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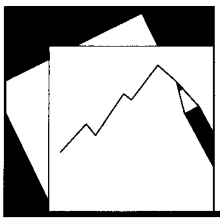

IMF Working Paper

The Monetary Policy Regime and Banking Spreads in Barbados

Wendell Samuel and Laura Valderrama

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Western Hemisphere Department

The Monetary Policy Regime and Banking Spreads in Barbados

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Authorized for distribution by Benedict Clements

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Abstract

The paper analyzes the determinants of banking spreads in Barbados, with a view to identifying the role of the monetary policy regime in explaining high spreads. The paper finds that interest rate spreads for Barbados are higher than would be suggested by its macroeconomic performance. Banking concentration and bank-specific variables, including bank size and provisions for nonperforming loans, do not have an important role in explaining variations in bank spreads. Rather, it appears that monetary policy variables, such as reserve requirements and capital controls, are the most important determinants of spreads.

JEL Classification Numbers: E43, E52, D43

Keywords: Interest rate spreads; Monetary policy regime

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I. INTRODUCTION

Barbados, like most Caribbean countries, has begun to liberalize the financial sector, but spreads between deposit and lending rates still remain relatively high. Since the mid-1990s the authorities have significantly relaxed exchange controls, reduced the security requirements for commercial banks, and eliminated administrative interest rate ceilings. At the same time, there remain some controls on capital outflows, and the central bank continues to set a floor on savings deposit rates. Despite the liberalization efforts to date, commercial bank spreads have increased, and reached 7¼ percent in 2004, compared with 6¾ percent in 1996.

Although the banking system is highly concentrated, it remains open to new entry. Branches and subsidiaries of Canadian and U.K. banks have traditionally dominated the Barbados financial system, and the system is almost 100 percent foreign-owned. More recently, banks headquartered in Trinidad and Tobago and Bermuda have purchased majority interests in two locally owned banks, and the government and the local private sector only retain small minority positions in one of these institutions. Thus, despite relatively free entry—as evidenced by the entry and exit of U.S. banks over the years—the market remains highly concentrated.[2] Nevertheless, the free entry and exit of banks suggests that the sector is more contestable—and hence more competitive—than suggested by concentration ratios alone.

Commercial banks are by far the largest subsector of the financial system in Barbados. The total assets of commercial banks amounted to about 125 percent of GDP in 2003, with insurance companies (17 percent of GDP) and other financial institutions, including credit unions, mortgage, and finance companies, accounting for another 5 percent of GDP. Credit to the household sector (38 percent of total loans) represents the largest share of commercial bank loans, followed by the distribution sector with 20 percent. Only 20 percent of bank lending goes to tourism, the most important productive sector.

Wide bank spreads may have contributed to low rates of private investment and economic growth. Even during the period of relatively good performance in the 1990s, private investment remained low. For example, it averaged 13.4 percent of GDP over 1995–2004, compared with 19.8 percent for CARICOM as a whole and about 19.4 percent of GDP for a wider set of comparator countries. Furthermore, private investment in Barbados edged downward over the period (Table 1). This low rate of investment may have contributed to lackluster growth (about 2.9 percent per annum) over 1995—2004.

[2] See Chase and others (2004) for further discussion.

Table 1. Private Investment and Growth in Barbados

	Private Investment (Percent of GDP)		GDP growth (Percent)	
	1995-2000	2001-2004	1995-2000	2001-2004
Barbados	**15.5**	**10.3**	**3.2**	**2.5**
Belize	22.4	10.3	5.1	5.6
Costa Rica	14.3	14.5	4.8	13.1
Eastern Caribbean Currency Union	22.5	21.0	3.5	3.3
Jamaica	23.8	29.7	-0.1	12.6
Mauritius	18.7	15.1	5.2	9.9
Netherlands Antilles	20.0	23.3	-0.1	2.4
Panama	20.5	13.6	4.9	5.2
Seychelles	23.7	10.4	5.2	2.5
Trinidad and Tobago	21.6	17.3	5.0	11.1
Comparator countries 1/	20.8	17.2	3.7	7.3

Source: IMF, World Economic Outlook Database.

1/ Comprises the countries above. These were chosen according to their similarity to Barbados in terms of size, location, or level of development.

This paper seeks to assess the determinants of commercial banking spreads in Barbados, including the monetary policy regime. High spreads between deposit and borrowing rates point to inefficient financial sector intermediation which may be curtailing investment. Bank spreads are likely to reflect certain features of the monetary policy regime, such as the minimum deposit rate and capital controls.[3] This captive environment has, in some instances, generated excess liquidity in the banking system, giving rise to short-term interest rates on government debt close to or below the minimum deposit rate. These low rates of return on nonloan assets relative to the cost of deposits have, in turn, put upward pressure on banks' lending rates.

The paper is structured as follows. Section II presents some stylized facts on investment and financial intermediation in Barbados. Section III provides a review of the literature on the linkages between financial intermediation and lending-deposit rate spreads. Section IV explores the effect of macroeconomic performance on spreads across countries, using a comprehensive set of countries for which credit ratings are available. Section V provides some preliminary empirics of bank spreads in the Caribbean, with a view to assessing

[3] For the purpose of this paper, capital controls are considered part of the monetary policy regime. Without these controls, monetary policy would be ineffective under Barbados's fixed exchange rate regime.

whether banks' interest margin is correlated with bank size. Section VI attempts to identify the impact of the monetary policy regime on bank spreads. Panel regressions are presented using data on bank financial variables for Barbados, Jamaica, and Trinidad and Tobago for 1989–2004. Finally, Section VII concludes with some policy implications.

II. STYLIZED FACTS

Barbados compares favorably with Caribbean economies with respect to its level of spreads, sovereign credit rating, level of economic development, and overall macroeconomic stability. Table 2 displays a summary of descriptive statistics for a set of selected individual countries, as well as for various groupings of countries with characteristics similar to those of Barbados. All data refer to 2003. Although the average commercial bank spread in Barbados (7.6 percentage points) is lower than the one prevailing in the CARICOM region (8.9 percentage points), the sovereign credit rating for Barbados is notably better than for the average comparator economy.[4] The sovereign credit rating incorporates measures of economic and financial stability that attempt to capture a country's debt service capacity, including GDP growth. These variables may also influence bank spreads through their effects on interest rates.[5] Therefore, the lower bank spreads observed in Barbados, in comparison with the CARICOM area, may be due to its higher GDP per capita (which is almost 50 percent higher) and its lower inflation, which is 5.5 percentage points lower than the CARICOM average.

Spreads in Barbados are higher, however, than in economies throughout the world at a similar level of development. This is the case in spite of a favorable sovereign credit rating. This suggests that although spreads in Barbados are moderate relative to Caribbean averages, they are higher than predicted by the strength of its macroeconomic policy.

Both private investment and financial intermediation declined sharply since the 1980s in Barbados. The level of deposits gradually increased in 1995–2004, but the growth of bank credit was sluggish (Figure 1). This pattern differs from that observed in similar economies, where private credit has grown in tandem with bank deposits. Financial intermediation, measured as the ratio of private bank credit to overall deposits in the economy, reached 91 percent in 1981, but declined sharply to 72 percent in 1990, and fell further to 61 percent in 2004. Similarly, private investment has been on a declining path from a peak of 39 percent of GDP in 1981 to a relatively low level of 15 percent in 2004 (Figure 2). Not surprisingly, the ratios of private investment to GDP, and the level of financial intermediation, are highly correlated ($r = 0.85$).

[4] For the purpose of this section, the CARICOM region comprises all countries for which a Standard & Poor's credit rating was available in 2003—that is, Bahamas, Barbados, Belize, Grenada, Jamaica, Suriname, and Trinidad and Tobago.

[5] Gelos (2006) argues that greater macroeconomic stability in Latin America would be conducive to lower interest rates. This, in turn, would contribute to a compression of bank spreads.

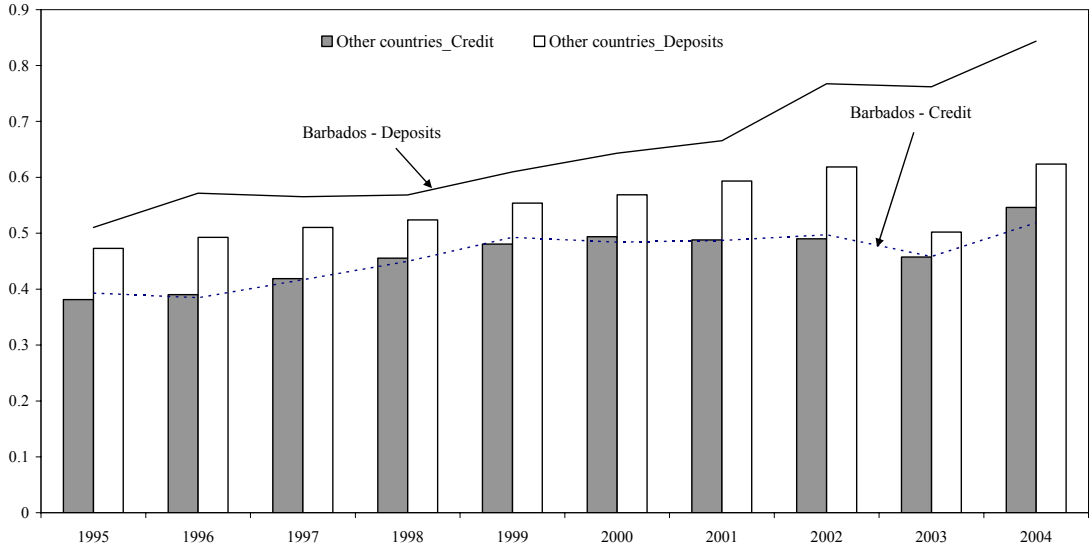
Table 2. Spreads and Macroeconomic Variables, 2003

	Spreads	Rating 1/	GDP per Capita (US $)	GDP (bl US $)	Inflation	GDP Growth	M2/GDP	Cap. Flows (in percent of GDP)	Variance Interest Rate 3/	Variance Capital Flows 4/
Selected countries										
Bahamas, The	7.3	A-	16866	5.2	2.8	1.9	0.7	9.4	0.0	0.0
Barbados	7.6	A+	9979	2.7	1.5	2.2	0.7	5.0	0.0	0.0
Belize	7.4	BB-	3831	1.0	2.5	9.4	0.5	22.5	0.0	0.0
Costa Rica	15.2	BB+	4244	17.7	9.4	6.5	0.4	4.9	0.3	0.1
Cyprus	3.6	A+	16552	13.2	4.1	1.9	1.2	2.9	0.1	0.1
Dominican Rep.	10.9	CCC	1839	16.1	27.4	-1.6	0.5	-2.5	0.7	0.3
Grenada	8.7	BB-	4279	0.4	2.2	5.7	1.0	0.2	0.0	0.0
Jamaica	10.4	B+	3003	8.0	12.9	2.0	0.4	9.3	0.0	0.1
Malta	2.1	A+	12236	4.8	1.9	-1.8	1.8	0.4	0.1	0.0
Panama	5.9	BB	4288	12.9	1.0	4.3	1.0	1.4	0.9	0.3
Suriname	12.8	B	2242	1.0	23.1	5.3	0.5	-4.3	0.0	0.0
Trinidad and Tobago	8.3	A-	8225	10.5	3.8	13.2	0.3	0.0	0.0	0.1
CARICOM	8.9	BB+	6918	4.1	7.0	5.7	0.6	6.0	0.0	0.0
Small islands 2/	5.9	A-	11982	5.3	2.5	2.0	1.1	3.6	0.0	0.0
Developing (40)	12.2	BBB-	4785	66.5	5.5	4.2	60.9	0.2	0.9	19.4
All countries (59)	13.8	BBB+	10093	364.4	4.7	3.7	66.7	-0.6	0.8	30.0

Sources: IMF World Economic Outlook Database; IMF International Financial Statistics; and Standard & Poor's.

1/ Local currency long-term sovereign credit rating in December 2003 (Standard & Poor's).
2/ Includes islands with population below one million. It comprises Bahamas, Barbados, Cyprus, Grenada, and Malta.
3/ Defined as the monthly variance of the average interest rate on deposits in 2003. Fluctuating interest rates may feed into spreads owing to maturity mismatch.
4/ Defined as the annual variance of net foreign flows in 1994-2003.

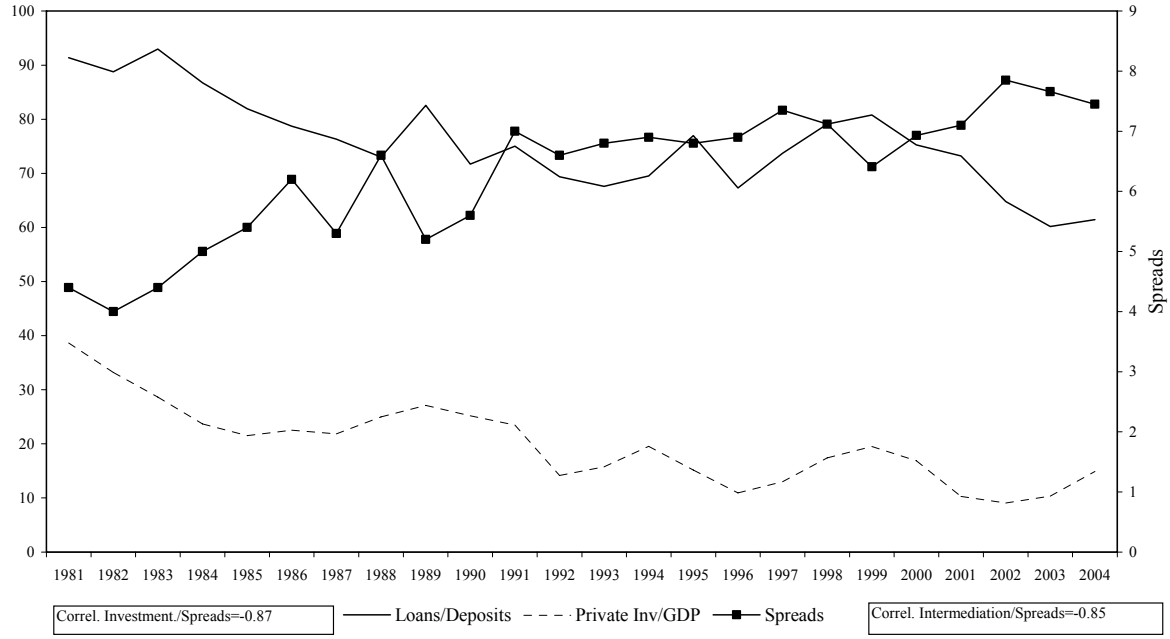
Figure 1. Financial Intermediation: Barbados vs. Comparator Countries 1/



Sources: IMF, World Economic Outlook Database; and International Financial Statistics Database.

1/ The set of comparator countries includes Belize, Costa Rica, ECCU, Jamaica, Mauritius, Netherlands Antilles, Panama, Seychelles, and Trinidad and Tobago.

Figure 2. Investment, Financial Intermediation, and Spreads in Barbados, 1981-2004
(In percent)



Sources: IMF, World Economic Outlook Database; and International Financial Statistics Database.

The secular decline in financial intermediation has been accompanied by a gradual widening in bank spreads. Bank spreads have widened from 4.40 percentage points in 1981 to 5.60 percentage points in 1990 and 7.30 percentage points in 2004.[6] High spreads can be an impediment to financial intermediation by discouraging profitable investment opportunities (Hanson and Rocha, 1986).

Spreads have increased despite a substantial program of financial liberalization. This includes a substantial reduction of the reserve requirement, the removal of the average lending rate, the removal of credit controls, and substantial liberalization of exchange controls.

III. Literature Review on the Determination of Spreads

The factors advanced in the literature on the determinants of bank spreads are the macroeconomic environment, the banking sector's market structure, bank-specific factors, and financial regulation. With respect to the first determinant, macroeconomic imbalances are generally associated with high bank spreads. Instability in the macroeconomy is likely to increase the probability of default by bank debtors. For example, exchange rate instability and high and variable inflation can constrain corporations' and households' ability to meet their loan obligations, if it adversely affects their balance sheets. This is supported by empirical studies for developing countries, which find a positive relationship between inflation and spreads (Brock and Rojas-Suarez, 2000; Demirguc-Kunt and Huizinga, 1999). Robinson (2002) found that interest rate spreads in Jamaica have fallen since 1990 as

[6] The correlation coefficient between the level of spreads and financial intermediation is -0.85.

inflation declined. In addition, macroeconomic instability may increase bank spreads through its impact on financial market volatility. According to this view, bank spreads are regarded as a hedging tool against the reinvestment and refinancing risks arising from fluctuations in interest rates, owing to the endemic maturity mismatch between banks' assets and liabilities. Using the quarterly variance of weekly interest rates of bonds, Ho and Saunders (1981) find a significant correlation between U.S. commercial banks' spreads and the variance in the rate on bonds.

The industrial organization literature predicts that an oligopolistic market structure may result in higher spreads in the banking sector, but the empirical evidence is mixed. Hannan and Liang (1993) and Bajaras, Steiner, and Salazar (1999), among others, suggest that concentration leads to higher spreads. However, Claessens and Laeven (2004) argue that traditional measures of competition like the Herfindahl index of concentration (H-index) perform poorly because there is no direct relationship between concentration and competition. Instead, they find that what matters for effective competition is contestability, which they measure by the Panzar and Rosse (1987) measure of bank behavioral response. Contestability appears to be enhanced by free entry and minimal restrictions on bank activity. In the same vein, a recent study by the IDB (2005) suggests that, controlling for the level of development, there is no statistically significant relationship between bank concentration and interest margins. In the Caribbean context, Craigwell and Moore (2002), based on aggregate banking data for 10 Caribbean countries over 1990–99, argue that market power plays a significant role in explaining relatively high spreads, which in turn are sustained by the limited competition posed by nonbank financial institutions and by an underdeveloped local capital market.

There is a wealth of empirical evidence suggesting that net interest margins are strongly related to the efficiency of the banking sector. The efficiency hypothesis suggests that smaller banks are likely to have higher overhead costs than larger banks. This prediction is borne out in the empirical work of Demirguc-Kunt and Huizinga (1999), Barajas, Steiner, and Salazar (1999), and Brock and Rojas-Suarez (2000). The small size of the markets in the Caribbean would imply that banks are operating well below their minimum efficiency scale, and hence cannot reap economies of scale. These banks tend to have much higher operating costs, especially for labor, than banks in larger developed markets (Randall, 1998, and Robinson, 2002). Technology considerations also add to the higher cost of banks in the Caribbean, because their adoption of new technology lags behind their counterparts in more developed economies (Robinson, 2002). Separately, Barajas, Steiner, and Salazar (1999) argue that the extent of nonperforming loans is positively associated with spreads.

The capital structure of the banking sector and informational asymmetries may also contribute to spreads. The level of capital that banks hold to cushion themselves against risks could result in higher spreads (Saunders and Schumacher, 2000). In particular, holding capital in excess of the regulatory minimum for insuring against additional credit risk turns out to be relatively more expensive than debt because of differential taxation (Chirwa and Mlachila, 2004). This cost may be offset by increasing spreads, leading to a positive relationship between the actual capital ratio and spreads. For instance, in Trinidad and Tobago, banks have a tendency to hold capital far in excess of the regulatory minimum. The extent of asymmetric information between the bank and its borrowers may also have an impact on spreads. In this vein, Craigwell and Moore (2003) find that local banks, endowed

with better information on the creditworthiness of borrowers, tend to discriminate in their lending rates across borrowers, whereas foreign banks tend to set a uniform interest rate.

Institutional constraints related to financial regulation also tend to influence bank profit margins and, therefore, interest rate spreads. These constraints include liquidity requirements, statutory government securities holding requirements, and capital controls. Less than fully remunerated reserves act as a tax on banks. Banks often attempt to pass on the cost of this tax to their customers by raising lending rates or reducing deposit rates. Thus, higher reserve requirements will typically result in a widening of commercial banks' margins. Barajas, Steiner, and Salazar (1999) and Saunders and Schumacher (2000) find evidence of a positive relationship between reserve requirements and interest rate spreads in Latin America. Similarly, Gelos (2006) highlights reserve requirements, together with overhead costs and the extent of banking competition measured by the degree of market concentration, as the key factors driving spreads in Latin America.

IV. Bank Spreads And Macroeconomic Performance

Banks, in their role as financial intermediaries, face substantial uncertainty which can add to spreads. This uncertainty is due to the indeterminate timing of loan demand and the supply of deposits. Uncertainty can be exacerbated by macroeconomic instability, owing to the limited contractual redress available to banks in the event of default. Consequently, even in a world of highly competitive banking markets, positive spreads (above and beyond what is needed to generate normal profits) would still exist as long as transaction uncertainty is present.

This section explores the impact of macroeconomic stability on bank spread determination for both developing and developed countries. Bank spreads can be contained by sustained competition from international capital markets supported by a strong sovereign credit rating. Given the strong correlation observed between actual sovereign spreads and ratings-based spreads (Sy, 2002), an improvement in credit rating is associated with enhanced access to international capital markets, which could be expected to put downward pressure on bank spreads. Thus, a favorable credit rating may act as a signal of strong macroeconomic performance that helps facilitate access to international finance. The data on macroeconomic variables are obtained from the IMF's International Financial Statistics and World Economic Outlook databases. The S&P credit rating is used to proxy investors' expectations regarding the capacity of policymakers to maintain economic stability.

To determine the impact of the macroeconomic environment on bank spreads, we test the hypothesis that a more favorable credit rating is associated with lower spreads.[7] In addition to the country's sovereign credit rating,[8] a number of other of explanatory variables that could also influence spreads are included in the estimated equations. Specifically, the following

[7] This section focuses on the impact of macroeconomic variables on spreads in a comparative perspective, and therefore excludes microeconomic factors. These factors, captured in the unexplained residual of the regression, are further examined in Section VI.

[8] The credit rating variable is constructed as a linear function of the qualitative measure provided by S&P over the range C to AAA. Its impact on spreads is robust to an alternative specification that discriminates nonlinearly between investment and non-investment grade ratings.

variables are incorporated in the regression: (i) population size, to account for country size, (ii) GDP in U.S. dollars, to account for the volume of economic activity, (iii) a dummy variable for small island economies,[9] to address the efficiency hypothesis of spreads, (iv) GDP per capita, to account for the level of economic development, (v) a dummy variable for developing countries, (vi) current inflation, to account for the risk stemming from asymmetric lags in the transmission of inflation shocks to lending and deposit rates, (vii) broad money over GDP, to measure the depth of the financial system, (viii) GDP growth, to account for potential vulnerabilities in the corporate sector affecting the quality of banks' loan portfolios, (ix) the variability of interest rates, to address the reinvestment and refinancing risks faced by banks in the face of the stochastic arrival of loans and deposits, and (x) the net level of capital flows and its volatility, as a proxy for the availability of alternative sources of finance to domestic bank credit. Table 3 reports the regression results for the cross-country factors determining bank spreads. The results are displayed in columns containing several sets of explanatory variables. All columns except (6) include the S&P's rating for local currency long-term debt as an independent variable. Results are robust to the inclusion of a dummy variable for investment grade rating, as well as to the definition of sovereign credit rating on short-term credit. Column (6) includes only macroeconomic factors as explanatory variables.

The results suggest that an upgrade in the sovereign credit rating by a notch is associated with a drop in spreads of 43 basis points. Sovereign credit rating alone explains 41 percent of the cross-country variation in spreads. By contrast, macroeconomic control variables turn out to be generally insignificant. Excluding the sovereign credit rating variable, the most significant macroeconomic determinant is the inflation rate (column 8), pointing to the correlation between credit ratings and inflation. Still, when the credit rating variable is introduced, the power of the regression increases markedly from 27 percent to 49 percent. Moreover, credit rating is always highly significant, and its coefficient robust to various specifications of the model.

[9] The set of small island economies includes both developing and industrial countries, among the latter Cyprus and Iceland. As such, it is not correlated with the dummy for developing countries.

Table 3. Impact of Macroeconomic Variables on Spreads: Cross-Country Regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rating	-0.42	-0.43	-0.43	-0.43	-0.44	-0.43	-0.40	
	(0.066)***	(0.059)***	(0.097)***	(0.093)***	(0.091)***	(0.090)***	(0.117)***	
Population	-0.01		-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
	(0.006)		(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)
Small island dummy		1.00	0.84	1.31	1.71	1.58	0.80	1.24
		(-1.09)	(1.125)	(1.094)	(1.086)	(1.075)	(1.173)	(1.286)
Developing dummy			-0.54	-1.36	-1.56	-1.36	-0.50	1.51
			(1.052)	(1.061)	(1.040)	(1.033)	(0.981)	(1.011)
Inflation			0.05	0.11	0.07	0.10	0.08	0.23
			(0.061)	(0.064)*	(0.067)	(0.069)	(0.068)	(0.077)***
GDP growth				0.29	0.23	0.14		0.14
				(0.119)**	(0.120)*	(0.132)		(0.158)
M2/GDP					-0.02	-0.02		-0.02
					(0.008)*	(0.008)**		(0.010)
Var. interest rate						-0.24		-0.25
						(0.151)		(0.181)
Net foreign flows							0.01	
							(0.039)	
Var. foreign flows							0.00	
							(0.006)	
No. countries	59	59	59	59	58	59	59	59
R-squared	0.43	0.43	0.45	0.51	0.54	0.56	0.48	0.36
Adj. R-squared	0.41	0.41	0.40	0.45	0.48	0.49	0.41	0.27

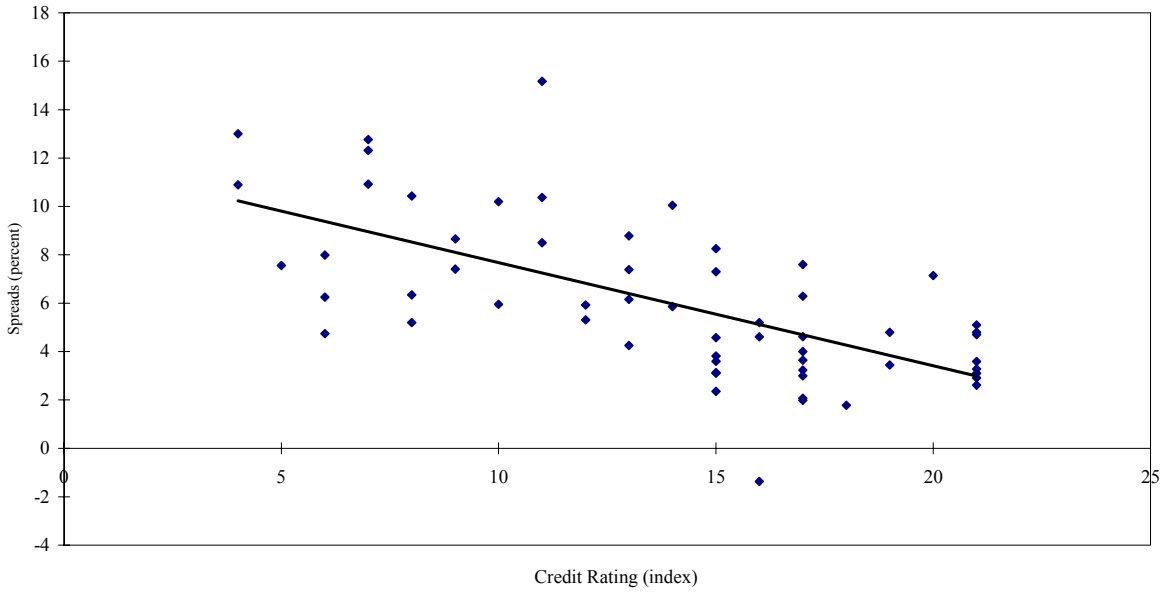
Note: The analysis is based on 2003 data. The t-statistics are shown in parenthesis, with ***significant at the 1%, **significant at the 5%, and *significant at the 10%.

Contrary to a priori expectations, there is little evidence that spreads are sensitive to the size of the economy or the level of development.[10] In contrast, GDP growth and financial deepening turn out to be significantly correlated with the level of spreads in two of the regressions at the 10 percent confidence level. An increase of 1 percent in GDP growth leads to a decline of 29 basis points in bank spreads. Similarly, an increase of 1 percent in broad money relative to GDP is associated with a drop of 2 basis points in bank spreads. An increase in financial deepening from the sample average (66.7 percent of GDP) to the average in ASEAN-4 (79.4 percent) would lead to a decrease in spreads of 25 basis points.

[10] This result is robust to the specification of the size and level of development in terms of GDP and GDP per capita, respectively.

In sum, the empirical evidence suggests that approximately 2.1 percentage points of bank spreads in Barbados cannot be explained by its macroeconomic environment. Figure 3 shows a bivariate negative correlation between bank spreads and credit rating. Barbados lies above the fitted line, with an observed level of spreads of 7.6 percent, exceeding its predicted value of 5.5 percent.

Figure 3. Credit Rating and Domestic Spreads, 2003



Sources: IMF, International Financial Statistics Database; and Standard & Poor's.

V. Bank Spreads in the Caribbean: Some Preliminary Empirics

There has been a gradual convergence of spreads in the Caribbean during the 1990s. The recent consolidation in the banking sector has resulted in similar levels of banking concentration as measured by the Herfindahl index (Figures 4 and 5).[11] This period includes the phase when financial liberalization took hold in the Caribbean, thus enabling banks to be more responsive to external shocks.[12]

[11] Figures based on a data set of 199 observations pertaining to 19 banks in Barbados, Jamaica, and Trinidad and Tobago over 1989–2004. The latter were selected because of their similarity with Barbados in terms of location, size, and overall level of development. These countries are also seeking macroeconomic convergence within the context of the CARICOM Single Market and Economy (CSME).

[12] The relationship between bank concentration and banking sector performance remains ambiguous in the literature (Claessens and Laeven, 2004; IDB, 2005).

Figure 4. Bank Spreads in the Caribbean, 1996-2004
(In percent)

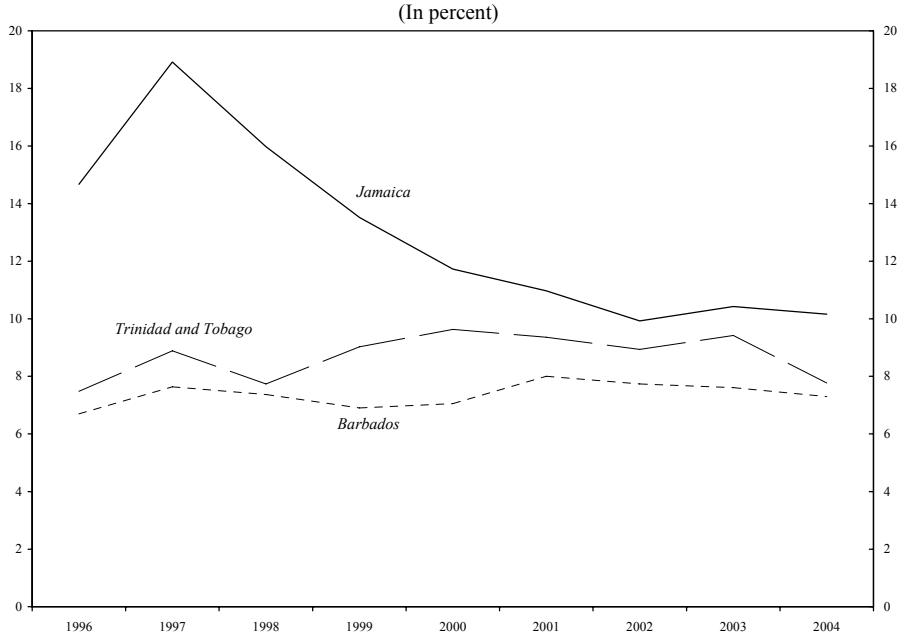
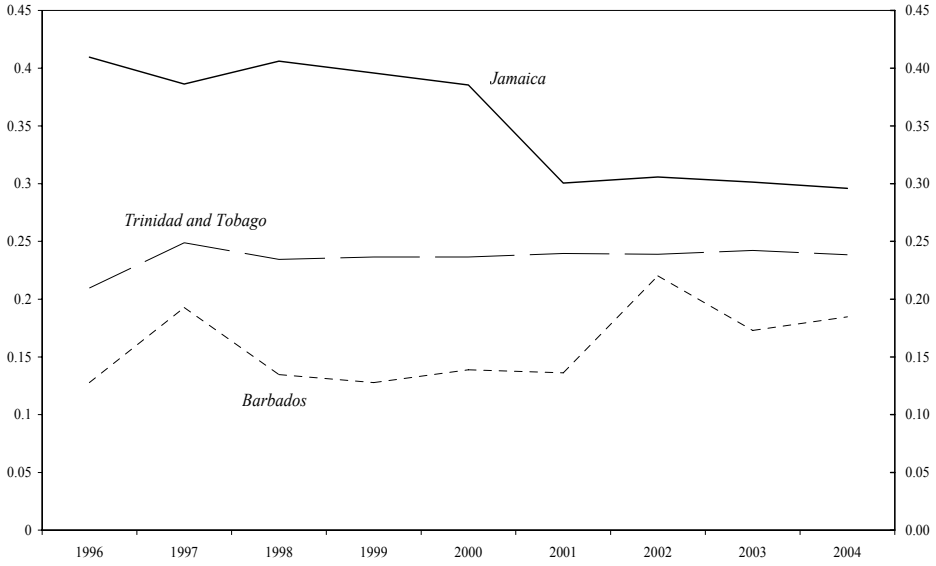


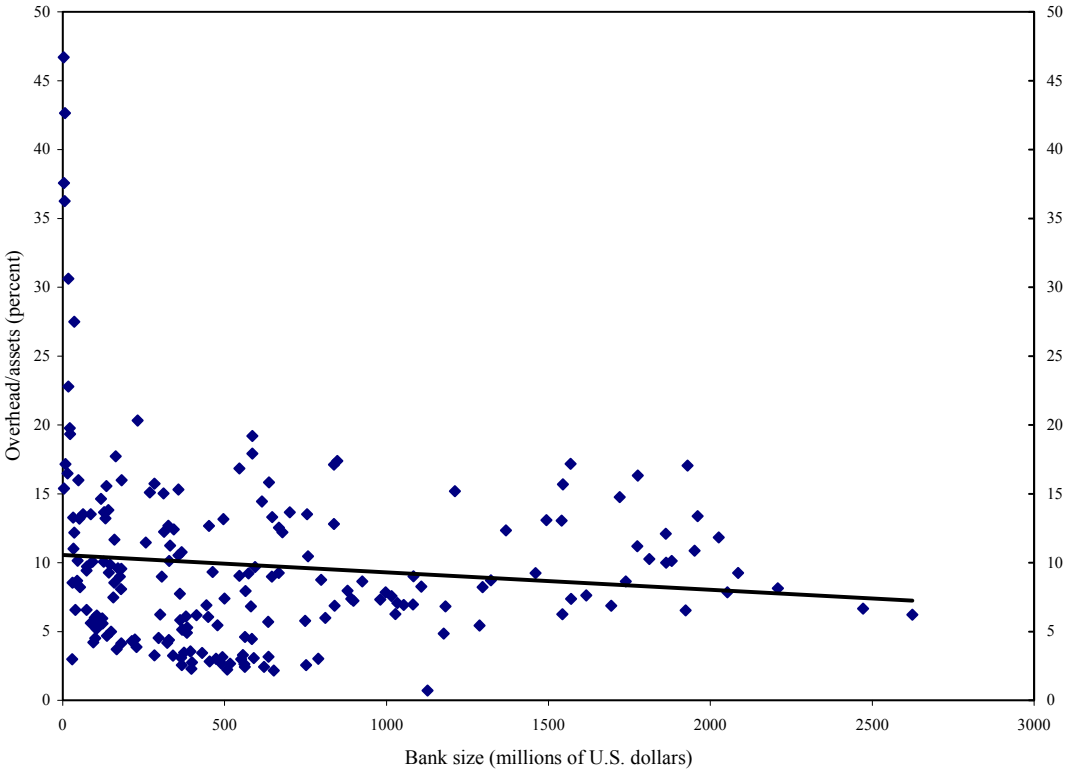
Figure 5. Banking Concentration in the Caribbean, 1996-2004
(Herfindahl Index from 0 to 1)



Bank size does not appear to affect the level of operational costs of Caribbean banks. Figure 6 shows an insignificant negative correlation (0.1) between the ratio of overhead costs to assets and bank size, measured in U.S. dollars, for the three Caribbean countries during the period 1996–2004. Consistent with this finding, the IDB (2005) study of the banking sector in Latin America finds evidence of substantial economies of scale for small banks with less than US$150 million in assets. These banks are reported to have overhead costs which are

2 percentage points higher than large banks. However, for banks with assets in excess of US$150 million, economies of scale are insignificant.

Figure 6. Bank Size and Efficiency in the Caribbean, 1989-2004

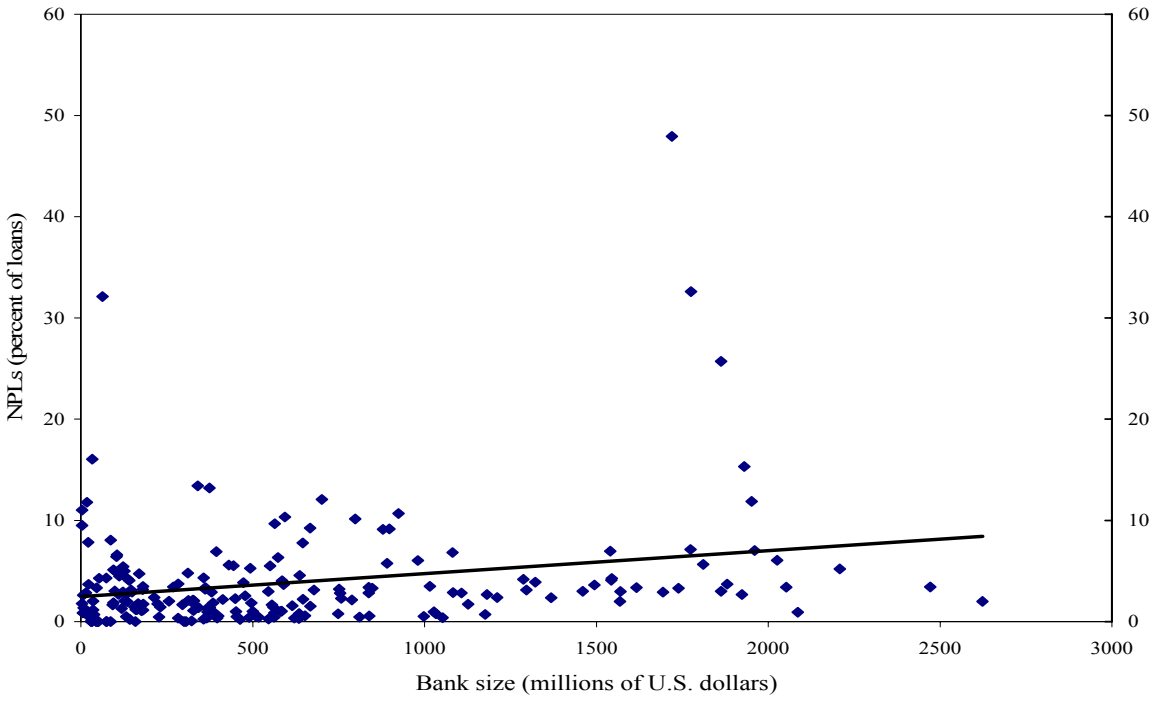


Source: Country authorities; and IMF staff estimates.

Further, bank size does not seem to affect the provisioning for nonperforming loans (NPLs). It is often thought that larger banks, being able to create a better diversified portfolio, should face lower probability of default, which should exert downward pressure on expost net interest margins. This hypothesis was tested by Beck, Demirguc-Kunt, and Levine (2003), who find that greater levels of bank concentration are associated with lower levels of bank instability. However, Figure 7 suggests no significant correlation between bank size and the provision for nonperforming loans in the Caribbean.

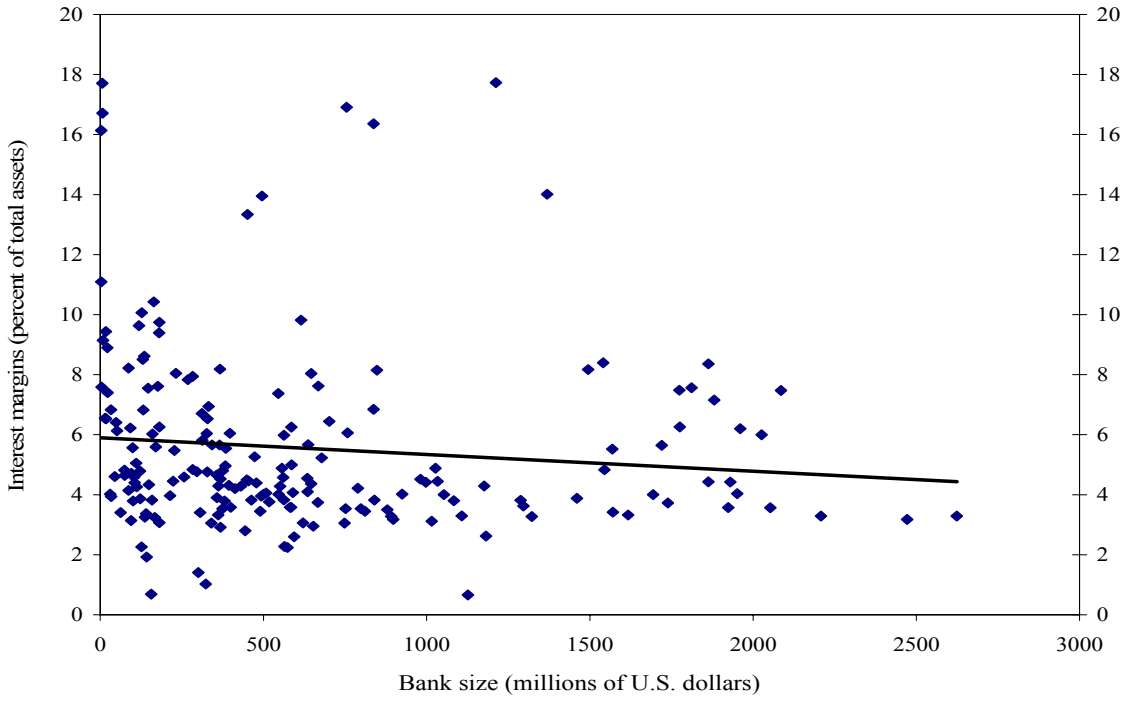
Finally, there seems to be no significant correlation between interest margins and bank size in the Caribbean. Bank size could alter the pricing behavior of banks in two ways: first, by affecting the marginal cost of production reflected in overhead expenditures and in the amount of expected receipts from loan repayment; second, by influencing the quantity of credit which is extended in equilibrium. In this vein, one might expect that size constraints may limit the bank's loan portfolio, thus leading to higher spreads. However, Figure 8 does not seem to provide support for this hypothesis in the Caribbean context. This is consistent with the results provided by Gelos and Roldos (2002), who find that the banking sectors of Eastern Europe and Latin America have not become less competitive following increased bank concentration. On the other hand, this contrasts with the results provided by Ho and Saunders (1981) for the United States. They find that smaller commercial banks have an average interest margin of approximately one-third of one percent more than larger banks, suggesting that smaller banks are able to extract higher rents.

Figure 7. Bank Size and Loan Quality in the Caribbean, 1989-2004



Source: Country authorities; and IMF staff estimates.

Figure 8. Bank Size and Interest Margins in the Caribbean, 1989-2004



Source: Country authorities; and IMF staff estimates.

VI. Econometric Estimation of Bank Spreads in the Caribbean

Balance-sheet data were utilized for estimating the determinants of bank spreads. Both ex ante and ex post measures of spreads were used. The ex ante spread is measured as the difference between the contractual rate charged on loans and the rate paid on deposits. These rates are publicly available and are easily comparable across banks. The ex post spread, sometimes referred to as the bank's net interest margin, is calculated from bank financial statement information as the intermediation margin relative to bank assets. The main difference between the two definitions is that ex ante spreads may incorporate a default risk premium, while the net interest margin takes account of the realized default. The determining factors of spreads are analyzed using both definitions of spreads.
The following reduced form equation is regressed on the pooled sample of bank-level data:

$$spread_{itj} = \alpha_0 + \alpha_1 oper\exp/assets_{it} + \alpha_2 staff\ \exp/assets_{it} + \alpha_3 loans/assets_{it} + \alpha_4 banksize_{it} + \alpha_5 provNPLs/loans_{it} + \beta concentration\_index_t + \lambda_1 \min deposit\_rate_t + \lambda_2 deposit\_rate_t + \lambda_3 \cos t\_reserves_t + \lambda_4 \cos t\_\sec urities\_requirement_t + \lambda_5 \cos t\_capital\_controls_t + \mu_1 \inf lation_t + \mu_2 corporate\_tax_t + \sum \gamma_j country\_dummy_j + \varepsilon_{it} \quad (1)$$

Where $spread_{itj}$ is the dependent variable standing for bank spreads, and the set of explanatory variables include the following regressors: *operexp/assets* as the ratio of operational expenses; *staff exp/assets* as the ratio of staff expenses to total assets; *loans/assets* as the ratio of loans to total assets; *banksize* as the size of assets measured in

U.S. dollars and expressed in logarithm; *provNPLs/loans* as the provisions for NPLs in percent of total loans; *concentration*, measured by the Herfindahl index, *min deposit_rate,* as the minimum statutory deposit rate,[13] *deposit_rate*, as the average deposit rate unexplained by the minimum statutory rate, *cost_reserves* as the cost of holding unremunerated reserves[14]; *cost_securities_requirement,* as the difference between the average deposit rate and the yield on government instruments multiplied by the statutory securities ratio, *cost_capital_controls,* proxied by the unexplained spread between the yield on U.S. treasury bills and the return on local short-term instruments; *inflation* as the level of inflation at the end of the year; *corporate_tax,* as the corporate tax rate on profits, and two country dummies to account for country-specific effects. The sum of the α coefficients account for the marginal impact of bank-specific variables on spreads, and the β coefficient captures the effect of market concentration**.** The impact of regulatory variables is captured by the sum of the λ coefficients. Specifically, they show the sensitivity of spreads to variables used to implement monetary policy or affected by the monetary policy regime.[15] The sum of μ coefficients measure the effect of control variables on spreads.[16] Finally, γ captures country specific effects vis-à-vis Jamaica.

Table 4 reports the panel regression results displayed in columns. Columns (1) to (4) display the regressions of the set of explanatory variables on ex ante spreads.[17] All regressions were run using bank fixed effects and country dummies. The estimates are also corrected for potential heteroscedasticity and autocorrelation in the residuals by clustering the observations in country groups. The robust standard errors associated with each coefficient are given in parenthesis. Columns (1) to (3) include bank-specific variables. Column (2) includes the H-index of bank concentration, and column (3) incorporates

[13] Assessing the effect of the minimum deposit rate is problematic, given that it only exists in Barbados.

[14] The cost of holding unremunerated reserves is proxied by the statutory cash ratio multiplied by the average deposit rate, as it is standard in the literature (Gelos, 2005).

[15] The cost of holding reserves in Barbados is likely to be influenced by the statutory minimum deposit rate. Therefore, the opportunity cost of holding reserves is first regressed on the statutory minimum deposit rate, and the residuals are included in the panel estimation. Changes in the minimum statutory deposit rate account for 80 percent of the variability in the cost of holding unremunerated reserves. Likewise, endogeneity between the average rate paid on deposits and the minimum deposit rate is addressed by regressing the former on the latter, and including only the residuals in the main regression. Similarly, the difference in yields on short-term instruments in Barbados and the United States is regressed on the inflation rate differentials. The unexplained residual is used as a proxy for the cost of capital controls. As the Barbados dollar has been pegged to the U.S. dollar at a constant rate since 1975, we assume the absence of foreign exchange risk. Also, given that the sovereign credit rating on short-term local currency debt for Barbados and the U.S. was the same during the period, namely A-1, it is not necessary to control for country risk premium.

[16] As this section aims to explore the variation of spreads across time, the models used in the analysis exclude the credit rating variable, owing to its persistence over time.

[17] When net interest margins are used as the dependent variable, all explanatory variables turn out to be statistically insignificant, though typically showing the expected signs in their coefficients.

Table 4. Determinants of Spreads: Panel Regressions, 1989-2004

	Bank-level	Competition	All	Only Mon. Pol.
	(1)	(2)	(3)	(4)
Operational expenditure over assets	-0.08	-0.14	-0.07	
	(0.039)	(0.033)*	(0.016)**	
Staff expenditure over assets	1.83	1.69	0.85	
	(0.711)	(0.367)**	(0.297)	
Loans over assets	-0.06	-0.05	-0.03	
	(0.023)	(0.010)**	(0.016)	
Bank size (US$)	0.36	0.56	0.05	
	(0.445)	(0.309)	(0.288)	
Provision for NPLs over loans	-0.08	-0.06	0.02	
	(0.004)***	(0.008)**	(0.005)*	
Herfindahl Index		31.92	1.30	
		(16.082)	(3.117)	
Minimum deposit rate			-0.03	-0.04
			(0.080)	(0.111)
Cost of holding reserves			3.60	3.58
			(0.309)***	(0.214)***
Average deposit rate			-0.83	-0.84
			(0.100)**	(0.075)***
Cost of securities requirement			0.01	-0.28
			(0.154)	(0.293)*
Capital controls			1.02	1.29
			(0.167)**	(0.147)**
Inflation			-0.05	-0.06
			(0.007)**	(0.006)**
Corporate tax			-9.40	-8.69
			(8.738)	(6.341)
Trinidad and Tobago	0.48	3.07	-5.92	-5.24
	(0.965)	(2.129)	(1.057)**	(0.373)***
Barbados	0.45	4.97	-7.09	-6.81
	(1.094)	(3.158)	(0.793)**	(0.571)***
Number of observations	199	199	199	199
Adjusted R-squared	0.53	0.60	0.80	0.79

Note: The standard errors are shown in parenthesis, with ***significant at the 1 percent, **significant at the 5 percent, and *significant at the 10 percent level.

monetary policy variables and two control variables (inflation and the corporate tax rate). Column (4) includes only monetary policy variables and the two control variables.

Monetary policy variables appear to be important determinants of ex ante bank spreads. Including the two control variables, they account for 79 percent of the variability of spreads, as shown in column (4).[18] The cost of holding reserves turns out to be highly significant with an increase of 1 percent in the cost of reserves raising bank spreads by 3.6 percentage points.[19] Not all monetary policy variables behave as expected, however. The impact of the statutory minimum deposit rate on spreads appears to be insignificant, pointing to the difficulty in isolating the effect of this variable in a panel of data across countries. The cost of the government securities requirement variable has the wrong sign in column (4), although it is only weakly significant, and becomes statistically insignificant in a richer specification of the model where all variables are included (column 3). The effects of this variable on spreads are also captured, however, in the average deposit rate, given the correlation between rates on government securities and average deposit rates.[20] Average deposit rates, as indicated in Table 4, are robustly and negatively related to spreads, and the estimated coefficient is high in absolute terms (over 0.80).

There is some evidence that capital controls may affect spreads. They not only exert a direct effect on spreads by reducing the return on fixed-income securities, but also affect spreads indirectly by holding down the return on deposits.

Bank size and market concentration do not appear to affect spreads in the Caribbean. The statistically insignificant coefficient for bank size does not support the "efficiency hypothesis" of spread determination and corroborates the apparent lack of correlation between spreads and bank size indicated by Figure 6.[21]

Bank-specific variables have little explanatory power when regulatory variables are included in the estimated equations. In particular, we find only weak evidence that bank fragility, proxied by the provision for nonperforming loans, explains spreads in these Caribbean countries.[22] The coefficient is insignificant and carries the wrong sign in some of the estimated equations. This result is contrary to the "financial management" view of spreads determination.

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[18] Excluding control variables, monetary variables alone explain 76 percent of the variation in bank spreads.

[19] Given that the cost of reserves is constructed by multiplying the cash ratio by the deposit rate, an increase of 1 percentage point in the cost of reserves requires a substantial increase of either of the two variables.

[20] The correlation between the average deposit rate and the t-bill rate is 0.93 for the sample period.

[21] This finding does not address the potential effect of bank size on profits. One factor driving mergers and acquisitions in the banking sector may be the search for portfolio diversification.

[22] This variable is significant only at the 10 percent confidence level with a coefficient of 0.2.

VII. Concluding Remarks and Policy Implications

There is some evidence that spreads in Barbados are higher than predicted by its macroeconomic environment. Although commercial bank spreads in Barbados lie between the average bank spread observed in small open economies and those prevailing in the CARICOM region, spreads in Barbados appear to be 2.1 percentage points higher than predicted by the strength of its macroeconomic policy.

The analysis of bank spread determination in the Caribbean shows that monetary policy variables are most significant. Along with the control variables (inflation and the corporate tax rate), they account for 79 percent of the variability of spreads in 1989–2004. By contrast, banking concentration, proxied by the Herfindahl index, proves to be statistically insignificant—suggesting that the level of concentration is not the key determinant of spreads. Likewise, bank-specific variables, including bank size and provisions for nonperforming loans, do not have an important role in explaining variations in bank spreads.

There is some evidence that capital controls (proxied by the unexplained spread between the yield on U.S. treasury bills and the return on local short-term instruments) may play a significant role in explaining the evolution of spreads in the Caribbean. On the one hand, capital controls exert a direct effect on spreads by reducing the return on fixed-income securities, which in turn puts upward pressure on lending rates. On the other, they affect spreads indirectly by holding down the return on deposits.

The results of the study suggest that financial sector efficiency is likely to increase in Barbados and other Caribbean countries by introducing more market-based instruments of monetary policy. In effect, the greater use of these instruments could lower the tax imposed by direct monetary policy tools, such as the use of the liquid securities ratio. This is confirmed by the experience of a number of countries, where greater use of indirect market-based instruments is associated with a decline in spreads (Alexander, Balino, and Enoch, 1995).

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DATA SOURCES AND DESCRIPTION

Macroeconomic variables were obtained from the published sources of the country authorities. The inflation rate is measured by the 12-month average change in the consumer price index, and the corporate tax rate is the statutory rate prevailing during the relevant year. Regulatory variables include the ratio of unremunerated reserves and the requirement on holdings of government securities. Bank-specific variables comprise the average lending rate and the average return on deposits, the bank's interest income and interest-related expenses, the interest margin normalized by the level of assets, the level of operational expenditures, the amount of personnel expenses, the provision for nonperforming loans as a fraction of total loans, and the bank's size, measured by the natural logarithm of its assets.

To assess the impact of the macroeconomic environment on bank spreads, we consider the set of countries for which S&P sovereign credit ratings are available as of December 2003. This results in a sample of 96 countries. The final sample is smaller as we apply two filtering criteria. First, we impose some outlier rules that eliminate two countries, namely Brazil and Paraguay. Second, we delete countries for which the main variables, including spreads, are not available. This reduces the final sample to 59 countries. Once the country sample has been constructed, we create a linear index to capture the qualitative rating credit scale.

Regarding the analysis of bank spreads using individual bank characteristics, the data for Barbados cover the period 1996 to 2004, resulting in a total number of bank-year observations of 57. The data for Jamaica covers the period from 1989 to 2004, yielding 84 observations. Finally, the data for Trinidad and Tobago span over the period 1994 to 2003, with an overall number of 58 observations. It is an unbalanced panel with the largest number of observations for 1996–2003.