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**Interest Rate Spreads in the Eastern Caribbean**

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**Abstract**

This paper examines interest rate spreads in the Eastern Caribbean and seeks to explain why they are persistently high by comparison with other low-inflation countries. The paper concludes that operating costs appear to be a key determinant of observed interest rate spreads, giving rise to the policy recommendation that efforts to expand the market size of efficient banks might help pave the way for greater efficiency.

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## SUMMARY

The paper examines and seeks to explain interest rate spreads in the Eastern Caribbean region, which are persistently high by comparison with other low inflation countries, over a six year period from 1991 to 1996.

An interest rate spread identity is derived, and used to decompose the spread into its cost and profit components. The outcome suggests that reserve costs, operational costs, and provisions for loan losses account for over 75 percent of the observed spread. A behavioral model is also developed, which derives the interest rate spread as the result of profit maximization by a representative commercial bank. Parameter estimates for key structural variables characterizing the region's deposit and loan markets—such as the elasticity of loan supply with respect to the deposit rate, the elasticity of loan demand with respect to the lending rate, and the production cost elasticity with respect to deposits—are obtained and used to estimate and then decompose the interest rate spread into its cost and profit components. The results of this exercise help corroborate the results of the interest rate spread identity.

Lastly, a separate regression attempts to estimate the influence of various policy determinants of the interest rate spread. This exercise suggests that: (1) the 4 percent statutory minimum deposit rate added significantly to the cost of bank intermediation; (2) a tightening of loan loss provisioning guidelines in July 1995 did not add to commercial bank costs after accounting for the tendency of banks, in the aggregate, to under provision in the case of government loans; and (3) commercial bank fixed costs, including the cost of capital controls (which were largely invariant over the review period), and operating costs, were significant explanatory factors of the interest rate spread over the review period.

## I. INTRODUCTION

The objective of this study is to examine and explain interest rate spreads in the Eastern Caribbean.<sup>1</sup> The spread between lending interest rates and deposit rates in the region appears high, by international standards, for low inflation countries. Chart 1 shows that the spread, based on weighted average lending and deposit rates, was uniformly high in each member country over the review period (1991-96)<sup>2</sup>, ranging from a low of 5.1 percentage points in St. Kitts and Nevis in 1991 to a high of 8.9 percentage points in St. Lucia in 1994, with a regional average of 7.3 percentage points.

Member countries of the Eastern Caribbean Central Bank (ECCB) share a common currency (the EC\$), which has been fixed to the U.S. dollar at EC\$2.70 = US\$1 since 1976. The ECCB operates as a *quasi currency board* (see discussion below), whereby lending to members is strictly limited by statute and 60 percent of its monetary liabilities are required to be backed with foreign currency assets. When operated effectively, currency boards serve to limit exchange rate uncertainty and foster macroeconomic stability, thereby helping to create the conditions for the convergence of interest rates (net of country risk) to levels found in the peg currency country.<sup>3</sup> However, the common perception is that interest rate convergence to U.S. levels has not occurred in the ECCB area. Chart 2 shows that the ECCB area regional average interest rate spread exceeded the spread of the representative lending and deposit

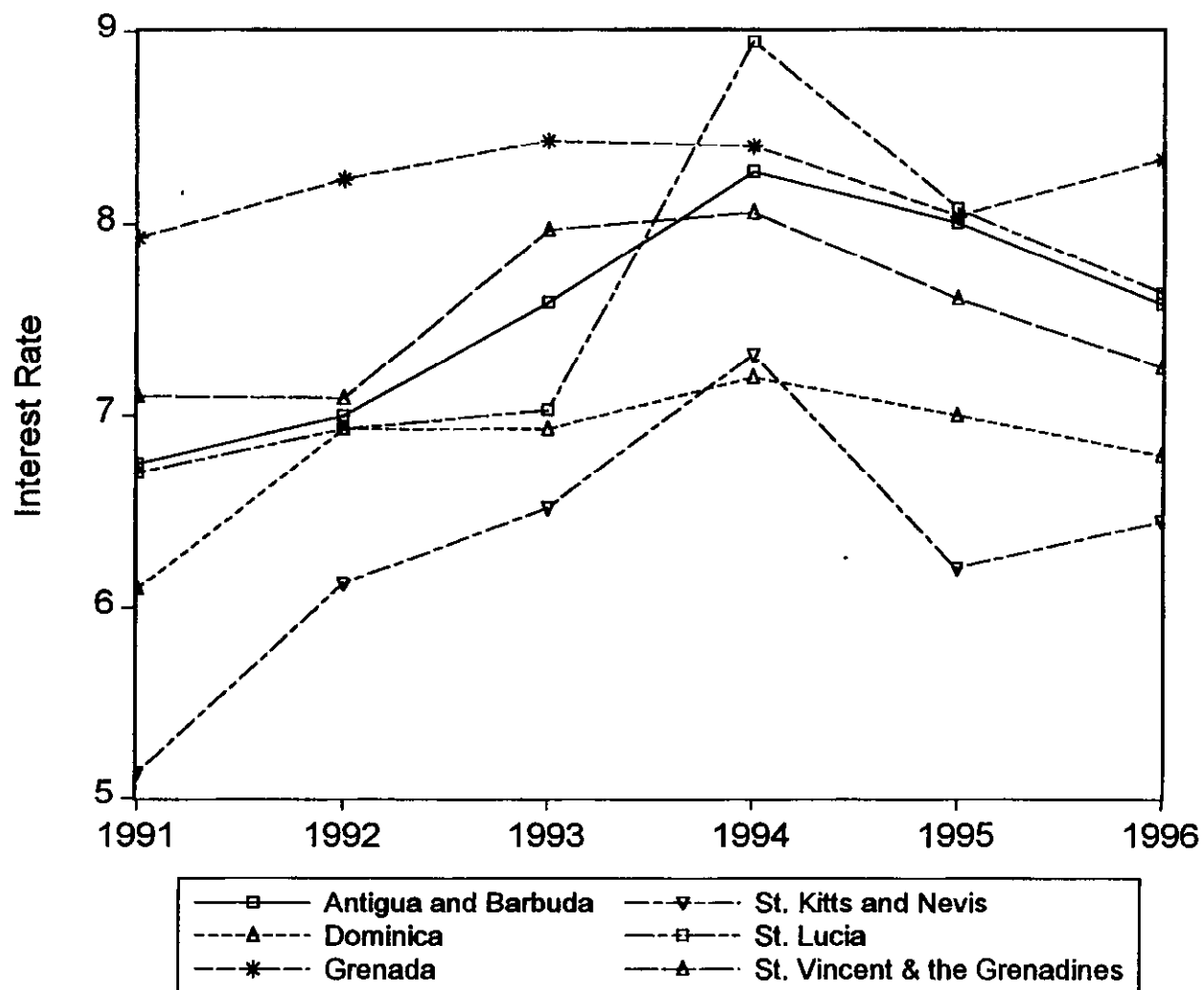
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<sup>1</sup> There are eight countries in the region that share a common central bank, namely the Eastern Caribbean Central Bank (ECCB), six of which are independent states and are members of the International Monetary Fund (IMF). The six countries are, in alphabetical order: Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, St. Lucia, and St. Vincent and the Grenadines. These six countries are henceforth collectively referred to as the ECCB area. The two non-independent states are Montserrat and Anguilla.

<sup>2</sup>The review period from 1991-96 was selected on the basis of the availability of the required data for each member country. However, it is also noteworthy that this time frame corresponds with a new banking regime under the Uniform Banking Act, approved by member governments in 1991, which expanded the ECCB's banking, regulatory, and supervisory powers and procedures. In so doing, the new regulations tightened the capital requirements for banks, established a limit on unsecured loans of 15 percent of banks' total loan portfolio, and mandated the publication of financial performance information.

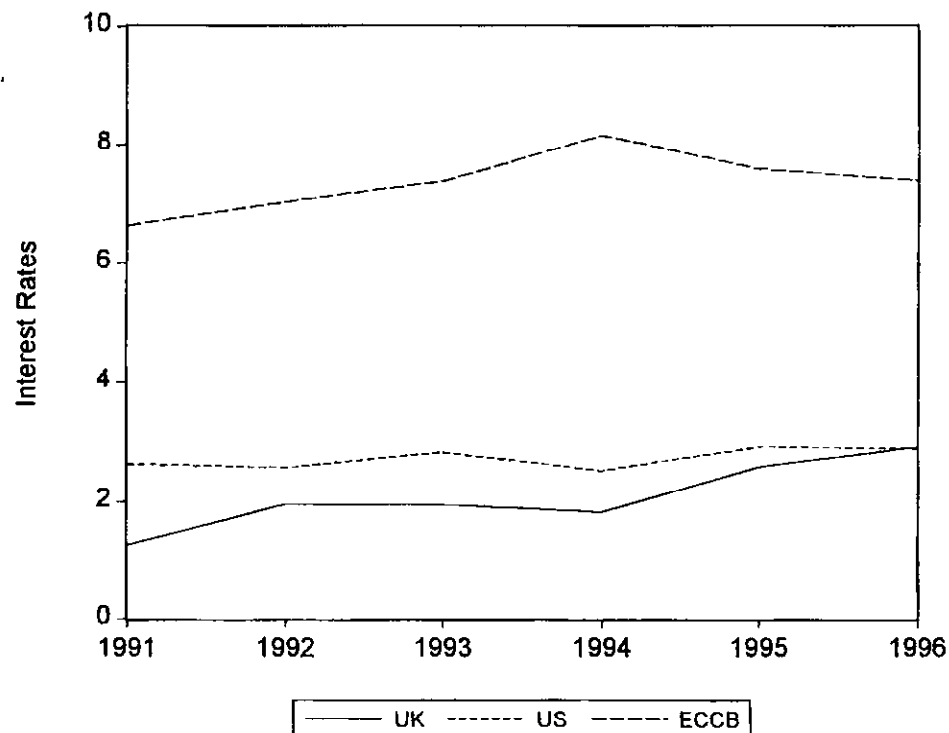
<sup>3</sup>The theory of interest rate parity states that in a competitive market, interest rates movements will shift so that a domestic investor will become indifferent between investment in the domestic currency securities and foreign currency securities with foreign rates, as capital flows seek the highest rate of return. To the extent then that commercial bank deposits are potential substitutes for financial securities, then by a logical theoretical extension, in the absence of capital controls, domestic interest rates can be expected to equal foreign interest rates plus the expected change in the exchange rate and an adjustment for market risk.

Chart 1. ECCB Area: Weighted Interest Rate Spread



Sources: Data provided by the ECCB.

Chart 2. ECCB Area, United Kingdom, and the United States: Comparative Interest Rate Spreads



Notes:

ECCB area weighted average spread based on weighted lending and deposit rates provided by the ECCB, whereby individual country interest rate spreads are weighted by the share of ECCB area commercial bank assets. The U.K. and U.S. spreads are based on the representative lending and deposit rates shown in the IMF International Finance Statistics.

rates for the United States and the United Kingdom by sizable margins (an average of 4.6 and 5.3 percentage points, respectively)<sup>4</sup>. This comparison is only indicative, however, as the ECCB rates shown are weighted averages across loans and deposits while the rates shown for the United States and the United Kingdom are only representative owing to the unavailability of data on weighted average interest rates for both the United Kingdom and the United States.

The persistence of wide spreads can be a cause for concern because such spreads can be symptomatic of a number of systemic problems, such as: a lack of adequate competition in the region's banking industry; perceived market risk; bank unsoundness; scale diseconomies constrained by "small" markets; and/or high fixed and operating costs, due both to scale diseconomies and to the existence of regulatory constraints, which may distort the financial market—such as the 4 percent statutory minimum savings deposit rate (see below) and the existence of various capital controls. Moreover, many of these problems are compounded by the lack of development of the region's financial markets, including the absence of an integrated market for the region's government securities<sup>5</sup>. Wide spreads can be inimical to economic growth as they can contribute to financial disintermediation and reduce private investment.<sup>6</sup> Thus, to the extent that the determinants of the spread are distortionary, these problems can be redressed, so as to permit interest rate spreads in the region to narrow, with positive effects on economic growth and the efficiency of resource allocation<sup>7</sup>.

The wide interest rate spreads found throughout the region have been discussed often between Fund staff and country authorities during Article IV consultations. Despite the growing consensus about the factors that have contributed to the spread, there is a dearth of literature quantifying the impact of the various known influences. This study seeks to

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<sup>4</sup>The representative rates are as shown in the IFS. The ECCB area regional average interest rate spread (for the period 1991-96) based on representative rates in the IFS exceeded the average spread in the U.S. and the U.K. by 3.2 and 4.0 percentage points, respectively.

<sup>5</sup>The subsequent discussion explains that the ECCB is in the process of rectifying this problem, through the establishment of a regional government securities market.

<sup>6</sup>For example in Dominica and St. Kitts and Nevis, where some private businesses reportedly have started to accept deposits and provide credit to the private sector. In addition, there were reports of banks rejecting savings deposits following the enactment of this regulation.

<sup>7</sup>It is worth noting that although a narrowing of the spread would be expected, in practice, interest rate spreads might never fully converge to international levels for any number of reasons. For instance, if fixed costs are high—say, owing to a certain amount of excess capacity stemming from over-banking—and the banking system serves primarily small depositors, then there might be a certain inelasticity in the demand for local bank services (driven principally by a transactions, as opposed to speculative, motive) despite the lower remuneration rates available on local deposits.

investigate the issue, with a view to quantifying the influence of various hypothesized determinants of the spread.

The paper is structured in accordance with this objective. Section II provides a regional overview that includes a discussion of common country characteristics; the role of the ECCB and the nature of the currency union; the structure and performance of the region's banking industry; and regulations affecting the banking industry. In Section III, the components of the spread are disaggregated, based on the income statement of the banks. Section IV then derives the spread within the context of a behavioral model, which is based on the theory of the depository firm. Thus, the interest rate spread is derived as the result of profit maximization by the representative commercial bank. Section V discusses the estimation methodology by which aggregated commercial bank data are used to estimate key structural parameters that describe the region's commercial banking industry. Such structural parameters include: the elasticity of supply of loans with respect to the deposit rate, the elasticity of the demand for loans with respect to the lending rate, and the production cost elasticity with respect to deposits. A separate regression analysis seeks to assess the effect of several explanatory variables which are often proffered as policy determinants of the observed trend in interest rate spreads in the region. Section VI discusses the empirical results, and Section VII presents the paper's conclusions.

## **II. BACKGROUND**

### **A. Regional Monetary Arrangements**

The member countries of the ECCB are small island economies, ranging in size from St. Kitts and Nevis, with 269 sq. km, to Dominica, with 750 sq. km., and with populations ranging from 41,000 in St. Kitts and Nevis to 140,000 in St. Lucia. They also share a similar economic structure and had a collective GDP of US\$2.1 billion in 1996, with per capita GDP ranging from US\$2,500 in St. Vincent and the Grenadines to US\$6,785 in Antigua and Barbuda. The countries in the region are typically primary commodity producers, specializing mainly in banana production principally for export to the United Kingdom and other European destinations, sugar production destined largely for the United States and European markets (both historically exported under preferential trading arrangements), and local root crops mainly for intra-regional and intra-Caribbean trade. Tourism has also been an important source of growth for the region. The countries are geographically susceptible to periodic natural disasters—such as hurricanes and volcano eruptions—which, given the smallness of the economies and the lack of economic diversification, occasionally threaten the economic base.

Prior to the establishment of the ECCB in 1983, the countries shared a long tradition of monetary cooperation, with the historical antecedents of the present currency union dating back to 1950 when the British Caribbean Currency Board (BCCB) was established. The BCCB was replaced by the Eastern Caribbean Currency Authority (ECCA) in 1965, when the



Eastern Caribbean dollar (EC\$) was introduced and initially pegged to the pound sterling at a rate of EC\$4.80 = 1 British pound. Following a series of depreciations of the pound sterling, the parity was redefined with respect to the U.S. dollar in 1976 and pegged to the U.S. dollar at the then prevailing market cross-rate of EC\$2.70 to the US dollar; the parity has since remained fixed at that level. The ECCA was replaced by the Eastern Caribbean Central Bank (ECCB) in July 1983.

The ECCB is required to maintain its external reserves at a level that is *at least* 60 percent of its monetary liabilities. In practice, however, the level of foreign exchange cover typically has exceeded this requirement and at end-June 1997 it was 97 percent. The bank is authorized to make temporary advances to member governments amounting to no more than 5 percent of each government's average annual recurrent revenue based on the three preceding financial years (in 1991, government advances were EC\$20.4 million or 0.7 percent of GDP). In addition, central bank holdings of treasury bills of any one government cannot exceed 10 percent of the estimated recurrent revenue of that government. Holdings of government securities, other than treasury bills, may not exceed 15 percent of currency in circulation and other demand liabilities. Holdings of bonds issued by development finance corporations may not exceed 2.5 percent of the average annual government revenue over the preceding three years. The ECCB's provisions also call for a general reserve fund equivalent to 10 percent of demand liabilities, which must be replenished (according to prescribed rules), if necessary, before the distribution of ECCB profits to member countries.

The ECCB's "Articles of Agreement" provide it with the power to: establish discount and rediscount rates and ceilings; set differential rates and ceilings for various classes of transactions and determine priority areas for credit distribution, in cooperation with member governments; and establish a schedule of reserve requirements (including marginal required reserves) which could vary by deposit type. In practice, however, no rediscount ceilings have been utilized, and since its inception the ECCB has maintained a uniform reserve requirement of 6 percent, with a one percent cash requirement, on all deposits. Although most commercial bank interest rates are unregulated, the Bank established a 4 percent minimum savings deposit rate in 1984 with the intention of encouraging saving by small investors<sup>6</sup>. In 1986 the ECCB permitted interbank lending to provide an outlet for commercial bank excess liquidity previously held with the ECCB, although banks with excess liquidity can also make deposits with the ECCB in a 7-day call account.

In 1988, the ECCB established a facility for discounting and rediscounting treasury bills; however, rates are administered rather than market determined and are therefore relatively unresponsive to changing market conditions. Table 1 shows that although ECCB deposit rates for commercial banks were responsive to international rates over the review period (the average difference between the three-month deposit rate and the LIBOR three

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<sup>6</sup>There is also a ceiling of 16 percent on lending rates in Grenada, although it is believed to be non-binding and is not found elsewhere in the ECCB area.

**Table 1. Selected Interest Rates**  
(December)

	1991	1992	1993	1994	1995	1996
<b>ECCB rates 1/</b>						
Deposit rates for commercial banks						
Call	3.8	2.8	2.7	4.1	4.3	5.4
One-month	4.7	3.3	3.0	4.3	5.5	5.4
Three-month	4.2	3.3	3.1	4.5	5.4	5.4
Six-month	4.2	3.5	3.3	4.6	5.3	5.4
Lending rates						
Overdraft rate	10.5	10.5	10.5	10.5	10.5	10.5
Temporary advance	10.0	10.0	9.0	9.0	9.0	8.0
<b>LIBOR rates 2/</b>						
Three-month	4.6	3.6	3.4	6.4	5.8	5.6
(Difference from ECCB 3-month rate)	0.4	0.3	0.3	1.9	0.4	0.2
<b>Commercial Bank rates 2/</b>						
Weighted deposit rate						
ECCB aggregate 3/	5.2	5.0	4.8	4.6	4.7	4.9
Antigua and Barbuda	5.9	5.7	5.2	5.0	4.8	5.0
Dominica	5.0	4.3	4.7	4.7	4.8	4.9
Grenada	4.4	4.3	4.2	4.4	4.3	4.3
St. Kitts and Nevis	5.5	5.8	5.3	4.8	5.0	5.0
St. Lucia	5.0	5.0	4.7	4.3	4.8	5.1
St. Vincent and the Grenadines	4.8	4.5	4.2	4.2	4.5	4.7
Weighted lending rates						
ECCB aggregate 3/	11.8	12.1	12.1	12.7	12.3	12.3
Antigua and Barbuda	12.7	12.7	12.7	13.2	12.8	12.6
Dominica	11.1	11.2	11.6	11.9	11.8	11.7
Grenada	12.3	12.5	12.7	12.8	12.3	12.6
St. Kitts and Nevis	10.6	11.9	11.8	12.1	11.2	11.5
St. Lucia	11.7	11.9	11.7	13.3	12.9	12.7
St. Vincent and the Grenadines	11.9	11.6	12.1	12.3	12.1	11.9

Sources: ECCB; IMF International Financial Statistics.

1/ Based on end-of-period rates.

2/ Based on quarterly averages.

3/ Country rates are weighted by the percentage share of average total assets to arrive at a regional average.

month rate was 0.6 percentage points), lending rates were relatively constant. In particular, the overdraft rate was unchanged over the review period, while the rate on temporary advances was 10 percent over 1991-92 and then lowered to 9 percent in May 1993; it then remained at that level until 1996 when it was lowered to 8 percent.

## **B. Commercial Bank Performance**

There are presently 36 commercial banks operating in the six ECCB member countries included in this study. Included in the total are six "branch banks", which have continued to operate—usually in more than one country—as branches of foreign banks since independence, and the remainder are local banks, including government-owned, private, and locally-incorporated subsidiaries of foreign banks (see below). Table 2 shows consolidated commercial bank performance indicators over the review period both for the region as a whole and at the country level. The data reveal that for each of the series shown the regional average appeared to be a good representation of individual country performance.

The data in Table 2 indicate that the ECCB aggregate return on assets declined over the review period, by four-tenths of a percentage point. This was despite an increase in the aggregate spread of 0.8 percentage points and a corresponding increase of six-tenths of a percent in the ratio of interest income to average total assets. The decline in profitability appears to be attributable both to a decline in operating income and a doubling in the provisioning for doubtful debts.<sup>9</sup> The increase in the provision for doubtful debts occurred in most countries in 1995, and corresponds to the tightening of ECCB loan loss provisioning guidelines and the expansion of reporting requirements on banks' investment portfolios in July 1995<sup>10</sup>, as well as with the timing of Hurricanes Luis and Marilyn in September 1995, that

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<sup>9</sup>Data on nonperforming loans were not provided.

<sup>10</sup>The new regulations stipulated specific provisions based on loan risk characteristics. For example, a 100 percent provision is required for unrecoverable loans, a 50 percent provision for doubtful loans, and a 10 percent provision for substandard loans. Also included was a minimum general provision of 1 percent. In addition, the maximum time permissible for writing off bad debts and suspending interest income was tightened to three months. The ECCB also required banks to hold a minimum capital (including equity capital and disclosed reserves) equivalent to 8 percent of a bank's risk weighted assets. Risks for on-balance sheet assets are zero for currency and government securities, 20 percent for claims on domestic and foreign financial institutions, 50 percent for loans fully secured by mortgages on residential properties, and 100 percent for other claims on the private sector and for real estate and equity investments. The new bank reporting requirements call for detailed information on the type, currency, country of issue, interest rate, and maturity date of a bank's investments. Banks are also required to file separate reports on investments that they administer as fund

(continued...)

Table 2. ECCB Area: Consolidated Commercial Bank Performance Indicators

	1991	1992	1993	1994	1995	1996
<b>Profitability Ratios</b> (Percent of average total assets)						
<b>Interest Income</b>						
ECCB Aggregate	8.1	7.7	8.2	8.3	8.5	8.7
Antigua & Barbuda	9.2	8.5	8.4	8.4	8.6	8.5
Dominica	8.1	8.1	8.7	9.0	8.9	9.0
Grenada	7.8	6.2	7.2	7.5	8.1	7.6
St. Kitts and Nevis	6.9	6.7	6.5	6.9	7.6	8.2
St. Lucia	9.0	8.7	9.7	9.8	9.8	10.1
St. Vincent & the Grenadines	6.4	6.9	7.5	7.3	7.5	7.8
<b>Operating Income</b>						
ECCB Aggregate	2.8	2.4	2.5	2.2	2.2	2.1
Antigua & Barbuda	2.7	2.4	3.0	2.4	2.6	2.3
Dominica	3.2	2.7	2.3	2.3	2.0	1.9
Grenada	2.3	1.9	2.3	2.1	2.5	2.4
St. Kitts and Nevis	2.5	1.6	1.7	1.8	1.7	1.8
St. Lucia	2.7	2.3	2.5	2.1	2.1	2.0
St. Vincent & the Grenadines	3.5	3.6	3.0	2.3	2.2	2.2
<b>Net Interest Margin</b>						
ECCB Aggregate	4.2	4.0	4.7	5.1	5.0	4.9
Antigua & Barbuda	5.0	4.4	4.8	4.9	5.1	5.0
Dominica	4.7	4.6	5.4	5.8	5.5	5.2
Grenada	4.3	3.3	4.1	4.6	4.8	4.4
St. Kitts and Nevis	3.1	3.1	3.4	3.6	4.0	4.2
St. Lucia	4.7	4.9	5.8	6.7	6.1	6.0
St. Vincent & the Grenadines	2.6	3.0	3.7	3.9	4.1	3.9
<b>Net Profit Before Tax</b>						
ECCB Aggregate	2.7	2.3	2.8	3.0	2.7	2.4
Antigua & Barbuda	2.6	1.6	2.3	2.0	2.0	2.2
Dominica	4.1	3.7	4.0	4.1	3.8	2.4
Grenada	2.0	1.1	2.1	2.9	3.1	2.3
St. Kitts and Nevis	1.7	1.6	2.2	2.3	2.5	2.8
St. Lucia	3.2	3.3	3.6	4.2	2.9	2.5
St. Vincent & the Grenadines	2.8	2.5	2.5	2.5	2.5	1.9
<b>Net Profit After Tax</b>						
ECCB Aggregate	2.0	1.7	2.1	2.3	2.0	1.7
Antigua & Barbuda	1.9	1.1	1.9	1.3	1.3	1.6
Dominica	3.1	2.9	3.2	3.4	3.2	1.7
Grenada	1.5	0.8	1.7	2.2	2.4	1.7
St. Kitts and Nevis	1.2	1.1	1.7	1.9	2.2	2.2
St. Lucia	2.7	2.6	2.8	3.3	2.0	1.9
St. Vincent & the Grenadines	1.3	1.4	1.3	1.5	1.5	1.1

Table 2. ECCB Area: Consolidated Commercial Bank Performance Indicators (Cont.d)

	1991	1992	1993	1994	1995	1996
<b>Expense Ratios</b> (Percent of average total assets)						
<b>Operating Expenses</b>						
ECCB Aggregate	4.1	3.9	4.2	4.1	4.1	4.2
Antigua & Barbuda	4.9	4.8	5.0	5.2	4.9	4.6
Dominica	3.8	3.6	3.6	3.7	3.4	4.0
Grenada	4.2	3.3	3.9	3.8	4.1	4.3
St. Kitts and Nevis	3.5	2.9	2.7	3.0	3.1	3.1
St. Lucia	4.1	3.9	4.7	4.3	4.6	4.8
St. Vincent & the Grenadines	3.2	3.9	4.1	3.7	3.7	4.0
<b>Provision for doubtful debts</b>						
ECCB Aggregate	0.2	0.3	0.2	0.1	0.4	0.4
Antigua & Barbuda	0.2	0.5	0.4	0.1	0.8	0.5
Dominica	-0.1	0.1	0.1	0.3	0.3	0.7
Grenada	0.4	0.8	0.5	0.1	0.1	0.3
St. Kitts and Nevis	0.3	0.1	0.2	0.0	0.1	0.1
St. Lucia	0.1	0.0	0.0	0.1	0.6	0.6
St. Vincent & the Grenadines	0.1	0.2	0.1	0.0	0.0	0.1
<b>Interest Rate Spread</b> (Percentage points)						
ECCB Aggregate	6.6	7.0	7.4	8.2	7.6	7.4
Antigua & Barbuda	6.8	7.0	7.6	8.3	8.0	7.6
Dominica	6.1	6.9	6.9	7.2	7.0	6.8
Grenada	7.9	8.2	8.4	8.4	8.0	8.3
St. Kitts and Nevis	5.1	6.1	6.5	7.3	6.2	6.5
St. Lucia	6.7	6.9	7.0	8.9	8.1	7.6
St. Vincent & the Grenadines	7.1	7.1	8.0	8.1	7.6	7.2

Sources: Supporting data provided by the Eastern Caribbean Central Bank.

Note: ECCB aggregates are weighted averages based on the respective country shares of average total assets and average total loans, respectively.

caused extensive damage in several countries in the ECCB area. The decline in operating income seems to have stemmed from a sharp decline in income from commissions, which fell from the equivalent of 10 percent of average total assets at the start of the period to roughly 4 percent of average total assets by 1996, and from a moderate decline in "other operating income".

As explained above, the region's banking industry is heterogenous in ownership, with the number of banks locally incorporated banks having grown rapidly since independence to now account for over 50 percent of bank assets<sup>11</sup>. These banks often operate at a cost disadvantage relative to the branch banks, which are better able to achieve economies of scale in their bank operations by managing their liquidity on a regional basis. In addition, many of the local banks are said to be subject to both formal and informal governmental pressure to restrict their lending to home markets. For instance, many of the government-owned commercial banks, often largely financed by the deposits of National Insurance Schemes, are said to be forced to make loans to various governmental bodies, often at below-market rates. The Alien Land Holding Acts also restrict foreign (including from within the ECCB area) ownership of domestic assets (both real and financial). Other restrictions affecting bank operations include those pertaining to domestic residents on the purchase of foreign currency securities or real estate abroad<sup>12</sup>, limits on outward capital flows, and restrictions which limit the tax-exemption of government securities to domestic residents only.

Thus, by hampering the flow of funds both within and outside the ECCB area (and thereby preventing the movement of interest rates towards international levels through capital flows), these restrictions are likely to have had an impact on the size of the interest rate spread and to have contributed to the *segmentation* of the regional banking market.<sup>13</sup> In addition, were the 4 percent minimum rate on savings deposits binding, this could exert upward pressure on bank interest rate spreads—by raising banks' marginal interest costs—resulting in an increase in the lending rate, and possibly their operating costs, following a proliferation of small savings accounts (see below). On the other hand, the noted tendency for government-owned banks to issue loans to parastatals at sub-market rates is believed to have exerted

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<sup>11</sup>The OECS Financial Sector Review, The World Bank, February 1997.

<sup>12</sup>During the review period, these restrictions applied in the case of Grenada, Dominica, St. Kitts and Nevis, St. Lucia and St. Vincent and the Grenadines (Exchange Arrangements and Exchange Restrictions, Annual Report 1996.)

<sup>13</sup>The growing awareness of this problem has reportedly prompted eleven of the larger local banks to seek to implement a joint initiative that would possibly: establish a jointly-owned lending subsidiary that could diversify across countries and fund loans too large for individual banks; expand the existing joint credit card facility to link ATMs and to support debit cards; create an investment banking subsidiary; and facilitate the acquisition of problem institutions both inside and outside the OECS. (The OECS Financial Sector Review, *op.cit.*)

downward pressure on the weighted lending rate, while possibly augmenting the volume of nonperforming assets if the standards for qualifying and performance criteria were lowered to accommodate these loans.

### III. ANATOMY OF THE SPREAD

The income statement and balance sheet of commercial banks can be used to derive an accounting framework which will facilitate a decomposition of the interest rate spread. This framework provides a descriptive analysis of the determinants of the spread without any behavioral content.

The consolidated income statement of commercial banks defines profit before taxes (P) as interest income (II) plus noninterest income (NII), minus interest expense (IP), operating cost (OC), and provision for loan losses (Prov). This identity can be rearranged and expressed as the interest margin—that is, the difference between interest income and interest expense:

$$II - IP = OC + Prov + P - NII$$

Dividing this expression by average deposits (D) as a scaling factor, and using average loans (L) and assets (A), the following expression results:

$$\frac{II}{L} * \frac{L}{D} - \frac{IP}{D} = \frac{OC}{D} + \frac{Prov}{D} + \frac{P}{A} * \frac{A}{D} - \frac{NII}{D}$$

Where:

$$\frac{P}{A} = \text{Gross return on assets (ROA)}$$

Using the fact that interest income is equivalent to the average lending rate times the average volume of loans, and that interest expenses are equivalent to the average deposit rate times average deposits, as well as the fact that the ratio of loans to deposits is equal to one minus the required reserve ratio, the following expression for the interest rate spread results:

$$i_L - i_D = \rho i_L + \frac{OC}{D} + \frac{Prov}{D} + ROA * \frac{A}{D} - \frac{NII}{D} + \frac{\epsilon}{D} \quad (1)$$

Where:

$\rho$  = required reserve ratio

ROA = Return on Assets

$$\frac{II}{L} = i_L$$

$$\frac{IP}{D} = i_D$$

$$\frac{L}{D} = (1 - \rho)$$

$\epsilon$  = residual

The residual,  $\epsilon$ , reflects errors that result from combining data from the income statements (flow data) and stock data from the consolidated balance sheet as well as the simplifying assumption that loanable funds are comprised of deposits net of required reserves. The result of the decomposition of the ECCB interest rate spread into its various components according to equation (1) is contained in Table 3 (below).

Table 3. Anatomy of the Interest Rate Spread  
(Percentages)

	1991	1992	1993	1994	1995	1996	Average
$i_L$	12.1	12.0	12.3	12.3	12.5	12.5	12.3
$i_D$	4.7	4.6	4.3	3.9	4.2	4.5	4.4
<b>Spread</b>	7.4	7.4	8.0	8.4	8.3	7.9	7.9
$\rho * i_L$	0.7	0.7	0.7	0.7	0.7	0.7	0.7
OC/D	4.9	4.8	5.1	4.9	5.0	5.1	5.0
Prov/D	0.2	0.3	0.3	0.1	0.5	0.5	0.3
ROA*(A/D)	3.3	2.8	3.4	3.6	3.2	2.9	3.2
NII/D	3.3	3.0	3.1	2.6	2.6	2.5	2.9
Residual	1.6	1.7	1.6	1.6	1.5	1.3	1.5
Memorandum :							
ROA	2.7	2.3	2.8	3.0	2.7	2.4	2.7
A/D*100	119.9	124.7	121.6	120.5	119.9	120.6	121.2

Table 3 reveals that although the implicit average interest rate spread was 7.9 percentage points, on average approximately 6 percentage points of this spread was attributable to various costs—namely reserve costs, operational costs and provisions for loan



losses. Moreover, the slight *increase* in the spread observed over the review period was associated with an increase in two out of three components of cost and a decline in non-interest income as a percentage of average deposits. The combined effect of these trends was a slight reduction in the average return on assets which went from 2.7 to 2.4 percent over 1991-96. It is also noteworthy that the estimated implicit average interest rate spread of 7.9 percentage points is in line with the actual average interest rate spread of 7.4 percentage points, as presented in Table 2, which serves as a check for internal consistency.

Chart 2 and the discussion that followed revealed that the average interest rate spread in the ECCB area was higher than the United States interest rate spread when based on representative interest rates presented in the IMF International Finance Statistics. The United States serves as an important reference case for comparisons with the ECCB area since the EC\$ is pegged to the US\$ and because of the reputed efficiency of the United States banks. This comparison was only indicative since the rates used for the United States were not average interest rates, but the above accounting framework suggests a method for deriving implicit average lending and deposit rates for the United States, which in turn could be used to improve the comparison with the average spread in the ECCB area.

Accordingly, United States commercial bank data on interest earnings were divided by data on average loans and leases to arrive at a proxy for the United States average lending rate. Similarly, on the deposit side, interest expenses were scaled by data on average deposits to arrive at an implicit average deposit rate. The difference between the implicit average lending rate and the average deposit rate yielded an estimate of the average implicit interest rate spread in the United States. The comparison between the United States data and the data for the ECCB area is shown in Table 4, which corroborates the findings presented in Chart 2, namely that there is a substantial difference (of 5.7 percentage points) between the average interest rate spread in the United States, the reserve currency country, and the ECCB area.<sup>14</sup>

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<sup>14</sup> A comparison of the cost structure of the commercial banks in the ECCB area and that of banks in the United States was not shown owing to the absence of a comparable scaling factor for operating costs in the United States, reflecting the growing significance of off-balance sheet items in the operations of the United States banks. Off-balance sheet operations give rise to operational costs and income, but have no balance sheet asset counterpart. Thus, the understatement of commercial bank assets would bias the ratio of operating cost to total assets (or similarly the ratio of operating cost to average deposits) upwards. In addition, it is possible that such a comparison could also be subject to biases stemming from differences in accounting practices.

**Table 4. Implicit Average Interest Rate Spread, 1991-96**  
(Percentages)

	US	ECCB area
Implicit average lending rate	8.6	12.3
Implicit average deposit rate	6.4	4.4
Implicit interest rate spread	2.2	7.9

Sources: ECCB area data provided by the ECCB. United States commercial bank interest earnings and expenses data taken from FDIC Historical Statistics on Banking. United States average loans and average deposits data calculated from quarterly IFS data.

#### **IV. THE MODEL**

Although the accounting framework derived in the previous section seems to suggest that production cost inefficiencies might be an important determinant of the wide spreads observed in the ECCB area, the framework does not incorporate the role of competitiveness, and cannot provide any answers as to how the spread would respond to changes in its determinants at the margin. By contrast, the discussion in this Section builds on the descriptive analysis above by constructing a behavioral model with predictive power. In short, the following behavioral model will make explicit the role of the elasticities of loan and deposit demand in determining interest rate spreads in the ECCB area, and will provide a framework for assessing the impact of marginal changes in the known determinants of the spread.

The model is formulated for the representative bank in each member country of the ECCB included in this analysis. Individual data observations exist for country "i" over "t" time periods.

##### **A. Assumptions underlying stylized model of the depository bank**

- Assume a simple depository firm (or bank) seeking to maximize profits. The representative depository firm operates in a national market where there are barriers to entry.
- Given that loans are the major earning asset of the commercial banks, comprising an average of 67 percent of total assets over the period 1991-96, and as a result of market segmentation in the ECCB area, we make the stylized assumption that all deposits—net of required reserves and the payment of any deposit taxes—are placed in the domestic loan market. It is assumed that the bank chooses a deposit rate, and that individuals in country "i" then choose a level of deposits (equivalent to the supply

of loanable funds), giving consideration to alternative market rates and the level of income.<sup>15</sup> Consequently the supply of loanable funds ( $L^s$ ) can be expressed accordingly:

$$L^s = D \quad (2)$$

Where:

$$D = D(r_d, r_m, y)$$

$$\frac{\partial D}{\partial r_d} > 0, \text{ since the loan supply increases with higher deposit rates}$$

$$D = \text{average total deposits}$$

$$r_d = \text{the weighted deposit rate}$$

$$r_m = \text{the interest rate available on alternative market instruments}$$

$$y = \text{national income}$$

- For simplicity, it is assumed that demand for deposits is characterized by constant elasticities in  $r_d$ ,  $y$ , and  $r_m$ , according in the following specification:

$$D = \alpha_0 r_d^{\alpha_1} y^{\alpha_2} r_m^{\alpha_3} \quad (2')$$

Where:

$$\alpha_0 > 0, \quad \alpha_1 > 0, \quad \alpha_2 > 0, \quad \alpha_3 < 0$$

- The representative depository firm or bank, a monopolist, is assumed to be facing a downward-sloping market demand curve for its loanable funds.<sup>16</sup> Again, assuming constant elasticities, the demand for loans,  $L^d$ , is specified as:

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<sup>15</sup>Wealth is omitted as an explanatory variable for purposes of simplification, given the difficulties inherent in the measurement of this variable in developing countries.

<sup>16</sup>The monopoly assumption is made for simplification purposes. Since the market is probably best characterized as oligopolistic, the optimal level of deposits is likely to lie between the perfectly competitive and monopolistic outcome. Therefore, when possible, the solution under perfect competition is also presented (see graphical analysis below).

$$L^d = \beta_0 r_a^{\beta_1} y^{\beta_2} \quad (3)$$

Where:

$$\beta_1 < 0, \beta_2 > 0$$

$$\beta_0 = \text{a constant}$$

$$\beta_1 = \text{the elasticity of loan demand w.r.t. the lending rate.}$$

$$\beta_2 = \text{the elasticity of loan demand w.r.t. national income.}$$

- For simplicity sake, assume that there is a resource constraint that the bank must satisfy, in that loans equal deposits net of the reserve requirement:

$$L^d \approx D * (1 - \rho) \quad (4)$$

Where:

$$\rho = \text{the required reserve ratio.}$$

- The firm incurs production costs (for factor inputs, service inputs, etc.) which vary with the level of production. It is assumed here that the production cost function has a constant elasticity with respect to the deposit level<sup>17</sup>:

$$C = \eta_0 D^{\eta_1} \quad (5)$$

Where:

$$\eta_0 > 0, \eta_1 > 0$$

$$C_{\eta} = \text{annual production cost plus loan loss provisions.}$$

$$\eta_1 = \text{the constant cost elasticity}$$

$$\eta_0 = \text{a constant}$$

- Thus, the average and marginal costs are as follows:

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<sup>17</sup>Loan loss provisions are grouped together with production costs since they represent a small proportion of total commercial bank costs in the ECCB area, notwithstanding the regulatory changes that went into effect in July 1995. A deposit tax of 1 percent, applicable solely to private banks, is known to exist only in St. Vincent and the Grenadines, and was unchanged over the review period—consequently, the influence of taxes will not be modeled explicitly.

$$AC = \frac{C}{D} = \eta_0 D^{\eta_1 - 1} = c \quad (5')$$

$$MC = \frac{\delta C}{\delta D} = \eta_0 \eta_1 D^{\eta_1 - 1} = \eta_1 c$$

- In addition, it is assumed that agents operate under complete certainty.

## B. Optimization

Under the objective of maximizing present period profits (defined as revenue from loans plus any remuneration from reserves less interest cost and production cost), the depository firm (or bank) seeks to find the profit-maximizing deposit level by setting the profit-maximizing *weighted* deposit rate. Consequently, the firm seeks to maximize the following objective function with respect to the deposit rate (for given  $r_m$ ,  $y$ ,  $\rho$ ).<sup>18</sup>

$$\begin{aligned} \text{Max } P &= r_a(L(r_d)) * [L(r_d)] + r_R \rho D(r_d) - r_d * D(r_d) - C(D(r_d)) \\ \text{Choice variable} &= r_d \end{aligned} \quad (6)$$

Where:  $P$  = Profit

$L$  = loans =  $D(r_d) * (1 - \rho)$

$r_d * D(r_d)$  = interest cost

$r_a$  = the average asset earning rate, proxied by the weighted loan rate

$r_R$  = the reserves remuneration rate

Optimization results in the following first order condition:

$$\frac{\delta P}{\delta r_d} = \frac{\delta r_a}{\delta L} \frac{\delta L}{\delta r_d} * [D(r_d) * (1 - \rho)] + r_a * (1 - \rho) * \frac{\delta D}{\delta r_d} + r_R \rho \frac{\delta D}{\delta r_d} - D(r_d) - r_d \frac{\delta D}{\delta r_d} - \frac{\delta C}{\delta D} \frac{\delta D}{\delta r_d} = 0 \quad (6')$$

Under a constant  $\rho$ ,  $\Delta L = \Delta D$ ; (6') simplifies accordingly:

$$\left[ \frac{\delta r_a}{\delta D} * D(r_d) * (1 - \rho) + r_a * (1 - \rho) + r_R \rho \right] = D(r_d) * \frac{\delta r_d}{\delta D} + r_d + \frac{\delta C}{\delta D}$$

Where:  $r_R = 0$

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<sup>18</sup>Reserves are unremunerated in the ECCB area, so  $r_R$ , which is only shown here for completeness is zero, and will be subsequently dropped from the analysis.

Thus, at the profit-maximizing deposit level, marginal revenue (the left hand side of the equation) is set equal to marginal costs—the latter consisting of the marginal interest cost (comprised of the interest cost of all existing intra-marginal deposits and the interest rate cost of the marginal deposit dollar, respectively) and the marginal production cost augmented by the provision for loan losses. With respect to marginal revenues, the term  $[(\delta r_d / \delta D) * D(r_d)]$  is assumed to be negative reflecting the downward-sloping nature of the demand curve. From this first order condition it is possible to derive an expression for the spread between lending and deposit rates, namely:

$$r_a - r_d = \left[ 1 - \frac{\alpha_1}{1 + \alpha_1} \frac{((1 - \rho) + \beta_1)}{\beta_1} (1 - \rho) \right] * r_d + \frac{\alpha_1}{1 + \alpha_1} \eta_1 c \quad (7)$$

Thus, the interest rate spread depends on the estimated parameters for  $\alpha_1$ , and  $\beta_1$ , the asset rate ( $r_d$ ), and the level of efficiency, as measured by marginal cost  $\eta_1 c$ . A value of  $\eta_1$  less than 1 would suggest the existence of economies of scale, indicating that production costs rise less than proportionately to the deposit level.<sup>19</sup> This would in turn imply efficiency, as both average and marginal costs decline with the deposit level (with marginal costs being below average costs). By contrast, an estimate of  $\eta_1$  greater than 1 would imply diseconomies of scale and would tend to exert upward pressure on the spread. A value of  $\eta_1$  equal to unity would imply that marginal and average costs are equal and constant. In this equation it is recognized explicitly that both  $r_a$  and  $c$  are endogenous and depend on the level of deposits, and hence ultimately on  $r_d$ , as can be seen in equation (6).

### C. Graphical Analysis

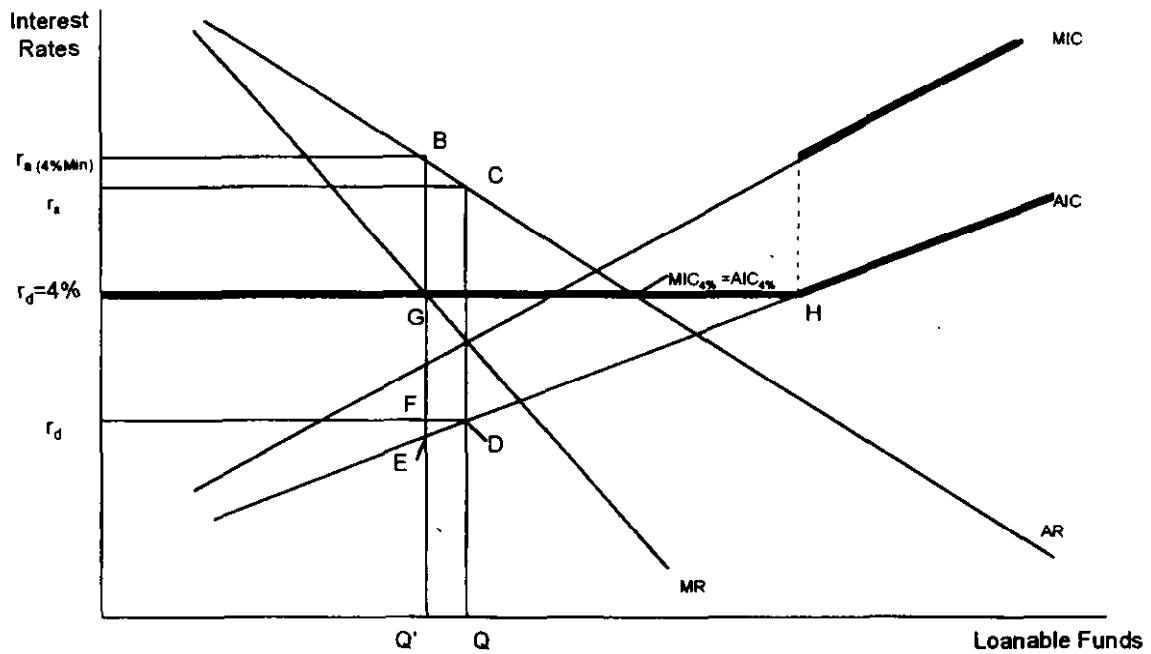
The estimated parameters of the demand for and supply of loanable funds can also be used to assess the likely impact on the interest rate spread of the existence of the 4 percent statutory minimum deposit rate. Chart 3 reveals the possible impact of the 4 percent statutory minimum deposit rate under a monopoly and Chart 4 examines the possible impact in the case

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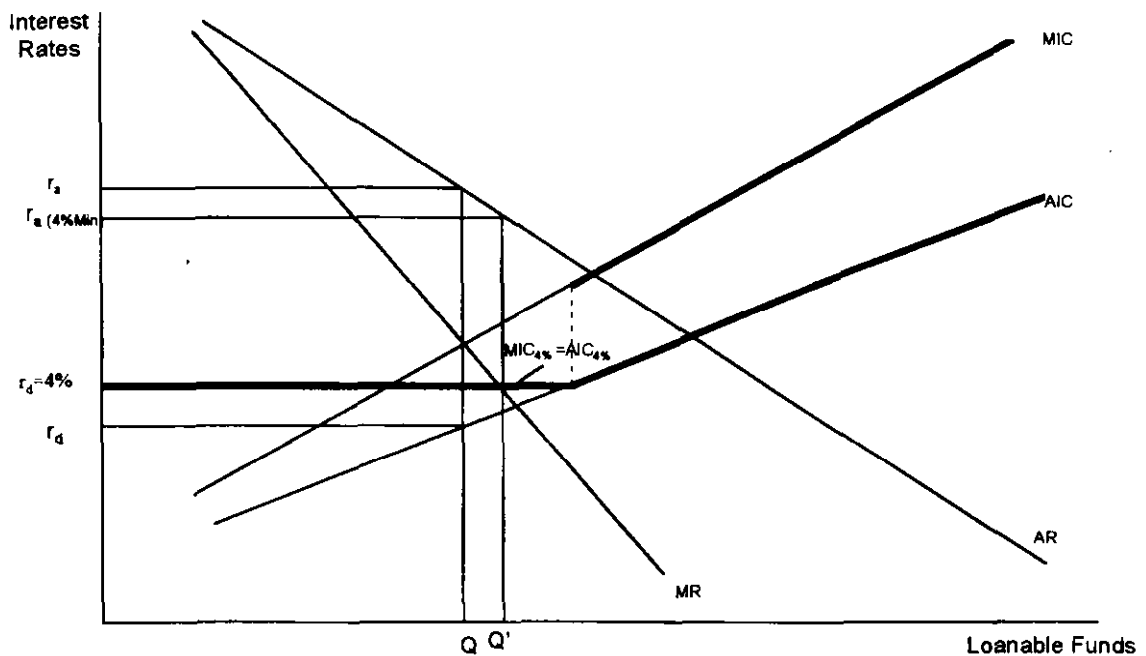
<sup>19</sup>The present analysis will not permit an assessment as to whether or not the observed scale economies are of a long run or short run nature, owing to data constraints which limit our ability to observe how costs vary over time and with changes in banks' scale. With the requisite information on individual firms, it would be interesting to investigate further the issue of scale diseconomies in banking in the ECCB area, with a possible partitioning of the data between private and government-owned banks.

**Chart 3. Statutory 4 Percent Minimum Deposit Rate Under a Monopoly**

**Case I: The 4% Statutory Minimum Leads to Financial Disintermediation**



**Case II: The 4% Statutory Minimum Deepens Financial Intermediation**



of perfect competition.<sup>20</sup> The equilibrium output level under a monopoly occurs where the marginal revenue curve (downward-sloping for the monopolist) intersects with the marginal interest cost curve. Hence, in Case I, in the absence of the 4 percent statutory minimum, the monopolist accepts  $Q$  in deposits, and pays an interest of  $r_d$  per deposit dollar, while earning  $r_s$  per dollar invested—thus the spread is  $r_s - r_d$ . The introduction of the 4 percent minimum makes the marginal interest cost curve perfectly elastic on the range  $r_d = 4\%$  to  $H$ , changing the curve from  $MIC$  to the horizontal line  $MIC_{4\%} = AIC_{4\%}$  at a rate of 4 percent, since average interest costs and marginal interest costs are equated to 4 percent. This also implies that the supply of loanable funds elasticity,  $\alpha_1$ , is infinite (see equation (1')) on the relevant range. The introduction of the 4 percent minimum unambiguously raises the lending rate from  $r_s$  to  $r_{s(4\% \text{ minimum})}$ , and reduces the quantity of loanable funds from  $Q$  to  $Q'$ . However, the impact on the spread is ambiguous and will depend on the slope of the average revenue curve.

In Case II of Chart 3, the 4 percent minimum deposit rate is below the intersection of the original marginal revenue and marginal cost curves. This creates an outcome where the spread is unambiguously reduced and the volume of loans issued increases (from  $Q$  to  $Q'$ ). In short, under this scenario, the monopolist is forced to effect an expansion in its production while reducing its monopoly rents.

The following conclusions can be drawn:

- The impact of the introduction of the statutory minimum on the spread is theoretically ambiguous under Case I and will depend on the slope of the average revenue curve (AR). The more inelastic is the demand for loans, the more likely it is that the spread will be larger in the aftermath of the introduction of the statutory minimum. However the statutory minimum unambiguously reduces the spread under Case II. Thus, an empirical assessment is necessary to determine the actual impact of the regulation within the context of the ECCB area.
- Society as a whole is unambiguously worse off under Case I, since there is a deadweight loss to society, amounting to the area  $BCDE$ . There is a comparable welfare gain to society in Case II following the expansion of output to  $Q'$ . The reallocation of resources of  $(r_d = 4\%)Gr_dF$  from the monopolist to depositors (since the monopolist's profits change from the area  $r_sCr_dD$  to the area  $r_{s(4\% \text{ Minimum})}B(r_d = 4\%)G$ ) occurs at a cost, as the unambiguous reduction in the volume of loans issued has potentially adverse consequences for economic growth, particularly given the shortage of alternative sources of domestic financing at the present stage of development of the financial system.

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<sup>20</sup>For the purposes of simplification, the presentation in Charts 3 and 4 assumes that marginal production costs (including taxes) and reserve requirements are zero, so the only costs are interest cost—hence the marginal interest cost curve is drawn.



- Finally, although the presentation abstracted from the role of marginal production costs, for the purpose of simplification, it is also noteworthy that under both Case I and Case II, upward pressure on the spread could also result from a proliferation of small savings deposits following the introduction of the 4 percent minimum, which could prove costly to administer.

Since the region's market is most likely to be oligopolistic, with an outcome that lies between the monopoly outcome and that of perfect competition, Chart 4 provides a contrast to the two monopoly scenarios above by analyzing the impact of the introduction of the statutory minimum within a perfectly competitive banking industry. Under perfect competition, the equilibrium output level results from the intersection of the industry supply curve<sup>21</sup> and the market demand curve at  $Q$ . The introduction of a statutory minimum that is binding will lead to an incipient movement along the average revenue curve from point A to point B, representing an increase in supply of loanable funds (deposits) to  $Q_s$ . However,  $Q_s$  is not an equilibrium as it is unsustainable, since banks are unable to cover their marginal costs. This creates pressure for banks to either: (a) de-capitalize, in violation of central bank provisioning requirements, which is unsustainable over the medium term; or (b) ration the available supply of loanable funds to the level  $Q_s'$  at point C—the new equilibrium point—and charge a rate of  $r_s'$  per dollar invested, while paying depositors a rate of 4 percent. Thus, in equilibrium, the quantity supplied of loanable funds is reduced from  $Q$  to  $Q_s'$ , and as in Monopoly Case I, the effect is to unambiguously raise the lending rate and restrict the volume of loans to less than the equilibrium level in the absence of the restriction, with potentially adverse consequences for economic growth. The effect on the spread is ambiguous within this context, and depends on the slope of the industry's average revenue curve, as in monopoly case I.

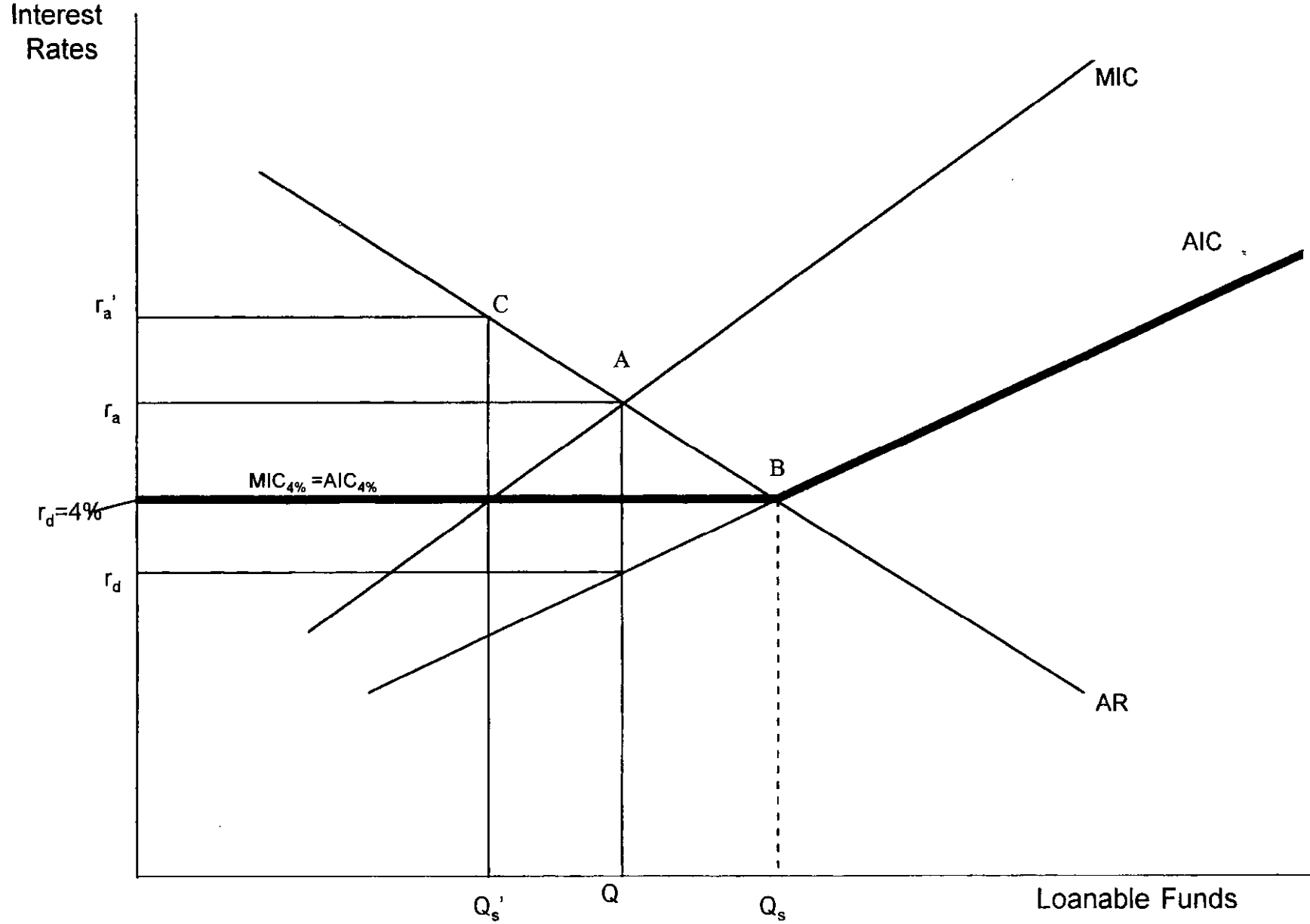
#### **D. The Data**

The sample period is 1991 to 1996, and was determined by data availability. All of the data on the countries in the ECCB area were provided by the ECCB. Quarterly data on the weighted deposit rate and weighted loan rate were averaged to obtain annual averages. Data on operating expenses, interest income, and expenses were based on the consolidated income statements of the commercial banks in the ECCB area.

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<sup>21</sup>The industry supply curve is the horizontal summation of those portions of the individual firms's marginal cost curves above their respective minimum average variable cost points.

Chart 4. Statutory 4 Percent Minimum Deposit Rate Under Perfect Competition



## V. THE METHODOLOGY

Owing to the limited number of data points, the cross-section and time series estimates for each country were pooled in a panel data set, which was then estimated simultaneously using Iterative Two Stage Least Squares under the assumption that the estimated intercept and slope coefficients are constant over time and across the countries. The limited number of observations precluded the relaxation of these assumptions and reliable testing for the presence of either fixed or random effects—that is, separate country intercepts that are either fixed for each country or random.

There are two approaches to estimation adopted in this paper. The first approach is based on an underlying theoretical model, and is designed to obtain estimates of key parameters that characterize the banking industry in the ECCB area—namely, the elasticity of loan supply with respect to the deposit rate ( $\alpha_1$ ), the elasticity of loan demand with respect to the asset rate ( $\beta_1$ ), and the production cost elasticity with respect to deposits ( $\gamma_1$ ). This approach consists of the estimation of the following system of linear equations (the first three equations were first linearized by taking logarithms) <sup>22</sup>:

$$\ln D = \ln \alpha_0 + \alpha_1 * \ln r_d + \alpha_2 * \ln y \quad (2'')$$

$$\ln D = \beta_0 + \beta_1 * \ln r_a + \beta_3 * \ln y \quad (3')$$

$$\ln C = \ln \gamma_0 + \gamma_1 * \ln D \quad (5')$$

$$r_a - r_d = \lambda_1 * r_a + \lambda_2 * c \quad (7')$$

Where:

$$\lambda_1 = 1 - \frac{\hat{\alpha}_1}{1 + \hat{\alpha}_1} \frac{((1 - \rho) + \hat{\beta}_1)}{\hat{\beta}_1} (1 - \rho)$$

$$\lambda_2 = \frac{\hat{\alpha}_1}{1 + \hat{\alpha}_1} \hat{\gamma}_1$$

Equation (7') then yields estimates of the fitted values for the interest rate spread, which, when compared with the actual spread can be used to provide an indication of the goodness of fit of the model.

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<sup>22</sup> The influence of market rates cannot be estimated separately owing to the fact that both the Treasury Bill rate and the yield on government securities were practically invariant in each country during the review period and were therefore indistinguishable from the constant. The effect of market rates is therefore believed to be captured by the constant.

The alternative approach seeks to assess the contribution of other policy-driven explanatory factors which are particularly characteristic of the region. The determinants of the spread were taken from the following categories (discussed below): (a) macroeconomic variables, (b) market characteristics<sup>23</sup>, (c) operational considerations, and (d) the regulatory environment. Finally, although the influence of capital controls was not estimated directly, owing mainly to measurement difficulties, it is expected that the influence of capital controls will be captured by the constant, since there was little variation in the number and nature of these restrictions over the review period. Thus capital account restrictions are hypothesized to have been a determinant of the *size* of the spread and not the variation in the spread over the review period.

## VI. EMPIRICAL RESULTS

### A. Estimating Structural Parameters in the Market for Loanable Funds

The results of systems estimation by Iterative Two Stage Least Squares are presented in Table 5. The coefficients on most of the variables included in the model were significant at the 1 percent level and all were significant at least at the 10 percent level. The adjusted coefficient of determination was 80 percent in the case of the loan supply equation, 67 percent in the case of the loan demand equation, 91 percent in the case of the production cost equation, and 51 percent in the spread equation. In addition, the percentage standard error (that is the standard error as a percentage of the mean of the dependent variable) was well under the acceptable norm of 10-15 percent in the case of each equation. This percentage was 1.2 percent in the case of the loan supply equation, 1.5 percent in the case of the loan demand equation, 1.4 percent in the case of the cost equation, and 7.7 percent in the case of the spread equation. Although these results seem robust, the Durbin Watson statistic for each of the equations indicates the presence of serial correlation. However, it was not possible to correct for serial correlation within the context of systems estimation of a panel data set. Although serial correlation can result from model misspecification, it is unlikely to be the main cause of the problem in this instance, given the model's sound theoretical underpinnings.<sup>24</sup> Moreover,

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<sup>23</sup>Market characteristics such as the degree of competition and market size are all expected to be important determinants of the variation in the interest rate spread. However, the direct effect of competition on the interest rate spread could not be assessed owing to the lack of time series information on the number of commercial banks by country. Ideally with data on both operational cost and the volume of operations *per bank*, the analysis could include the calculation of concentration ratios, and more thoroughly analyze the issue of scale diseconomies in the region's banking industry.

<sup>24</sup>This conclusion is consistent with that reached by Robert A. Lucas, Jr., in "Money Demand in the U.S.: A Quantitative Review" in Carnegie-Rochester Conference Series on Public  
(continued...)

**Table 5. System Estimation Results**

Estimation Method: Iterative Two-Stage Least Squares

Sample: 1 36

Instruments: MKSH SVSH GOVT C 1/

Convergence achieved after 2 iterations

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	6.103360	1.077358	5.665118	0.0000
C(2)	1.181180	0.393465	3.001996	0.0032
C(3)	0.805703	0.144471	5.576915	0.0000
C(4)	16.42314	4.902235	3.350133	0.0010
C(5)	-4.630336	2.518345	-1.838642	0.0681
C(6)	1.266169	0.263001	4.814314	0.0000
C(8)	-7.591226	2.175544	-3.489346	0.0007
C(9)	1.345054	0.163183	8.242636	0.0000

Equation:  $\text{Ln}(D) = C(1) + C(2) * \text{Ln}(r_d) + C(3) * \text{Ln}(y)$

R-squared	0.809116	Mean dependent var	13.32806
Adjusted R-squared	0.797547	S.D. dependent var	0.357523
S.E. of regression	0.160866	Sum squared resid	0.853974
Durbin-Watson stat	0.890038		

Equation:  $\text{Ln}(D) = C(4) + C(5) * \text{Ln}(r_d) + C(6) * \text{Ln}(y)$

R-squared	0.688305	Mean dependent var	13.32806
Adjusted R-squared	0.669414	S.D. dependent var	0.357523
S.E. of regression	0.205563	Sum squared resid	1.394459
Durbin-Watson stat	1.326611		

Equation:  $\text{Ln}(C) = C(8) + C(9) * \text{Ln}(D)$

R-squared	0.913051	Mean dependent var	10.33574
Adjusted R-squared	0.910494	S.D. dependent var	0.482797
S.E. of regression	0.144441	Sum squared resid	0.709352
Durbin-Watson stat	0.506147		

Equation:  $\text{SPRD} = [1 - (C(2)/(1 + C(2))) * ((1 - 0.06 + C(5))/C(5)) * (1 - 0.06)] * r_d + [C(2)/(1 + C(2))] * (C(9)) * (C/D)$

R-squared	0.542205	Mean dependent var	7.337292
Adjusted R-squared	0.514460	S.D. dependent var	0.814337
S.E. of regression	0.567436	Sum squared resid	10.62546
Durbin-Watson stat	0.885893		

1/ C = constant, MKSH = market share, defined as country-specific average total assets as a percentage of regional total assets; SVSH=the share of savings deposits; and GOVT=the share of public sector loans.

<sup>24</sup>(...continued)

Policy, 29 (1988), pp. 137-168.

the OLS estimates should remain unbiased in the presence of serial correlation (Kennedy, 1992).

The coefficients of equations (2'), (3'), and (5') are elasticities and therefore bear a different interpretation than the coefficients in equation (7'). The elasticity of supply of loanable funds was estimated to be 1.2, suggesting that a one percent rise in the weighted deposit rate gave rise to a 1.2 percent increase in the supply of loanable funds.

The demand for loans with respect to the asset rate was elastic and the elasticity was of the right sign, namely -4.6. Thus a one percent increase in the lending rate would result in a 4.6 percent reduction in the demand for loanable funds.

The estimated production cost elasticity,  $\hat{\eta}$  is 1.35, suggesting the existence of diseconomies of scale in production. This result is consistent with the observations stemming from the accounting breakdown contained in Section III, and seems to suggest that on average, commercial banks are operating in the region of their average cost functions where additional deposits add to both average and marginal cost. This might be due in part to the suspected inefficiency of many local banks—including many large government-owned banks—especially given that local banks now account for over 50 percent of regional bank assets.<sup>25</sup>

It is possible to reconcile the empirical finding of scale diseconomies with the systemic need to achieve greater efficiency through an expansion in bank operations by employing the notion of a distinction between short-run and long-run average costs. Chart 5 shows the "Production Cost Structure of Firms", and helps to illustrate that it is conceivable that commercial banks could be operating in the inefficient region of their *short run* average cost curve, at a point such as point A, while remaining in the region of their *long run* average cost curve where they could benefit from economies of scale. Thus, the estimate of 1.35 for  $\hat{\eta}_1$  could possibly represent a short run cost elasticity.<sup>26</sup> If this were the case, then any policies which have constrained the market size of efficient banks could have effectively prevented these banks from expanding their operations and from tracing out their long run average cost curve, so as to achieve a level of efficiency such as that represented by  $C_{\min}$ .

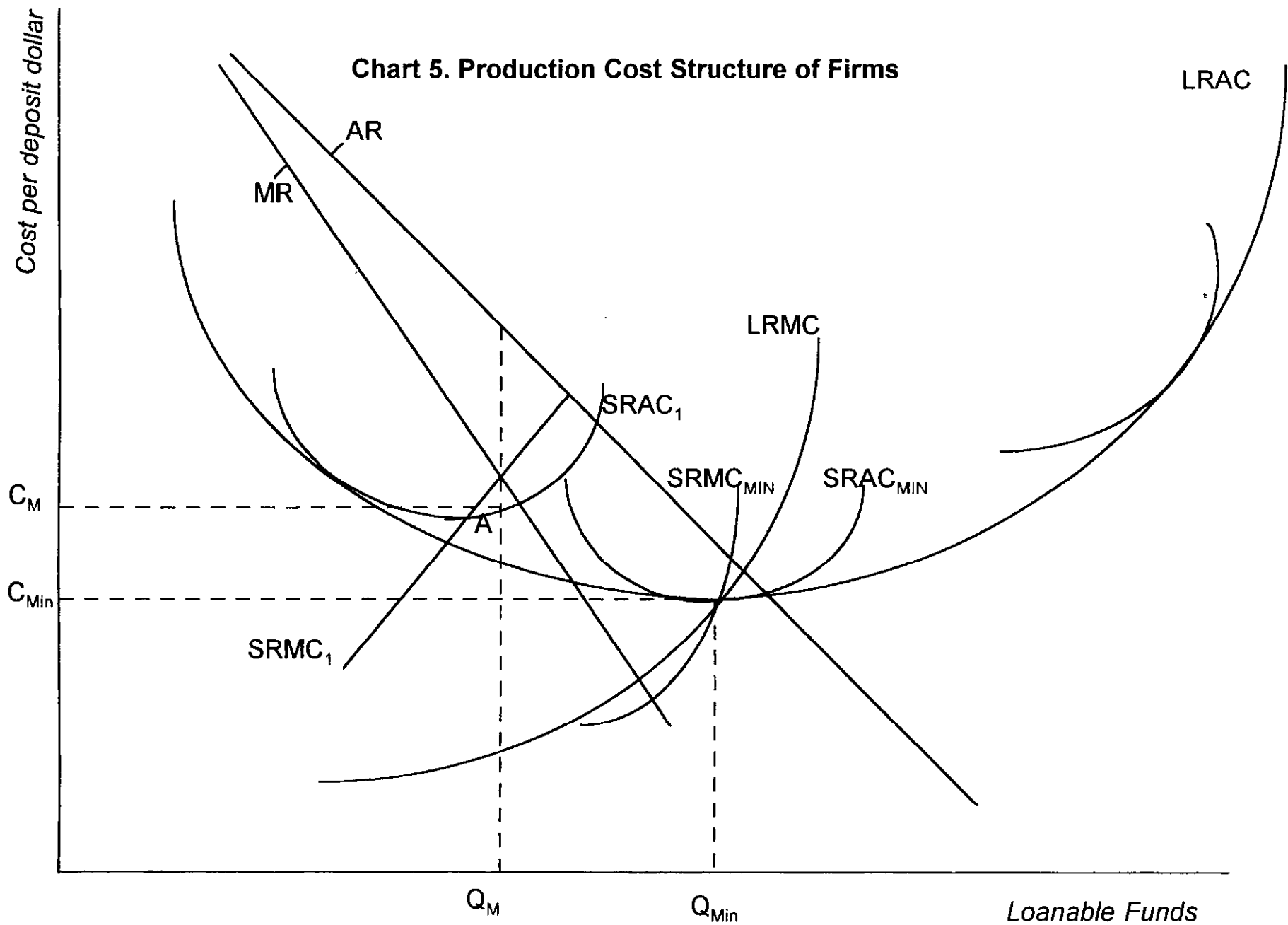
Such sub-optimal policies might include: (i) any policies which encourage financial disintermediation (including, perhaps the statutory 4 percent minimum savings rate) and strengthen the relative position of nonbank financial institutions vis-à-vis that of the

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<sup>25</sup>It would be useful, with additional data, to conduct an analysis of scale diseconomies which separates the government-owned banks from other banks in the region.

<sup>26</sup>It is not presently possible to conclude this with any certainty, however, as the current analysis is based on pooled data for commercial banks of varying operational size, owing to data constraints.

Chart 5. Production Cost Structure of Firms



commercial banks<sup>27</sup>; (ii) the maintenance of external capital account restrictions which constrain banks' market size to that of the domestic market; as well as (iii) the maintenance of large government-owned banks, which—buoyed by the deposits from National Insurance Schemes—frequently engage in operations at subsidized rates, often at the cost of crowding out the operations of more efficient, private commercial banks. Therefore, measures designed to increase the market share of more efficient banks, through: (a) the privatization of poorly-operated government-owned banks; (b) the merger of inefficient banks into viable entities; (c) the adoption of appropriate regulation for nonbank financial institutions, with respect to both reserves and capitalization, to eliminate any “artificial” cost advantages that these institutions may have vis-à-vis the commercial banks; and (d) programs designed to deepen and broaden the region's financial markets in general—through capital account liberalization, the establishment of the regional government securities market, and greater integration into international financial markets (see below)—should result in enhanced efficiency in the banking industry.

The estimates for  $\alpha_1$ ,  $\beta_1$ , and  $\eta_1$  can be used to solve for the coefficients of the spread equation. These coefficients result in an estimate of 0.59 for  $\lambda_1$  (which already encompasses the effect of the required reserve ratio) on the average lending rate  $r_a$  and an estimate of 0.73 for  $\lambda_2$  on average cost. Thus, a rise of one percentage point in  $r_a$  raised the spread by 0.6 percentage points over the review period, and an increase in average costs (inclusive of loan loss provisions) of 1 percentage point raised the spread by 0.73 percentage points. The estimated coefficients for  $\alpha_1$ ,  $\beta_1$ , and  $\eta_1$  can also be used to calculate the estimated average interest rate spread and the implicit equity return. These estimates are shown below in Table 6.

**Table 6. Derived Average Structural Variables 1/  
(Percentages)**

	Variable
Average lending rate (actual)	12.11
Actual average interest rate spread	7.34
Estimated interest rate spread	7.32
Contribution of reserve requirement	0.48
Contribution of average cost	3.87
Residual ( <i>implicit equity return</i> )	2.97

1/ Estimates are based on means across countries and time from 1991 to 1996.

<sup>27</sup>It is reported that the market share of nonbank financial institutions has been growing rapidly. However, it is not yet possible to document this empirically, as the ECCB has only just implemented a reporting requirement for these institutions.



The results of the behavioral model are broadly consistent with the outcome of the accounting exercise presented in Table 3. The estimated average spread was 7.32 percentage points, of which 3.87 percentage points was due to average cost and .48 percentage points was due to the reserve requirement. This in turn resulted in an implicit equity return of 2.97 percent, which compares favorably with the estimated average return on assets of 2.7 percent shown in Table 3. Thus, the econometric exercise reproduces the decomposition of the interest rate spread based on the accounting framework presented in Section III by assigning plausible numerical magnitudes and signs to the model's underlying structural parameters that are in accordance with theoretical priors.

### B. An Alternative Approach: Policy Determinants of the Spread

The alternative approach seeks to test the relevance of some policy variables, expected a priori, to have an effect on the spread. The following specification<sup>28</sup> was estimated while correcting for first order serial correlation in the cross-section time series data.<sup>29</sup>

$$SPRD = 4.85 + 1.07*ASQY - .03*GRTH + .02*SVSH + .44*OPCT - .09*GOVT*ASQY \quad (8)$$

(4.93)\*\*    (2.05)\*            (-1.09)            (1.92)            (2.81)\*\*    (-2.52)\*

$$R\text{-squared} = .65 \quad \text{Adjusted } R\text{-squared} = .55 \quad DW = 2.53 \quad F\text{-statistic} = 6.98**$$

$$S.E. \text{ OF regression} = 0.48 \quad \rho = .24$$

(17)

Where:

*SPRD* = The average interest rate spread

*ASQY* = The provision for doubtful debts scaled by average total loans

*GRTH* = Economic growth

*SVSH* = Savings deposits as a percentage of total deposits

*GOVT* = The share of commercial bank public sector loans

*OPCT* = Operating expenses as percentage of average total assets

The percentage standard error of this equation was 7.7 percent, and the adjusted coefficient of determination (55 percent) was marginally higher than for the spread equation

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<sup>28</sup>The market share variable (MKSH)—defined as country-specific average total assets as a percentage of regional average total assets—was found to be highly positively correlated with operating cost and strongly negatively correlated with the share of loans going to the public sector (GOVT) and the share of savings deposits (SVSH). The inclusion of MKSH in the equation rendered OPCT (operating expenses as a percentage of average total assets) and GOVT insignificant, while the variable itself was significant only at the 5 percent level and the coefficient of determination remained unchanged. The influence of this variable could therefore not be separately distinguished and was consequently omitted.

<sup>29</sup>The numbers in parentheses are t-ratios, and “\*” connotes significance at the 5 percent level and “\*\*” connotes significance at the 1 percent level.

described earlier. Although the reliability and explanatory power of this model were not significantly greater than that of the former one, this model provides a means to assess the importance of various macroeconomic indicators and other systemic influences on the interest rate spread. The sample means for each of the variables appearing in equation (7) were applied to the estimated coefficients to obtain a value for the mean estimated spread, and the outcome of this exercise is presented in Table 7.

**Table 7. Contribution to the interest rate spread <sup>1/</sup>**

	Derived Impact	Percent of Estimated Spread	Percent of Spread Normalized <sup>2/</sup>
Constant	4.85	66.06	65.27
Increase in loan loss provisioning	-0.07	-0.94	-0.93
Share of savings deposits	0.88	12.03	11.88
Operating expenses to average total assets	1.73	23.61	23.33
Share of government loans	0.03	0.45	0.44
GDP growth	-0.09	-1.21	
Total Explained	7.34	100.00	100.00

<sup>1/</sup> Estimates are based on means across countries and time from 1991 to 1996.

<sup>2/</sup> Normalized for the lack of significance of the growth of GDP, which was retained for completeness.

The coefficients of equation (8) imply the following:

(i) The constant in this equation may be important, as it could represent in part fixed costs, as well as the effect on the spread of the various regulations that were invariant over the review period.<sup>30</sup> These regulations included various capital controls and the deposit tax in St. Vincent. Thus, the estimated intercept implies that 4.85 percent (or roughly 66 percent of the average spread of 7.34 percentage points), may be attributable in part to regulatory distortions, which could inhibit optimal resource allocation in the region. It is important to note, however, that the intercept may be biased upwards owing to the limited variability of the spread over the review period.

(ii) The inverse of asset quality (ASQY), measured as the ratio of the provision for doubtful debts to average total loans, was strongly negatively correlated with the share of loans going to the public sector (GOVT). This may reflect under provisioning by government-owned commercial banks making government loans, or the presence of government guarantees which might act as a substitute for such provisions. This variable was

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<sup>30</sup>This hypothesis is difficult to substantiate, however, in the absence of bank-specific information and is somewhat difficult to reconcile with the finding of scale diseconomies.

therefore entered into the equation both individually and interactively with GOVT. The findings reveal that although the estimated *direct effect* of the increase in loan loss provisioning was to raise bank costs and hence the spread, the total change in the interest rate spread with respect to ASQY is actually the sum of two components, namely the change with respect to ASQY (i.e. the direct effect, 1.07) and the change with respect to the interactive term ASQY\*GOVT (the *indirect effect*,  $-.09 \times \text{GOVT}$ ). Thus, use of the mean value of GOVT of 13.98 percent to obtain an estimate of the total change results in an estimate of  $-0.19$ , suggesting that an increase in the ratio of the provision for doubtful debts to average total loans of one percentage point over the review period, ceteris paribus, actually resulted in a decrease in the interest rate spread of .19 percentage points once the tendency of under provisioning for government loans and/or the presence of government guarantees was accounted for.

(iii) Economic growth (GRTH) is expected to be negatively correlated with the interest rate spread, in light of the small, open nature of the economies; the concentration of economic activity in a few dominant sectors producing mainly primary export commodities that are potentially vulnerable to commodity price shocks; as well as the countries' vulnerability to hurricanes and other natural disasters. For instance, a significant disruption in economic activity could affect the overall profitability of the banking industry both through a deterioration of asset quality, as many debtors could have difficulty servicing their debts, and an observed rise in non-interest costs. However, although the coefficient on economic growth was of the right sign, suggesting that negative economic shocks, such as those caused by hurricanes Marilyn and Luis in 1995, also exerted upward pressure on the spread, the variable was not significant.

(iv) The increase in the percentage share of savings deposits was significant at more than the 10 percent significance level (probability = 7.1 percent), suggesting that this variable contributed to the observed rise in the spread, perhaps through both an increase in the cost of funding to the banks and an increase in administrative costs following a proliferation of small savings accounts as hypothesized earlier. Thus factors responsible for the rise in the percentage share of savings deposits—one of which could be the statutory minimum savings rate—tended to raise the region's average interest rate spread by .02 percentage points.

Data on the composition of the region's commercial bank deposits reveal that the share of savings deposits rose continuously over the review period, from about 39 percent in 1991 to 43.6 percent in 1996, while the percentage share of time deposits declined steadily from 42.6 percent to 34.8 percent over the same time period. On the other hand, data on the maturity structure of loans reveal that the demand for loans is increasingly long-term in nature, with the share of loans of a maturity of 3 years or more rising from 38.8 percent in 1991 to 44.3 percent in 1996. This suggests a growing mismatch in the maturity structure of loans and deposits, which could have raised commercial banks' intermediation costs over the review period.

(v) An increase in the ratio of operating expenses to average total assets of one percentage point over the review period, increased the spread by .44 percentage points. On average, this translated into a contribution of approximately 1.7 percentage point to the interest rate spread or almost a quarter of the average spread.

(vi) Finally, the change in the interest rate spread with respect to the share of loans going to the public sector (GOVT) is  $-.09 \cdot \text{ASQY}$ . Using the mean level of ASQY, namely 0.37, an estimate of the effect of this variable on the interest rate spread was -0.03 percentage points was obtained for this variable. This finding is believed to reflect the tendency, discussed earlier, for some local banks (now reportedly accounting for over 50 percent of regional bank assets) and particularly those which are government-owned, to issue loans to the public sector at administered sub-market rates. Alternatively, this may reflect lower administrative costs associated with processing large government loans.

## VII. CONCLUSION

The foregoing discussion examined the issue of interest rate spreads in the ECCB area, with the dual objective of deriving descriptive parameter estimates which characterize the region's commercial banking industry, as well as examining the role of several policy and other explanatory variables believed to have influenced the spread over the review period. The findings of the *behavioral model* suggested the presence of short-run scale diseconomies in commercial banking (reinforcing the findings stemming from the accounting framework presented in Section III) at the aggregate level, with approximately 53 percent of the spread attributable to operational costs. Reserve requirements accounted for an additional 6 percent of the interest rate spread, and the remaining 41 percent of the spread was estimated as the implicit equity return (estimated at 2.97 percentage points). Moreover, this estimate was found to be comparable to the estimate of the average return of 2.7 percent on commercial banks' assets, based on the consolidated reported commercial bank income statements.

The production cost elasticity was estimated to be 1.35—which is believed to be largely attributable to the limited market size faced by the average bank. This gave rise to the policy recommendation that efforts to expand the market size of efficient banks might help to both reduce scale diseconomies and pave the way for greater efficiency. Possible measures to increase the market share of more efficient banks included: (a) the privatization and closure of poorly-operated government-owned banks; (b) the merger of inefficient banks into viable entities; (c) the adoption of appropriate regulations for nonbank financial institutions, both with respect to required reserves and capitalization, to eliminate any existing unfair cost advantages these institutions may have vis-a-vis the commercial banks; and (d) programs designed to deepen and broaden the region's financial markets, and facilitate greater integration into international financial markets (see below).

In addition, although it was estimated that the contribution of unremunerated reserves to the interest rate spread was only six percent, a desirable reform over the medium term

could be to adopt a liquidity requirement either in tandem with—but at a reduced rate—or in lieu of, unremunerated reserves. This would reduce commercial bank costs (which should in turn reduce the interest rate spread) and augment banks' revenues, while helping to foster the development of the region's capital market by promoting the commercial banks' demand for liquid financial instruments. Alternatively, the ECCB might opt to remunerate reserves.

On the policy side of the equation, the provision for loan losses as a percentage of average total assets was found to be a significant determinant of the interest rate spread. The findings revealed that although the increase in loan loss provisions raised banks' total costs in the first instance, after accounting for the tendency of banks to under provision in the case of government loans, the total effect of the increase in the variable was to actually lower bank interest rate spreads. The increase in loan loss provisioning was due both to the implementation of new ECCB loan loss provisioning guidelines in July 1995 as well as to losses stemming from the effects of two devastating hurricanes in 1995. Both of these influences are believed to be statistical in nature, with a one-time effect on the *size* of the spread, and are not expected to have a continued effect on the variation of future spread levels. Moreover, in light of the diversity of size and ownership of commercial banks in the region, the new ECCB guidelines (consistent with international practices and standards) are seen as prudent, and, by enhancing the ECCB's supervisory practices, these measures are believed to have strengthened the banking system.

The percentage share of savings deposits was found to have had a positive impact on interest rate spreads over the review period as did operating expenses as a percentage of average total loans. The former was attributed to upward pressure on the average lending rate and to an increase in bank intermediation costs as a result of a possibly binding 4 percent statutory minimum on savings deposit rates, in light of the growing mismatch in the maturity structure of commercial bank loans (which are increasingly long-term) and the increasingly short-term maturity structure of deposits. Therefore, the elimination of the regulatory minimum savings deposit rate would be expected to help moderate existing spreads.

Finally, the share of loans going to the public sector was found to have a significant negative effect on interest rate spreads. This variable was found to have had a dampening effect on the spread because many public sector loans are believed to have been intermediated by government-owned banks and financed with resources from National Insurance Schemes at administered, sub-market rates.<sup>31</sup> It was also posited that this observation could be partly attributable to the existence of lower administrative costs that are quite possibly associated with the administration of large government loans.

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<sup>31</sup>This gave rise to the recommendation that further analysis be conducted—contingent on the availability of disaggregated data by bank and branch and over time—examine separately determinants of interest rate spreads in the case of private and government-owned banks.

The size of the average interest rate spread observed in the ECCB area is also attributable, in part, to a lack of integration of the region's financial system with international capital markets. Costs stemming from these restrictions were believed to be one of the driving factors behind the high intercept estimated in equation (8). The recognition of this problem in the countries themselves has resulted in an ongoing effort to broaden and deepen the region's financial markets. This effort already resulted in the establishment of the Eastern Caribbean Home Mortgage Bank (ECHMB), in July 1995, to provide a regional secondary market for home mortgages. In addition, efforts are reportedly still underway to establish the Eastern Caribbean Enterprise Fund, as well as the Eastern Caribbean Over-the-Counter Market (the latter with IDB assistance), which will eventually lead to the creation of a regional stock exchange. Furthermore, a regional government securities market is being launched with technical assistance from the IMF's Monetary and Exchange Affairs Department. The establishment of the regional government securities market and concomitantly, the elimination of existing tax distortions—for example because government securities are only tax-free in domestic markets—is expected to widen the range of investment options available to the region's investors and improve the allocation of resources throughout the region.

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