopted in this study focuses on commercial banks as regulated financial-services firms. This approach has been exemplified by studies such as: Pesek (1970), Klein (1970), Korakan (1970), Benston (1973), Sealey and Lindley (1977) and King (1986). In the context of the Barbados regulatory environment, a basic representation of the profit function of a banking firm is

$$\Pi_i = r_1 L_i + r_b B_i - r_2 D_i \qquad (1)$$

Where Π is profit

D_i is deposits with an individual bank.

L_i is loans with an individual bank.

r_1 is the average rate of interest on loans

r_2 is the average rate of interest on deposits

r_b is the rate of interest on government securities

B_i is the nominal value of government securities held by a commercial bank

In a regulated environment characterized by a ceiling on the loan rate of interest and a floor on the deposit rate of interest, any of the four possible scenarios may obtain:

Case 1: A binding ceiling and a non-binding floor

Case 2: A binding floor and a non-binding ceiling

Case 3: A binding ceiling and a binding floor

Case 4: A non-binging ceiling and a non-binding floor

Case 4 is tantamount to the absence of interest rate regulation. In Case 1, the loan rate of interest would predominantly be determined by regulatory measures and other exogenous variables. In such circumstances, commercial banks would determine the interest rate on loans prior to the interest rate on deposits. The banks would also choose the level of loans that is consistent with constrained profit maximization. Prior to March 1994, Cases 2 and 3 could not have been generally applicable in Barbados, because of the absence of a floor on the interest rate on time deposits. Hence, it is likely that Case 1 typifies the Barbadian experience.

However, in this regard, note must be taken of an official view of the content of interest rate regulation. DeLisle Worrell (1997) has stated that "*The Central Bank of Barbados' direct interventions with respect to interest rates reflected the underlying market conditions: the interest rate rose when credit conditions tightened and fell when credit eased.....Spreads between deposit and loan rates were adjusted in line with the banks' requirements. The loan rate was controlled in name only; exemptions were pervasive and the actual was frequently above the 'controlled' maximum.*"

Examining a related issue, Marion Williams (1996) concluded that "*The hypothesis of cost-axiomatic pricing is supported by the results for the banking system in Barbados. Results suggest accommodation by regulators in their approach to the setting of interest rate ceilings and floors and contradicts the conventional literature which posits that interest rate regulation impacts adversely on bank profitability.*"

The foregoing suggests that the Central Bank interest rate policy has been implemented in a manner that has afforded commercial banks a measure of discretion in regard to the fixing of the loan rate of interest. Given these circumstances, the interest rate on a commercial bank's loans may be represented in functional terms as,

$$r_{1i} = f(\Phi, r_{1j}) \; ; f_{r_{1j}} > 0 \; , \; i \neq j \qquad (2)$$

Where Φ is a vector of policy and other exogenous variables, including foreign interest rates..

In Barbados, commercial banks normally fix the interest rate on deposits and accept all deposits. For an individual bank, the supply function for deposits may be represented as:

$$D_i = D(r_{2i}, r_{2A\,i}, \bar{TD}); \quad D_{r_2}, D_{TD} > 0, \quad D_{r_{2A}} < 0 \qquad (3)$$

Where r_{2i} is the average rate of interest on deposits at a given bank.

r_{2Ai} is a vector of interest rates on alternative financial assets that may be held by the public, including deposits at other banks.

TD is total deposits within the banking system.

Assuming that commercial banks are desirous of holding no excess reserves[2], and abstracting from non-deposit sources of funding, profit maximization may be represented as subject to the constraint,

$$L_i = (1-\bar{\rho}_c-\bar{\rho}_s)D_i \qquad (4)$$

Where ρ_c is the required cash reserve ratio

ρ_s is the stipulated government security ratio

From the foregoing, abstracting pro tempore from equation 2, we may obtain the Lagrangean function,[3]

$$\mathcal{L} = r_{1i}L_i + [r_b\bar{\rho}_s - r_{2i}]D(r_{2i}, r_{2Ai}, \bar{TD}) + \lambda[L_i - D(r_{2i}, r_{2Ai}, \bar{TD})(1-\bar{\rho}_c-\bar{\rho}_s)] \qquad (5)$$

Equation 5 implies the following first order conditions for profit maximization:

$$\frac{\delta\mathcal{L}}{\delta L_i} = r_{1i} + \lambda = 0 \qquad (6)$$

$$\frac{\delta\mathcal{L}}{\delta r_{2i}} = -D(r_{2i}, r_{2Ai}, \bar{TD}) + [r_b\bar{\rho}_s - r_{2i} - \lambda(1-\bar{\rho}_c-\bar{\rho}_s)]D_{r_{2i}} = 0 \qquad (7)$$

$$\frac{\delta\mathcal{L}}{\delta\lambda} = L_i - D(r_{2i}, r_{2Ai}, \bar{TD})(1-\bar{\rho}_c-\bar{\rho}_s) = 0 \qquad (8)$$

Differentiating equations 6,7 and 8 totally, we obtain:

$$dr_{1i} + d\lambda = 0 \qquad (9)$$

$$D_{r_{2i}}[\bar{\rho}_s dr_b + r_b d\bar{\rho}_s + \lambda(d\bar{\rho}_c + d\bar{\rho}_s) - 2dr_{2i}] - D_{TD}d\bar{TD} - (1-\bar{\rho}_c-\bar{\rho}_s)D_{r_{2i}}d\lambda - Dr_{2Ai}dr_{2Ai} = 0 \qquad (10)$$

$$dL_i - (1-\bar{\rho}_c-\bar{\rho}_s)(D_{r_{2i}}dr_{2i} + D_{r_{2Ai}}dr_{2Ai} + D_{TD}d\bar{TD}) + D_i(d\bar{\rho}_c + d\bar{\rho}_s) = 0 \qquad (11)$$

Equations 9 and 10 imply that,

$$dr_{2i} = \frac{1}{2}[\bar{\rho}_s dr_b + (1-\bar{\rho}_c-\bar{\rho}_s)dr_{1i} + \lambda d\bar{\rho}_c + (\lambda + r_b)d\bar{\rho}_s - \frac{1}{Dr_{2i}}(Dr_{2Ai}dr_{2Ai} + D_{TD}d\bar{TD})] \qquad (12)$$

Equations 12 and 11 may be expressed in general functional form as:

$$r_{2i} = r(r_b, r_{1i}, \bar{\rho}_c, \bar{\rho}_s, r_{2Ai}, \bar{TD}) \;;\; r_b, r_{r_{1i}}, r_{\rho_c}, r_{\rho_s}, r_{r_{2Ai}} > 0 \;,\; r_{TD} < 0 \qquad (13)$$

$$L_i = L(r_{2i}, r_{2Ai}, \bar{TD}, \bar{\rho}_c, \bar{\rho}_s); \quad L_{r_{2i}}, L_{TD} > 0 \;,\; r_{r_{2Ai}}, L_{\rho_c}, L_{\rho_s} < 0 \qquad (14)$$

Equations 2, 13 and 14 represent a recursive system of structural equations, with a causal ordering which indicates that the impact of regulatory measures, on interest rates, may be derived from the reduced form variants of equations 2 and 13. However, in this regard, it should be noted that the commercial banks satisfy their stipulated government securities ratio predominantly by holding treasury bills, in a context where a high proportion of outstanding Treasury Bills are held by commercial banks. This situation and the Central Bank's tendency to allow market forces to

that enter a reduced form equation for the Treasury Bill rate should essentially be the same as those that are included in the loan and deposit rate functions.

2. Data Definition and Properties

The data used in this study are monthly series obtained from the Central Bank of Barbados. Included in the data set are thirteen endogenous variables: the Treasury Bill rate (TBR) and loan and deposit interest rates for six of the seven banks currently operating in Barbados. The loan rates are averages and the deposit rates are modal values of three-months time deposits. All thirteen of these variables were found to be integrated of order 1, I(1), at the 5% level, using the Augmented Dickey Fuller (ADF) unit root test.

As indicated in our theoretical model, the set of exogenous variables comprise: foreign interest rates, total deposits within the commercial banking system (AB_DTO) and policy variables. The overnight London Inter-bank Offer Rate (LIBOR_ON) was chosen as representative of foreign rates. Five policy variables were included in our analysis: the bank-rate (BR), the average lending rate ceiling (ALRC), the savings deposits rate floor (SDRF), the required cash reserve ratio (RHO) and the stipulated government securities ratio (SGSR). The ceiling on the average lending rate is the only policy measure that was not in force throughout the period of our study, 1986:01 to 1996:12. It was discontinued in June, 1990. Hence ALRC is a constructed variable comprising the interest rate ceiling for the period up to June 1990 and unit value (e^0) thereafter. This enabled us to take logarithms of ALRC, to obtain a "modulated" on-off variable. Preliminary analysis indicated that this variable outperformed an ordinary on-off dummy variable. All of the exogenous variables were found to be integrated of order 1, I(1), at the 5% level, using the ADF test.

We investigated Granger causality between pairs of interest rates. The results as presented in Table 1 indicate that every interest rate variable is Granger caused by at least one of the other variables. The general pattern of causation suggests a high degree of simultaneity in the relationships among the variables and, except in the case of the results for bank 6, is consonant with the structure of our theoretical model. For banks 1 to 5, there is uni-directional Granger causality between loan and deposit rates for the same bank, running from the loan rate to the deposit rate. In the case of bank 6, uni-directional causality also exists, but in the opposite direction. However, any adaptation to the model that is necessary to accommodate the causal patterns indicated in Table 1 would not alter the system of reduced form equations implied by our theoretical model.

Table 1: Granger Causality Matrix

P - Statistics pertaining to hypothesis, "Column entry does not cause row entry"

	B1_ALR	B2_ALR	B3_ALR	B4_ALR	B5_ALR	B6_ALR	B1_RT	B2_RT	B3_RT	B4_RT	B5_RT	B6_RT
B1_RT	0.00222	0.00369	0.03857	0.00086	0.00371	0.01015		0.45552	0.01759	0.68179	0.04196	0.04286
B2_RT	0.00079	0.00064	0.00315	4.7E-05	0.00372	0.00070	1.6E-05		0.00014	2.5E-06	0.12586	0.00170
B3_RT	0.00037	0.00176	0.00095	0.00061	0.00019	0.01348	0.01074	0.05687		0.00917	0.00235	0.02301
B4_RT	9.1E-08	2.0E-06	0.00042	0.00473	2.4E-06	5.0E-07	0.01695	0.00201	0.01497		0.14751	3.3E-06
B5_RT	0.02003	0.01938	0.00297	0.00066	0.03568	0.05360	0.00185	0.33695	0.46804	0.00117		0.01744
B6_RT	0.19453	0.09351	0.05631	0.22425	0.19787	0.11615	0.08091	0.00031	0.00689	0.03398	0.39700	
B1_ALR		0.11541	0.56127	0.84468	0.00222	0.34674	0.08276	0.34655	0.00047	0.18703	0.42553	0.01227
B2_ALR	0.65338		0.63447	0.96507	0.17814	0.59820	0.59840	0.25072	0.00039	0.65822	0.14340	0.08564
B3_ALR	0.00037	3.2E-05		0.04933	0.00077	0.02388	0.14067	0.71262	0.34335	0.66747	0.89646	0.54233
B4_ALR	0.28806	0.18593	0.32214		0.12850	0.25805	0.14068	0.20862	0.13808	0.62237	0.56379	0.03025
B5_ALR	0.02733	0.18090	0.26327	0.87037		0.62947	0.20435	0.28421	0.01142	0.69786	0.34319	0.00798
B6_ALR	0.76409	0.35821	0.11003	0.90603	0.21918		0.35529	0.34558	0.0018	0.15344	0.10655	0.03381

3. Econometric Results

In Table 2, we report the results pertaining to a thirteen equation system of reduced form equations, comprising loan and deposit interest-rate equations for the six commercial banks and an equation for the Treasury Bill rate. The exogenous variables initially included in all thirteen equations comprise the five policy variables, the foreign rate of interest and total deposits within the commercial banking system. The system was estimated with Eviews Version 2.0, using Iterative Seemingly Unrelated Regression.

The results indicate that the loan rate for all banks and the deposit rate for three of the six banks were repressed by the ceiling on the average interest rate on loans, albeit marginally so. The Bank Rate has had a significant effect on the loan rate of only one bank. The said bank is the only bank whose deposit rate has not been significantly influenced by the Bank Rate. The cash ratio, the stipulated government securities ratio and the savings deposits rate floor impacted significantly on the loan rate for every bank. However, these three measures had a less pervasive influence on the deposit rate. In general, the deposit rate for any given bank has been responsive to fewer policy variables than the loan rate. The loan rates, though generally responsive to all policy variables other than the bank Rate, has exhibited very low elasticities. This is evidently attributable to the constraining influence of the ceiling on the average lending rate. The loan and deposits rates have been most responsive to changes in the stipulated government securities ratio. The cash reserve ratio has had the second strongest effect.

All five policy variables have had a significant effect on the Treasury Bill rate. The Average lending rate ceiling and the cash ratio have had effects on the Treasury Bill rate that are the opposite of the respective effects on loan and deposit rates. All other policy variables have had a positive impact on the Treasury Bill, loan and deposit rates. All of the results are intuitively plausible.

Table 2: Part 1

Estimation Method: Iterative Seemingly Unrelated Regression

Sample: 1986:01 1996:12

Convergence achieved after 6 iterations

	LOG(B1_ALR)	LOG(B2_ALR)	LOG(B3_ALR)	LOG(B4_ALR)	LOG(B5_ALR)	LOG(B6_ALR)
LOG(ALRC)	-0.052043 (-10.23552)	-0.061682 (-10.49506)	-0.035881 (-6.080650)	-0.041252 (-5.642770)	-0.061512 (-12.17176)	-0.069814 (-7.423732)
LOG(BR)			0.069046 (3.271198)			
LOG(LIBOR_ON)	0.071542 (6.657869)	0.099725 (8.407263)	0.057658 (4.962066)	0.081740 (5.168476)	0.077556 (7.542282)	0.058985 (3.237194)
LOG(RHO)	0.357115 (9.555112)	0.430657 (9.670094)	0.203817 (5.162766)	0.364007 (6.201628)	0.363838 (10.52430)	0.367600 (7.263422)
LOG(SDRF)	0.220582 (16.68116)	0.228435 (15.33129)	0.140371 (7.508524)	0.210284 (9.854760)	0.221041 (17.13699)	0.159144 (8.482276)
LOG(SGSR)	0.416625 (7.828407)	0.402449 (6.748749)	0.361778 (5.213943)	0.499355 (5.793195)	0.417939 (8.102547)	0.372685 (4.042118)
LOG(AB_DTO)	-0.095742 (-5.201514)	-0.090107 (-4.199477)		-0.104319 (-3.257017)	-0.092081 (-5.231240)	
SELF(-1)	0.434626 (14.84425)	0.407391 (12.22542)	0.436254 (10.04421)	0.428771 (9.023367)	0.372790 (12.32812)	0.373612 (7.351167)
CONSTANT	3.885678 (13.89863)	3.995673 (12.49087)	2.012239 (11.02795)	4.037886 8.247086	3.999574 (14.41064)	2.786957 (10.47183)
R-squared	0.976744	0.974382	0.969501	0.948286	0.976747	0.930517
Adj. R-squared	0.975291	0.972781	0.967595	0.945054	0.975293	0.926828
S.E. of regression	0.023033	0.024794	0.025077	0.033530	0.021901	0.039921
D-W stat	1.644250	1.705722	1.979701	1.637396	1.530823	1.497265
SSR	0.059416	0.068852	0.070429	0.125920	0.053719	0.180091

Table 2: Part 2

	LOG(B1_RT)	LOG(B2_RT)	LOG(B3_RT)	LOG(B4_RT)	LOG(B5_RT)	LOG(B6_RT)
LOG(ALRC)			-0.053050 (-3.020842)	-0.080019 (-4.989963)	-0.055341 (-2.931711)	
LOG(BR)	0.696818 (8.381645)	0.522912 (5.034086)		0.742047 (9.467162)	0.315736 (5.330637)	0.490749 (7.173343)
LOG(LIBOR_ON)	0.226592 (4.776466)	0.290800 (4.322148)		0.446536 (7.168298)	0.206075 (3.361952)	0.099624 (2.743147)
LOG(RHO)			0.628059 (3.891056)		0.225362 (4.669704)	
LOG(SDRF)			0.155821 (2.907475)			
LOG(SGSR)	1.735160 (5.434659)	1.439491 (3.691201)		0.978745 (8.486093)		0.349979 (4.268067)
LOG(AB_DTO)						
SELF (- 1)	0.289477 (4.249482)	0.473630 (6.860589)	0.500655 (6.788372)	0.326284 (5.379376)	0.715943 (16.44214)	0.505873 (8.214662)
CONSTANT	1.728911 (3.768883)	1.244228 (2.108382)	2.411317 (4.583558)			
R-squared	0.816135	0.732081	0.626831	0.859811	0.876841	0.833992
Adj. R-squared	0.809684	0.722680	0.613737	0.854892	0.872520	0.829661
S.E. of regression	0.154202	0.213382	0.139501	0.141441	0.140821	0.125119
D-W stat	1.756576	2.053378	2.053945	2.309112	1.910702	2.273541
SSR	2.710734	5.190652	2.218487	2.280640	2.260698	1.800294

Table 2: Part 3

	LOG(ALRC)	LOG(BR)	LOG(RHO)	LOG(SDRF)	LOG(SGSR)	LOG(AB_DTO)	SELF (- 1)	CONST.
LOG(TBR)	0.026389 (3.664376)	0.079835 (2.215682)	-0.487082 (-6.83468)	0.125453 (3.959187)	0.621778 (5.661099)	-0.192923 (-5.430499)	0.893219 (35.95627)	2.221688 (4.593479)

R-squared 0.976744 **Adjusted R-squared** 0.975291 **S.E. of regression** 0.02303

Durbin-Watson stat 1.644250 **Sum squared resid** 0.059416

4. Evaluation of Results

The ineffectiveness of the Bank Rate vis-a-vis commercial bank loan rates is one of the noteworthy findings of this study. The reasons for this phenomenon derives from the fact that commercial banks do not make substantial use of the Central Bank's re-discount window. Interbank borrowing is usually available to the extent necessary to enable any given bank to manage its liquidity requirements. Hence, the cost of Central Bank accommodation is largely inconsequent to the banks. In these circumstances, the Central Bank should pursue a policy in which the Bank Rate follows the market. Any attempt to use the Bank Rate to lead the market is likely to fail and could result in misalignment of the Bank Rate with other interest rates.

The ceiling on the average lending rate, when it existed, depressed loan rate by less than one per cent, on average. This is largely attributable to the Central Bank's policy of adjusting the ceiling in line with market trends. The policy was discontinued as a concession to market liberalisation forces. There is no evident reason for a return to the former policy.

The cash reserves and stipulated government security ratios have had a highly significant impact on the interest rates and may be used effectively to target interest rates. However, these measures can also be used to target bank liquidity and the balance of payments. Hence, the appropriate use of these instruments should be determined on a case by case basis.

The savings deposits rate floor can be used to influence income distribution or the structure and level of interest rates. Hence, the appropriate use of this instrument should be determined on a case by case basis.

References

Benston, George J. "The Optimal Banking Structure: Theory and Evidence." *Journal of Banking Research* 3 (Winter 1973), 220-37.

Hart, Oliver D., and Dwight M. Jaffee. "On the Application of Portfolio Theory to Depository Financial Intermediaries." *Review of Economic Studies* 41 (January 1974), 129-47.

Horvitz, Paul M. "Economies of Scale in Banking." *In Private Financial Institutions*, edited by Paul M. Horvitz, et al., pp. 1-54. Englewood Cliffs, N.J. Prentice-Hall, 1963.

Hyman, David N. "A behavioral Model for Financial Intermediation." *Economic and Business Bulletin* Vol 24 No. 3 (Spring-Summer 1972), 9-17.

Kane E. J. and B. G. Malkiel "Bank Portfolio Allocation, Deposit Variability and the Availability Doctrine" *Quarterly Journal of Economics* Vol. 79 (February 1965), 113-134

King, Stephen R. "Monetary Transmission: Through Bank Loans or Bank Liabilities?" *Journal of Money, Credit, and Banking* Vol 18 No. 3 (August 1986), 290-303.

Klein, John J. "The State of Finance Field Methodology. A Discussion." *Journal of Finance* 25 (May 1970), 322-25.

Klein, Michael A. "A theory of the Banking Firm." *Journal of Money, Credit, and Banking* 3 (May 1971), 205-18.

Pesek, Boris P. "Bank's Supply Function and the Equilibrium Quantity of Money." *Canadian Journal of Economics* Vol. 3 No. 3 (August 1970), 357-85.

Parkin, Michael J. "Discount House Portfolio and Debt Selection." *Review of Economics Studies* 37 (October 1970), 469-97.

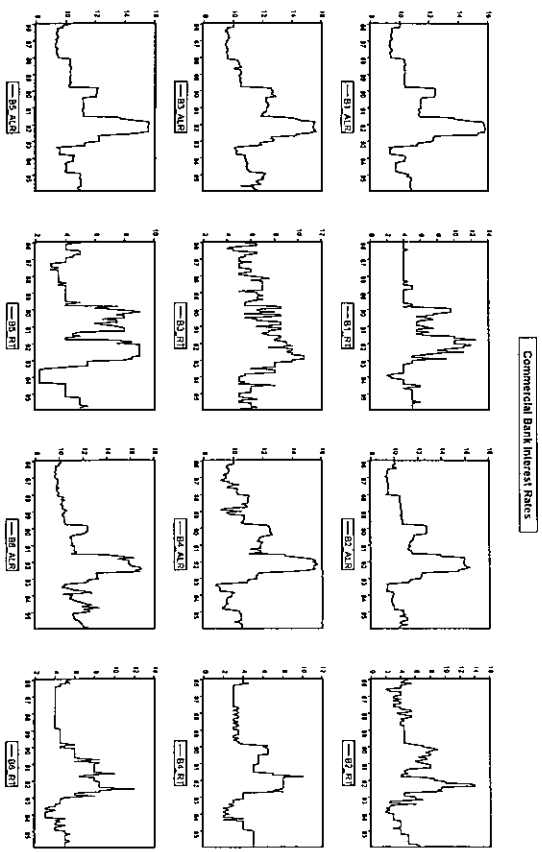
Pyle, David H. "On the Theory of Financial Intermediation." *Journal of Finance* 26 (June 1971), 737-47.

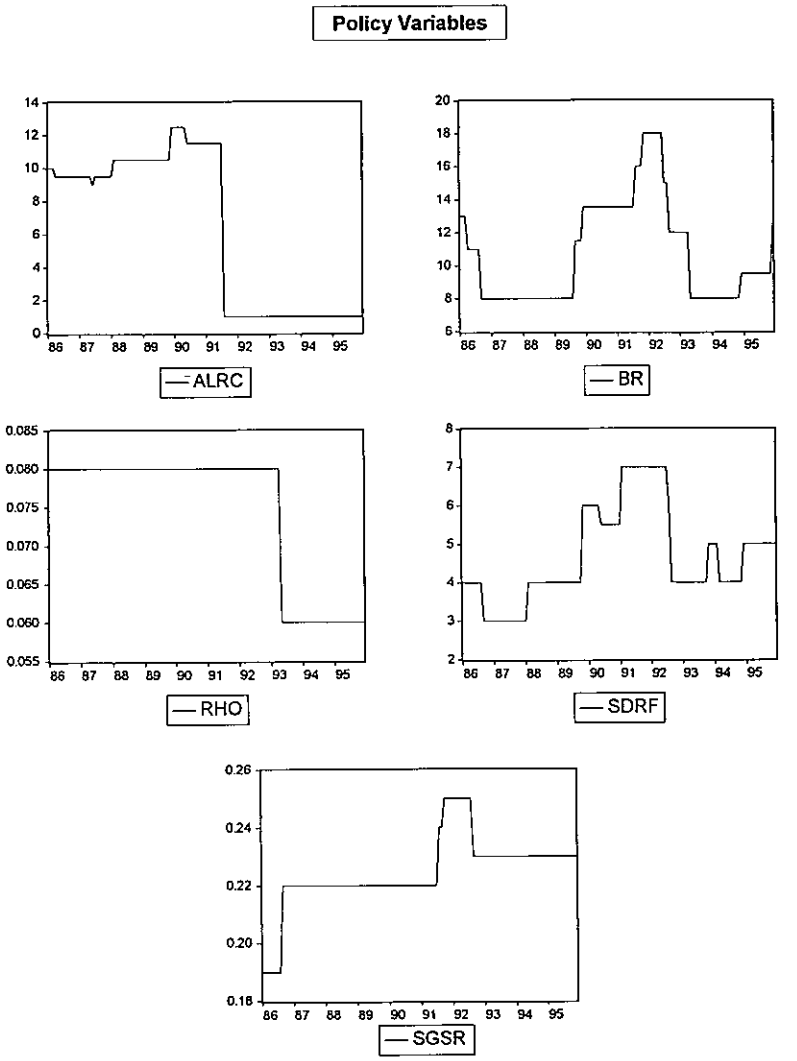
Sealey, C. W. Jr. "Deposit Rate-Setting, Risk Aversion, and the Theory of Depository Financial Intermediaries." *The Journal of Finance* Vol. XXXV NO. 5 (December 1980). 1139-54

Sealey, C. W. Jr., and James T. Lindley. "Inputs, Outputs, and a Theory of Production and Cost at Depository Financial Institutions" *The Journal of Finance*, Vol. XXXII, NO. 4, (Sept. 1977), 1251-66.

Williams, Marion V. Liberalising a Regulated Banking System: The Caribbean Case, Avebury, Aldershot, 1996

Worrell, DeLisle "Role Models for Monetary Policy in the Caribbean: Comparing Caricom Central Banks" in Central Banking in Barbados: Reflections and Challenges Edited by: Harold Codrington, Roland Craigwell and Cleviston Haynes. Central Bank of Barbados, 1997.


Commercial Bank Interest Rates


Policy Variables
ALRC
BR
RHO
SDRF
SGSR

1. The regulation of commercial bank interest rates pre-dated the existence of the Central Bank.

2. This is a simplification whose implications should be investigated in a further study. Banks do carry significant and varying levels of excess reserves.

3. When we abstract from equation 2, r_{ti} presents as a predetermined variable.