

# Development Discussion Papers

## *Central America Project Series*

### **Banking Spreads in Central America: Evolution, Structure and Behavior**

Astrid Dick

Development Discussion Paper No. 694  
April 1999

© Copyright 1999 Astrid Dick  
and President and Fellows of Harvard College

Harvard Institute for  
International Development

---

HARVARD UNIVERSITY



# DEVELOPMENT DISCUSSION PAPERS

## CENTRAL AMERICA PROJECT SERIES

A PROJECT OF HARVARD UNIVERSITY, INCAE AND  
THE CENTRAL AMERICAN BANK FOR ECONOMIC INTEGRATION



### **Banking Spreads in Central America: Evolution, Structure and Behavior**

Astrid Dick \*

#### **Abstract**

Central American banking spreads, defined as the difference between the lending and the deposit interest rates, are generally well above those observed in developed countries with mature financial systems. This study analyzes the spread of Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua in terms of their evolution, composition, and behavior. An empirical model of spread/lending rate determination is estimated with a panel data set for each country in the region. Analysis of the structure of the spread is carried out under the descriptive framework of the income statement of banks.

The results of this analysis indicate that operating costs are the most important component within the spread, and that there is a positive association between these costs and the spread in all the Central American countries. Additionally, the degree of market power does not appear to be a key determinant in the formation of the spread, for the exception of Costa Rica.

From a policy perspective, these results suggest that reforms that provide incentives for the entrance of new participants should continue. This would increase the degree of competition in the industry and force the decrease of operating expenses (as long as the proper assessment of banking costs functions is consistent with this policy).

**Keywords:** banking, financial systems, spreads, reserve requirements, market power, Central America, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua

**JEL codes:** G21

---

**Astrid Dick** is a PhD student in Economics at the Massachusetts Institute of Technology.

---

\*The author would like to thank the personnel of the central banks and superintendencies of the region who assisted with the provision of data.

**Banking Spreads in Central America: Evolution, Structure and Behavior**

Astrid Dick

**Table of Contents**

I.	Introduction.....	1
II.	Overview.....	2
III.	Conceptual Framework.....	4
	A. Descriptive Model: Structure of the Spread.....	4
	B. Empirical Model: Behavior of the Spread. ....	5
IV.	Empirical Results.....	12
	A. Costa Rica.....	14
	B. El Salvador.....	18
	C. Guatemala.....	21
	D. Honduras.....	24
	E. Nicaragua.....	27
V.	Summary of Results.....	30
VI.	Conclusion.....	33
	References.....	35

## **Banking Spreads in Central America: Evolution, Structure and Behavior**

Astrid Dick

### **List of Graphs**

Graph 1:	Average Lending, Deposit Interest Rates and Spreads In Central America .....	36
Graph 2:	Interest Rate Spreads in Central America (1990-96) .....	36
Graph 3:	Interest Rate Spreads in Central America vs. Some Selected OECD Countries .	37
Graph 4:	Costa Rica: Assets, Deposit and Net Loans (1994-1998) .....	37
Graph 5:	El Salvador: Assets, Deposits and Net Loans (1995-1997) .....	38
Graph 6:	Guatemala: Assets, Deposits and Net Loans (1990-1998) .....	38
Graph 7:	Honduras: Assets, Deposits and Net Loans (1996 – 1997) .....	39
Graph 8:	Nicaragua: Assets, Deposits and Net Loans (1992-1998) .....	39
Graph 9:	Selected Balance Sheet Items, December 1997 .....	40
Graph 10:	Selected Spread Components – Relative Importance (1997) .....	40

### **List of Tables**

Table 1.a:	Costa Rica: Income statement items in terms of end-of-period assets .....	41
Table 1.b:	Costa Rica: Structure of interest rate spread .....	41
Table 1.c:	Costa Rica: Regression variables summary statistics .....	48
Table 2.a:	El Salvador: Income statement items in terms of end-of-period assets .....	42
Table 2.b:	El Salvador: Structure of interest rate spread .....	42
Table 2.c:	El Salvador: Regression variables summary statistics .....	49
Table 3.a:	Guatemala: Income statement items in terms of end-of-period assets .....	43
Table 3.b:	Guatemala: Structure of interest rate spread .....	43
Table 3.c:	Guatemala: Regression variables summary statistics .....	50
Table 4.a:	Honduras: Income statement items in terms of end-of-period assets .....	44
Table 4.b:	Honduras: Structure of interest rate spread .....	44
Table 4.c:	Honduras: Regression variables summary statistics .....	51
Table 5.a:	Nicaragua: Income statement items in terms of end-of-period assets .....	45
Table 5.b:	Nicaragua: Structure of interest rate spread .....	45
Table 5.c:	Nicaragua: Regression variables summary statistics .....	52
Table 6.a:	Central America: Income statement items in terms of end-of-period assets (1997) .....	46
Table 6.b:	Central America: Structure of the interest rate spread (1997) .....	46
Table 7:	Nicaragua: Structure of interest rate spread .....	47
Table I:	Costa Rica: Regression Results .....	53
Table II:	Ecuador: Regression Results .....	54
Table III:	Guatemala: Regression Results .....	55
Table IV:	Honduras: Regression Results .....	56
Table V:	Nicaragua: Regression Results .....	57

## **Banking Spreads in Central America: Evolution, Structure and Behavior**

Astrid Dick

### **I. INTRODUCTION**

The financial system of a country is, to an arguable extent, an undeniable determinant of its economic growth, as it provides an efficient channel that routes funds from surplus sectors in the economy towards deficit ones.<sup>1</sup> Thus, bank spreads, defined as the difference between the lending and the deposit interest rates, have serious implications on how the scarce resources of an economy are allocated. This rate difference may be interpreted to be the margin between the prices of the main product (loans) and the main input (deposits) of this industry.<sup>2</sup>

As a result, there exists a clear motivation to identify the factors that affect the formation and behavior of this spread, especially when spreads are large. In the case of Central America, margins are generally well above those observed in developed countries with mature financial systems. This may adversely affect saving and investment, as the banking system provides the channel of intermediation between creditors and borrowers in the economy. Throughout this decade the region has undergone a major economic transformation; in particular, it has seen significant financial sector reforms that involve the overhaul of the regulatory institutions, deregulation and privatization of the industry.

This paper analyzes the evolution, structure and behavior of the banking spreads of Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua (referred to as Central American countries hereafter). Factors contributing to the banking spread include the operational efficiency, the regulatory environment, the degree of default risk, the market structure and the macroeconomic environment. In order to determine how the variation of these factors affects the interest rate spread, an empirical model of spread/lending rate determination, derived from the

---

<sup>1</sup> Gershenkron (1962) holds that banks have had a fundamental influence on economic growth and development. As Freixas and Rochet (1997) point out, his thesis has since then initiated a continuing debate about the degree of significance of the role of banks in the resource allocation process in an economy (Edwards and Ogilvie 1995).

<sup>2</sup> For a discussion of the production function of the banking firm, see Sealey, et al (1977). Also, see the survey by Baltensperger (1980) for an exposition of the alternative approaches to the theory of the banking firm.

income statement of banks, is estimated with a panel data set for each country in the region. The results are used to identify where and what policy reduce the interest rate spreads.

The few prior empirical studies on the banking spreads of Central America concentrate on the analysis of the constitution of the spread, such as the work for Costa Rica by Camacho Mejía and Messalles Jorba (1994), which covers the period 1987-1992. To the author's knowledge, there are no papers that carry out an econometric analysis of the spread in Central America for any recent period. There are, however, papers written for other Latin American countries that estimate econometric models of the determination of the interest rate spread. This is especially true in very recent times as the rapid development of the financial systems of these countries has made it a latent need to understand in more depth the constitution and behavior of the generally high banking spreads.<sup>3</sup> The conclusions of this line of study vary and do not always follow the standard results obtained in studies for developed countries, as in general the financial systems of the countries under study are in processes of transition.

The paper is organized as follows. Section II presents an overview of the evolution and state of the interest rate spreads in Central America, and how they compare to international levels. Section III details the descriptive and the empirical model applied in the study of the structure and the behavior of the spread, respectively. Section IV shows the results from applying the framework developed in section III to each country. Section V provides a summary of the findings of this paper, and section VI concludes.

## **II. OVERVIEW**

The countries of Central America experienced a major economic transformation during the 1990s through processes of political and economic stabilization. Average real GDP growth for the period 1992-97 was over 4%, with El Salvador presenting the highest average of 5.5% and Nicaragua with the lowest of 2.9%.<sup>4</sup> Though these levels are definitely not stunning in themselves, they are remarkable when compared to the poor performance of Central America throughout the 1980s, a decade of turbulent political and social environments. Annual inflation rates for 1992-1997, though high relative to the levels observed in developed countries, have also

---

<sup>3</sup> For instance, the paper by Brock and Rojas-Suarez (1998), who look at a group of Latin American countries

<sup>4</sup> Source: Consejo Monetario Centroamericano.

decreased considerably from the levels observed in the region throughout the 1980s. Inflation has averaged a little over 13%, with Honduras showing the highest level of 18.9% and Nicaragua the lowest of 10.0%.<sup>5</sup>

Economic reform in Central America has been decidedly dynamic in the 1990s. The countries of the region have carried out, though to varying extents, a process of deregulation and modernization of the economy. In the financial sector this has generally meant the creation or modernization of the supervisory institutions, the reduction of reserve requirements,<sup>6</sup> and the liberalization of interest rates, whose government determination created distortions in the economy. These processes significantly reduced these costs to banking institutions.

Though the determination of prices in the financial sector has been liberalized and the system has developed in an environment of expansion and increased competition, interest rate spreads generally remain high by international standards. Throughout the period of 1990-1996, the average spread for the Central American countries, defined as the difference between the lending rate charged by banks on loans to prime customers and the deposit interest rate paid by commercial or similar banks for time deposits, was a little below ten percentage points.<sup>7</sup> In 1996, this spread reached 10.0% (see graph 1), with Guatemala showing the highest spread of the region with 15.1 percentage points (see graph 2.)

The Central American spreads contrast with the levels observed in developed countries. For instance, during this same year, the United States showed a spread of only 2.7 percentage points, while a selected group of Organisation for Economic Co-Operation and Development (OECD) countries (including the US) presented an average of 3.1 percentage points. Note, however, that El Salvador presents an unusual case for the region having spread levels in accordance with international standards with an average of 4.4% throughout this period. Moreover, the trend of the banking spread throughout Central America is not, surprisingly and contrary to what one would expect under the recent and more competitive setting, downwards. Instead, as shown in

---

<sup>5</sup> It is worth pointing out that Costa Rica was rather stable politically and economically throughout the 1980s, unlike the rest of its regional counterparts, and that its effort to stabilize the economy began more than 15 years ago. Nevertheless, the reforms have usually lacked the comprehensiveness and depth of those applied by the rest of the Central American countries in the nineties.

<sup>6</sup> In some cases they had even reached levels of 100%

<sup>7</sup> Even though these punctual rates are not the most accurate reflection of all the rates charged for loans and paid for deposits by banks, they are appropriate for comparisons across countries, as the aggregate interest rates published by the governments generally differ in terms of the methodology utilized in their calculation.

graph 1, the spread increases throughout the nineties, with the level observed in 1996 actually higher than that in the first three years of the decade.

This raises two critical questions: what are the components of the spread and how important is the effect of a change in any of these components on its evolution? Finding a tentative answer to these questions would allow government (central bank) policy to be directed, whenever possible, towards the key components of the spreads in order to reduce their current high levels. The sections that follow investigate these issues.

### **III. CONCEPTUAL FRAMEWORK**

#### **A. Descriptive Model: Structure of the Spread**

The most straightforward manner to analyze the structure of the spread is to use the information found in the income statement of banks, according to the following disaggregation:

$$P = II - IE + NI - OC - LL$$

Where:

II = Interest income

IE = Interest expense

NI = Net non-interest income and all other income

OC = Operating costs

LL = Loan loss charges

P = Profit/loss

D = Deposits

L = Loans

Rearranging, and solving out for the difference between interest income and interest expense, we obtain:

$$(1) II - IE = OC + LL + P - NI$$

If we now divide the expression by deposits and multiply and divide interest income by loans from the balance sheet, we obtain:

$$(2) II / L * L / D - IE / D \equiv OC / D + LL / D + P / D - NI / D$$

Following Randall (1998), we use the fact that interest income is similar to the average lending rate times the volume of loans, that interest expenses are similar to the average deposit rate times the volume of deposits, and that the ratio of loans to deposits is equal to one minus the required reserve ratio, such that we obtain the following expression for the spread:

$$(3) i_L - i_D = r^* i_L + OC / D + LL / D + P / D - NI / D + \text{residual}$$

Where:

$r$  = required reserve ratio

$i_L = \Pi / L$

$i_D = IE / D$

$L / D = 1 - r$

Expression (3) defines the spread in terms of reserve costs, operating costs, loan loss, and profits/losses net of non-interest income and all other income, plus a residual to account for the substitution of the implicit interest rates by the actual ones. Expressed this way, this formula allows an estimation of the cost that reserve requirements impose on the intermediation activity. It also provides a simple structure of the spread and the lending interest rate. This may be used to construct an econometric model in order to estimate the way in which the behavior of each of the right-hand side variables relates to the behavior of the spread and the lending rate.

## **B. Empirical Model: Behavior of the Spread**

### *Model*

The empirical model of spreads builds on the descriptive analysis above, and incorporates other relevant factors that enter into the constitution of the spread that do not follow from the income statement analysis, such as controls for time. The model to be estimated is that of panel data. This is particularly useful as it allows for the study of the factors that may lead to variation in the spread, both across individuals and through time.

Given this framework, the two estimated models take the spread or the lending interest rate as the dependent variable,<sup>8</sup> as a function of:

- 1) average production costs,
- 2) average regulatory costs,
- 3) average credit risk,
- 4) macroeconomic factors, and
- 5) other factors such as size and average capital.<sup>9</sup>

The term "average" throughout refers to the fact that the variables are adjusted by some balance sheet item such as assets, deposits or loans, so that the variable ratio is used in the estimation.

Production costs refer to the operating costs incurred by banks partly in their generation of loans, and involve expenses of personnel, branch maintenance, and other costs associated with the banking activity.

A regulatory cost to the banking firm in raising loans comes from reserve requirements. The bank, by having to set aside funds in order to comply with banking regulations, incurs in the opportunity cost of earning a return (or a higher return if the reserves are remunerated) on those funds in the market.

Credit risk in the loan portfolio of banks is usually measured through the non-performing loan ratio (non-performing loans-to-total loans). This represents an ex-post proxy of default risk, and it will be used in our model to capture the ability of repayment of the representative loan in the credit portfolio of the bank.

Macroeconomic risk is measured through aggregate economic variables, and involves several things. In the case of the spread determination model, it refers to factors that affect the lending and/or the deposit interest rate, and therefore translate into the spread. Though macroeconomic factors usually affect both the lending and the deposit rates similarly, thus

---

<sup>8</sup> Both models are perfectly compatible with each other and are estimated for completeness.

<sup>9</sup> Though at first glance we would expect funding costs, as represented by the deposit interest rate, to be included as an explanatory variable in the model of the determination of the lending interest rate, a second glance would tell us that this would cause endogeneity, thus making our estimates inconsistent, as the rate depositors demand should also be affected by the degree of risk born by the bank and macroeconomic variables, all of which are explanatory variables of the lending interest rate.

canceling each other out, this risk variable intends to incorporate the uncertainty derived from the activity of generating loans, beyond that for which depositors demand a higher return. In other words, this is the uncertainty that productive sectors of the economy confront during periods of significant economic and political reform, which may translate into a severe reallocation of resources, with entry and/or exit, expansion and/or contraction. Since the risk of client's default, as measured by the non-performing loans ratio, is ex-post, a more complete way of estimating this factor into the formation of the interest rate spread and the lending rate is by explicitly including macroeconomic variables, such as the volatility of the return of government bonds or economic growth. Unfortunately, since most of the bank information used in the estimations is monthly, there is no daily series available on the yield of government bills, which would be required to calculate the monthly volatility. Whenever possible, the monthly/quarterly indicator (whichever is appropriate for the particular data set) of economic activity is used to stand in for economic growth.

Other factors such as size (assets-to-total industry assets) and average capital (measured through the capital-to-assets ratio) are included in order to control for the size of operations and the effect of the level of capitalization of banks. The latter is an important factor in the determination of the spread in mature financial systems, where the degree of capitalization maintains a direct relationship with shareholders' ability to control management activities, especially as far as risk-taking is concerned.

The benefits of panel data are all extremely important in dealing with the question posed in this paper. These include: (i) controlling for individual heterogeneity, (ii) giving more informative data, more variability, less collinearity among the variables, more degrees of freedom and more efficiency, and (iii) eliminating biases resulting from aggregation over firms or individuals (Baltagi, 1995). On the other hand, the usual limitations of panel data, which include design and data selection problems, measurement errors, and selection bias, do not arise as significant issues in the type of data utilized here. The problem of design and data collection is not a concern when dealing with the banking system of the Central American countries, as banks are required by law to report to the regulating agency periodically, with the best information possible. Furthermore, this reported information is audited by outside accounting firms, so that measurement error is greatly reduced through the standard and compulsory procedure for data reporting. Individual banking firms cannot opt out of this reporting process;

thus the entire population usually constitutes the sample. This does not imply that information is available for each individual bank in each time period, as some banks may not be able to report data at some point. Yet, one can be assured that whenever this omission occurs, it occurs for random reasons. As a result, the panel data technique used to study the spread formation is extremely rich and appropriate.

The one-way error component regression model is chosen over the two-way model, which includes an individual invariant component in the disturbance (unobservable time effect), for two reasons. First, the model includes macroeconomic factors such as inflation and economic growth which, by themselves, control for any major time effects. Second, time effects should not be important as the periods covered are rather short (either monthly or quarterly data are utilized) and extend throughout the last few years.<sup>10</sup> Also, during this period, all of the countries were undergoing a period of political and economic stability relative to prior years due to the financial system reforms implemented in the beginning of the 1990s.

The specific one-way panel data model is:

$$\text{Spread/Lending Interest Rate}_{i,t} = \mu_i + \beta_1 * \text{Operating Cost Ratio}_{i,t} + \beta_2 * \text{Reserve Cost Ratio}_{i,t} + \beta_3 * \text{Non-Performing Loans Ratio}_{i,t} + \sum_j \delta_j * \text{Macroeconomic factors}^j_t + \sum_k \gamma_k * \text{Other factors}^k_{i,t} + \varepsilon_{i,t}$$

where  $j= 1,2$  for inflation and economic growth, respectively;  $k= 1,2$  for capital-to-assets ratio and assets-to-total industry assets ratio, respectively;  $\mu_i$  is, in the random effects model, an individual specific disturbance, such that the above model may be written as

$$y_{i,t} = \alpha + \theta' X_{i,t} + \varepsilon_{i,t} + u_i$$

and  $\mu_i$  is a separate constant term for each unit under the fixed effects model, such that

$$y_{i,t} = \alpha_i + \theta' X_{i,t} + \varepsilon_{i,t}$$

<sup>10</sup> This, added to the structure of the data, which usually present a larger number of firms (N) than time periods (T), allows and even forces one to abstract from heteroskedasticity and serial correlation concerns, as usually the appropriate tests require  $T > N$ .

where  $y_{i,t}$  stands for either the spread or the lending interest rate,  $\theta'=(\beta \delta \gamma)$  is the vector of parameters, and  $X$  is the matrix containing the observations of the explanatory variables.

In order to introduce explicitly in a model of spread determination the cross-sectional and the time variation, Powell et al. (1997) use explanatory variable averages and deviations from the average (whenever appropriate) to capture differences between impact on the spread from time effects (exogenous changes to the industry) and from individual effects (cross sectional variation in the data).

These variables are constructed as follows:

Industry Average at time  $t$  for some variable  $x$  ( $Avgx_t$ ):

$$Avgx_t = \sum_{i=1}^n x_{it} / n$$

where  $x_{it}$  is the variable ratio for bank  $i$  at a particular  $t$ . Then, the individual bank  $i$  deviation from this average at time  $t$  ( $Dev_{itx}$ ) is,

$$Dev_{it} = x_{it} - \sum_{i=1}^n x_{it} / n$$

In the models estimated in this paper, the industry averages and individual bank deviations from these averages will be constructed for the operating and reserve cost ratios, non-performing loans ratio and capital-to-assets ratios.

The greatest advantage of this breakup is that it allows for an indirect method to study the market structure of the financial system. The market environment within which the banking firm operates should be an important factor in the determination of the spread. According to the particular market structure of the industry, the individual banks have more or less ability in transferring changes to their own costs and risks to the lending rate they charge and the spread they earn. By creating variables for the industry averages as well as for the deviations of the individual bank with respect to these averages, one can make inferences about the market structure and degree of monopolistic power of banks. This is extremely useful because it is not possible to measure directly the degree of freedom that banks have in setting their prices, neither in the output nor input markets (the lending and deposit rate, respectively). This methodology provides an indirect means to examine this issue.

If banks operate in an environment of large competition, mostly aggregate shocks in the independent variables should be transferred to the spread and the lending rate. Very little or no variation in the costs and credit risk faced by the individual bank should be passed on to the spread.

On the other hand, in less competitive environments where the banks hold more market power, they should be able to transfer a larger fraction of the variation in their costs and risk to the lending rate, and thus the spread.

This simple empirical model of the behavior of the banking spread is appropriate, given the availability of individual bank data in the region. More involved models of bank spreads, with stronger theoretical foundations, are available within the theory of the banking firm, but they generally require more detailed data by bank<sup>11</sup> or are simply not appropriate given the stage of development in the banking system of Central America.

#### *Relationship Between the Dependent and Explanatory Variables*

Stylized facts for the behavior of the spread, usually derived from empirical analysis of developed countries, indicate that we should expect to find the spread to be increasing in average operating costs, average reserve costs, and average non-performing loans. Assuming that loans are an output of the banking firm if banks incur higher administrative expenses in order to fulfill their service as intermediaries, the price of loans should increase. As the reserve requirements increase, banks should similarly transfer this opportunity cost to the interest margin. Likewise, when the risk of default rises through an increase in the non-performing loans-to-total loan ratio, the bank should receive a higher return on the loan as equity holders demand risk-adjusted returns.

We would expect the relationship between the spread and the non-performing loan ratio to be positive under well-regulated systems. Yet, we may find that either there is no relationship or even a negative one between the variables. This may reflect, as pointed out by Brock, et al. (1998), the incentives of poorly capitalized banks to give out risky loans in environments where regulators demonstrate an overly permissive attitude toward entry of new banks, and/or a lack of

---

<sup>11</sup> See the work of Ho and Saunders (1981) for a theoretical and empirical application of the determinants of bank spreads. There is not an abundance of papers that deal directly with the theory of the determination of banking spreads defined as the difference between the lending and the deposit rate, but rather the spread between deposit or money market rates and government bills.

desire to close existing undercapitalized institutions. Though undercapitalized banks must usually pay higher deposit interest rates in order to obtain funds, these increases in funding costs are not translated into proportional increases in loan rates, which may cause their risky clients to default. Therefore, reductions in spreads in weak banking systems may be indicative of worsening loan portfolio quality.

In terms of the individual bank deviations from the average non-performing loan ratio in the industry, one must also consider the deposit rate elasticity of bank lenders with respect to the default risk of a particular bank. Since the interest rate spread is the difference between the lending and the deposit rate, this elasticity of demand and therefore the degree of market power a bank has will determine the effect of a shock on such variable in terms of the final spread. Despite significant reforms in the financial system, all countries in Central America still have a long way to go in modernizing and strengthening their regulatory and supervisory frameworks. While important modifications of the norms and procedures of the banking system have occurred, enforcement must be strengthened. In particular, there has been little success in applying the newly written rules in practice. Thus, in banking environments with lax supervision, agents may still have incentive to take on excessive risk.

The theory of the determination of bank interest margins indicates that the size of the transactions undertaken by the bank affects the spread. Larger banks are expected to have smaller spreads (as we would expect the large banks to carry out the large operations). This may be analyzed as a shift or marginal effect. In this paper we include in the estimated model a variable that measures assets of the individual bank in terms of the industry total assets for a given time period. An alternative to this approach is to divide the sample by asset size groups, into, say, large and small banks. This approach may not be particularly insightful in the case of Central America, as the number of participants in the banking systems is rather small.

Additionally, higher capital-to-assets ratios have been identified as a cause of larger spreads, due to the existence of diseconomies of scale from increased expenses derived from the reduction of the ability of shareholders to oversee the performance of management. This may not be the case in Central America, where a developing supervisory system may allow banks to measure capital in a distortive manner, in order to fulfill minimum capital requirements, and

therefore not be representative of the true level of capitalization.<sup>12</sup> Therefore, as pointed out in Brock, et al., a negative coefficient for this variable may be indicative of weaker banking systems.

The macroeconomic variables should affect the lending interest rate more significantly than the spread. As pointed out earlier, macroeconomic variables should affect, for the most part, the lending and the deposit interest rate similarly, therefore canceling each other out in the spread. Inflation rates should affect the lending interest positively (since we are working with nominal interest rates), as predicted by the Fischer equation.<sup>13</sup> If economic growth is indicative of an increase in competition (and therefore efficiency) and macroeconomic stability, it should then affect the lending rate negatively.

It is crucial to keep in mind all these issues when interpreting the empirical results for the region. These issues differ in many respects from mature financial systems, which work within a framework of well-defined and fully enforced rules. The way we would expect and observe the spread and the lending interest rate to respond to changes in the explanatory variables in the industrialized world may be very different from what we actually find out for the countries of Central America.

Given the great dynamism pervading the Central American banking systems, results should be interpreted carefully. The banking industries and the financial systems in which these are immersed are undergoing a period of transition and growth. Moreover, the entire economies are all in a process of profound change and possibly not in a state of long-run equilibrium. These caveats are important to bear in mind when examining empirical evidence of the Central American banking sectors.

#### **IV. EMPIRICAL RESULTS**

##### *Data*

Tables 1.c through 5.c depict summary statistics for the regression variables of the five countries under study. There are some slight variations across countries in the way the variables

---

<sup>12</sup> This is not to say that the Central American countries have not in general implemented very significant and positive modifications in terms of their regulatory regime, but the system is under development and has still a long way to go.

<sup>13</sup>  $i$  (nominal interest rate) =  $r$  (real interest rate) +  $\pi$  (inflation rate).

are constructed, according to the availability of data. The superintendencies and central banks of each country provided the data used.

The empirical estimation is performed on the banking industry; such that only banks are included. It is reasonable to separate banks from other financial institutions in this type of study. Other financial institutions operate under different settings and may maximize different profit functions. In the case of Central American countries they also usually represent a very small fraction of the financial system, and therefore are not significant sources of financing for regular bank borrowers.

The empirical model uses implicit interest rates derived from the information contained in the income statements and balance sheets of banks. This is commonly done in other empirical analyses of the rate spreads. This is not ideal. There are many possible definitions of implicit interest rates because they are only an approximation to the representative actual interest rates charged and paid by banks (arrived at by carrying out a weighted average of all the actual rates charged for loans and paid for deposits). Given, however, the huge amount of loans and deposits that each bank generates, and often poor data availability, it is an incredibly difficult task to obtain this kind of information.

Accurate weighted averages of actual lending and deposit interest rates (weighted across all of the bank's loans and deposits) would truly capture the pricing behavior of the bank, both in the input and output markets. They represent a better measurement than implicit interest rates because interest income and interest expense usually include only the actual receipts and payments, which are not directly related to the variables the bank takes into account when determining what interest rate to charge and pay. A further distortion from using the implicit spreads comes from utilizing the balance sheet information in the denominator (by including many diverse interest-earning assets and costly liabilities).

### *Regressions*

As stated earlier, the estimated panel data model is the one-way error component model. Two sets of regressions are estimated. The sets vary in terms of the dependent variable, which is either the spread or the lending interest rate. Within each set, four regressions are run (Model A, B, C and D). Models C and D present the industry averages and the individual bank deviations from these averages, while models A and B simply incorporate the effects of the variables that

differ per individual per time period. Models C and D add the capital-to-assets ratio and the assets-to-industry total assets ratio. These ratios are not included in models A and B because they may not be measured accurately (accounting capital may be an aberration of the true level of capital due to lack of rigorous supervision) or there may simply be factors that may not be relevant (size) in the case of Central America.

The regression results appear in Tables I through V and are discussed below. P-values appear underneath each parameter estimate. The usual Hausman Test is carried out in order to be able to discern between the random and the fixed effects model. Whenever the null hypothesis of orthogonality between the individual effect  $u_i$  and the regressors  $X_{it}$  is rejected fixed effects is the consistent estimator (assuming the model is well specified). The individual effect in the error term may be correlated with the right-hand side variables as a result of a bank's "spunk."<sup>14</sup> These variables include management ability that affects the level of operational efficiency, the level at which reserves are kept above the required level by the central bank, and the risk faced by the bank beyond that accounted for in the spread.

The cut-off for the significance level is 10%. Whenever there are outliers in the data, the regressions are reestimated without them in order to determine qualitative robustness of the results to these observations.

Country specific analysis of the spread follows. Each section contains: 1) a brief description of the current structure of the banking system as well as the most important reforms that have taken place in the last few years, 2) some basic figures, 3) the descriptive analysis of the spread, and 4) the regression results.

## **A. Costa Rica**

In terms of its ownership structure, the banking system of Costa Rica stands out from the rest of the Central American banking systems. Public banks, though small relative to the private banks in terms of number of institutions, represent around 72% of total assets of the banking system. Total public ownership has remained more or less stable in the past five years (reaching the highest level of 79% of total assets in 1995 and the lowest in March of 1998), and there is no clear trend in terms of what the future development in this respect will be. This is the reflection

of a much wider lack of consensus over the appropriate role and size of the government in the many sectors of the economy.

The major reform in Costa Rica's financial systems this decade has been the abandonment by the Central Bank of instruments for direct monetary control such as interest and discount rates, maximum commission fees, and upper limits for the loan portfolio. Instead, the Central Bank has relied on indirect instruments such as the minimum reserve requirements and open market operations.

As of March 1998, the banking system was composed of 29 banks, 26 of which were private, and 3 public.<sup>15</sup> This is an increase from 20 private institutions and 4 public banks as of December 1994. Other financial institutions such as non-bank financial entities, cooperatives, savings and loans and others make up only 13% in terms of assets.

Since 1994, assets have grown 31%, after adjusting for inflation, deposits 25% and loans (net of provisions) 36%. The growth in loans is particularly significant when compared to the growth in the other two variables (see graph 4).

### ***Structure of the spread***

Table 1.a presents the major items of the income statement of Costa Rican banks, in terms of assets, for the period 1994-1998 (March). The interest margin, defined as the difference between interest income and interest expense, remains rather stable throughout the period, reaching an average of 4.1%, showing around a half percentage point decrease since 1994.

Loan loss charges in terms of assets are indeed very low, with an average of 0.7%, but not fully representative of the quality of the loan portfolio, for methodological reasons. In fact, past-due loans over 90 days have always been over a minimum of 3.0% in the last few years. Operating expenses represent an average of 5.0%. Profitability has been rather low, averaging 1.1% in the period. Neither of the items show any clear trend (with the exception of loan loss charges, which as discussed earlier, are not indicative of the quality of the loan portfolio, which has in fact fluctuated throughout the period).

When we apply the descriptive model for the spread derived earlier, for the same period, we find that the spread reaches an average of 11.7 percentage points (table 1.b), according to the

---

<sup>14</sup> Term coined by Jerry Hausman.

actual interest rates earned and paid.<sup>16</sup> The levels of both the lending interest rate ( $i_L$ ) and the deposit interest rate ( $i_D$ ) have steadily decreased since 1995, while the spread has decreased a few percentage points but shows no clear trend.

The cost of the minimum reserve requirement ( $r \cdot i_L$ ), though it represents an average of 6.1%, actually shows great variation throughout the period; it fell from a high of 10.2% in 1995 to a low of 3.3% in March of 1998. This reflects the significant changes that the minimum reserve requirements have undergone in the nineties. Since the reform of the Central Bank Law in November 1995, reserve requirements have shown a downward trend, going from 40% on sight deposits, 25% on obligations due in less than 180 days, and 10% on the rest (all for domestic currency obligations) in December 1994, to a unified 15% requirement in March of 1998. This reduction is apparent in the reduction of the cost to 3.3% in 1998.

Loan loss charges in terms of deposits (LL/D) were estimated by using the provisioning information from the balance sheet because: a) the actual charges transferred to the income statement are not representative of the standing of the loan portfolio and thus of the level of default confronted by the banks; and b) the available disaggregation of the loan loss charges item was not ideal for the analysis here. Though this is not a perfect measure either, it is a better approximation. Measured this way, loan loss provisioning represents an average of 2.1%.

Operating costs (OC/D) constitutes the most significant portion of the spread, which show an average of 7.2% for the period. This may be indicative of the operational inefficiency present in the public banks of Costa Rica, which usually have underutilized capacity and are overstaffed. It is interesting to observe that up to 1995, the most important component of the spread was the reserve requirement cost, as opposed to the current operating cost ratio. It is important to keep in mind that the percentages given in this analysis are only a rough estimate, and should rather be taken as measures for comparisons of the relative weight that each component contributes to the formation of the spread, especially since the residuals obtained are generally high.

---

<sup>15</sup> Public banks as used here do not include those created by "special law" such as Banco Hipotecario de la Vivienda, Banco Popular y de Desarrollo Comunal, y Caja de Ahorro y Préstamos de la ANDE.

<sup>16</sup> Rates for 1998 are a weighted average of the different lending and deposit rates. The rest of the years present the interest rates charged by banks on loans to prime customers and the interest rate paid by banks for time deposits, due to the unavailability of accurate weighted averages. This should be taken into consideration when analyzing the breakup of the spread.

### ***Regression results***

Table I presents the regression results. The panel data set is unbalanced. Two banks do not report appropriate balance sheet and income statement information in December 1996 and 1997. A third bank starts a process of merging with another bank in December 1997, and therefore shows irregularity in its data in the first quarter of 1998. Those public banks created by "special law" were not included in the analysis as these banks have a very specific agenda and operate under very different rules than the private and other public banks included in the estimation.

Given that public banks, though small in number relative to the private banks, represent the majority in terms of assets in the banking system, there is the possibility that they are driving the regression results. Estimation performed solely using private bank data presents evidence that this is not the case, as the regression results are not qualitatively affected by the removal of public banks (only the effect of inflation on the lending interest rate becomes significant at the 10% level).<sup>17</sup>

### **Operating cost ratio.**

The effect of these costs on both the spread and the lending interest rate is statistically significant at the 1% level ( $p \leq 0.01$ ) and positive. When this effect is broken up into the industry average and the individual bank deviation from the average, only the latter is significant at the 1% level. The magnitude of the effect of variations in this variable on the spread and the lending rate is around 31-32% and 33-40%, respectively, both for the individual deviation as well as for the overall cost ratio. Increases in the cost ratio of an individual bank are transferred into the spread in a magnitude similar to that of the overall cost ratio.<sup>18</sup> This is a result that we would expect, as public banks, which represent a huge majority, should have monopoly power in the market.

### **Reserve requirement ratio**

The coefficient on this ratio is significant at the 5% level in the model of the spread, except for the industry average. It tells of an inverse relationship between these costs and the spread (in the

---

<sup>17</sup> Results are not shown in this paper.

<sup>18</sup> This statement is appropriate as long as one is willing to assume a causal relationship among the variables.

order of 17-21%). Though this is not what we would expect in a mature banking system, as pointed out earlier, it may be indicative of the process of persistent reduction of the legal minimum reserves by the Central Bank of Costa Rica in the last few years, in a time when interest rate spreads have actually increased since 1996. It remains nevertheless somewhat difficult to interpret this relationship.

#### Non-performing loans ratio

In general, this ratio does not appear to have a statistically significant effect on the dependent variables.<sup>19</sup> The coefficient on the industry average is positive and significant in model C for the spread, where the variables are disaggregated into averages and deviations. Once capital and asset ratios are included, the coefficient loses significance. This indicates a relationship between these regressors that our simplified model is not able to capture.

#### Capital-to-assets and assets-to-total industry assets ratios

The coefficients on these ratios do not appear to be significant in the spread model. The assets ratio seems to have a negative influence on the lending rate (models B and D) which would be indicative of larger banks offering a lower rate, as we would expect.

#### Macroeconomic factors

Inflation has a positive and significant effect on the spread in models A and B, but not once variables are broken up into averages and deviations. It is not significant in the lending rate model. Economic growth is generally significant and affects the spread positively.

### **B. El Salvador**

The Reserve Bank law of 1991 set the stage for the reforms of the 1990s. The reforms entailed many modifications, including the extension of the autonomy of the Reserve Bank, overhaul of the loan portfolios of the public banks and their privatization. Reforms also

---

<sup>19</sup> There is a positive and significant relationship between the industry average and the lending rate in model D. This positive relationship is what we would expect in a well-regulated banking system were an increase in risk, rather than translating into the moral hazard of weak banks, as discussed earlier, transfers into an increase in the spread to cover for the additional cost.

emphasized the use of tools for indirect monetary control, such as the reserve requirements, as opposed to direct determination of interest rates.

The Salvadoran banking system is composed of 16 institutions, of which the government owns only one. There is only one non-bank financial institution; the rest by and large have become banks. The new laws do not permit any new institutions of this sort. Even though banking regulation and supervision are becoming more stringent, agents choose to operate from the banking system. This contrasts trends in other countries where more rigorous regulation spurs agents to conduct operations through channels other than the banking system.

Throughout the past three years, the banking system of El Salvador has grown around 36% in assets, 35% in deposits and 37% in net loans (net of provisioning), after adjusting for inflation. (See graph 5)

### ***Structure of the spread***

Table 2.a shows the major items of the income statement of Salvadoran banks for the period 1995-97,<sup>20</sup> in terms of assets. The interest margin averages 4.1%. Loan loss charges present an average of 0.1%, but do not fully represent the non-performing loan portfolio which has been above 3.4% throughout the period (also in terms of assets). Operating expenses represent an average of 3.1% of assets. Profits in terms of assets show a modest average of 1.3%.

Applying the descriptive model of the spread developed earlier, we find that the spread<sup>21</sup> is on average 9.3%. Both the lending ( $i_L$ ) and the deposit rate ( $i_D$ ) decrease steadily after 1995.

The reserve requirement cost ( $r^*i_L$ ) represents an average of 4.0% and has remained fairly stable throughout the period. In fact, the legal minimum reserve ratio has been around 21%, part of which is remunerated, throughout this decade.

Operating costs (OC/D) are the most important portion of the spread, with an average of 4.3 percentage points. Both operating and reserve requirement costs constitute the largest components of the spread and have remained a stable portion of it throughout the period analyzed.

---

<sup>20</sup> Due to a change in accounting methodology in 1995, data before this date are not readily available.

<sup>21</sup> The interest rates utilized in the construction of the spread are those derived from the income statement, such that  $i_L = \text{interest income} / \text{total loans}$ ,  $i_D = \text{financial expenses} / \text{total deposits} + \text{other liabilities}$ , as the actual interest rate data did not appear to be appropriate (representative of the overall lending portfolio and deposit structure) for this exercise.

### ***Regression results***

The panel data set is unbalanced as two banks entered the market in March 1995 and June 1995.<sup>22</sup> Public banks may behave differently from private banks. Therefore, as a robustness check, the regressions are further estimated with only the private institutions. The results, however, are not qualitatively affected, with the exception of the lending rate model where reserve and credit risk costs turn significant (results not shown).

#### Operating cost ratio

This ratio appears to have a positive and significant relationship with the spread. The relationship indicates that decreases in cost would be associated with a decrease in the spread in the order of 28-41%, and of 31% for the individual deviation (the industry average coefficient is not significant). As a result, individual banks have some market power in that they are able to transfer a fraction of the increase in their costs to the spread; however, this fraction is smaller than that for the overall change in costs.

#### Reserve requirement ratio

This ratio presents a positive relationship with the spread and the lending rate, which is what we would normally expect in matured financial systems. The estimated coefficient indicates that an increase in the reserve requirement of one percentage point would be associated with a 0.04 percentage point increase in the spread. Individual bank deviations and industry averages, however, do not appear to be significant. The positive relationship is also found in the model of the lending rate (models B and D).

#### Non-performing loans ratio

This variable generally shows no significance, with some exceptions; in particular, the individual bank deviation in the spread model (model D) indicates a positive and significant relationship among the variables, as expected.

---

<sup>22</sup> Multivalores and Promérica, respectively.

### Capital-to-assets and assets-to-total industry assets ratios

The coefficient on the capital ratio is significant in the spread model. The sign of the coefficient is negative, however, which is not what we would expect in well-developed and strongly supervised banking systems, as is discussed earlier. The assets ratio does not appear to have a significant effect.

### Macroeconomic factors

The rhythm of economic activity is significant at the 5% level in all cases and has a negative impact on the spread and the lending rate. Inflation is not significant.

## **C. Guatemala**

The Program for the Modernization of the National Financial System began in 1993. It sparked a process of reform in the financial system which entailed, among other things, the intensification of the autonomy of the Central Bank, the gradual reduction of reserve requirements, liberalization of interest rates, and the revision of other banking regulations. In good part due to these reforms, the Guatemalan banking sector has been extremely dynamic throughout the 1990s.

As part of this program a process of privatization and liquidation of public banks occurred, which reduced government ownership in the banking system. There are presently 33 private banks,<sup>23</sup> two of which are foreign, and only one government bank<sup>24</sup> (which should be privatized soon). Banks present a rather universal banking profile, usually concentrated in holding or related companies. Out of these 34 banks, 12 entered the industry within the last six years, while two government banks were privatized and one liquidated. Entry into the industry continues. Currently, a number of banks await analysis by the Superintendency of Banks, and approval to start operating in the Guatemalan financial system. Other financial institutions, mainly those specialized in investment banking, make up 13% of the total assets of the financial system.

---

<sup>23</sup> The most recent one is Banco de America Central, which opened in December, 1997. Banco Nacional de Desarrollo Agrícola was privatized in December 1997, and now carries the name of Banco de Desarrollo Rural.

<sup>24</sup> Crédito Hipotecario Nacional.

The banking system of Guatemala is becoming increasingly competitive. There are no barriers to entry as the legal process is generally rapid. The authorities are also working to increase the speed of the exit process.

As is the case for the rest of Central America, the banking system of Guatemala has seen spectacular growth during this decade. Assets grew 2.3 times, deposits 1.8 times, and loans (net of provisions) 1.9 times between 1990-98, after adjusting for inflation (See graph 6.)

### ***Structure of the spread***

Table 3.a<sup>25</sup> shows the major items of the income statement of Guatemalan banks, in terms of assets. From 1990-Mar.1998, the interest margin shows a stable level and an average of 5.8%, with no apparent trend. Operating expenses represent 5.0% of assets. Even though these expenses have decreased during the last year, there is no particular trend throughout the nineties. Profitability, as measured by the return on assets, presents an average of 1.5%.

The descriptive model of the spread developed earlier is shown on table 3.b. The average interest rate spread<sup>26</sup> for this decade is 10.5 percentage points, with no downward trend. Nevertheless, the lending rate ( $i_L$ ) appears to have significantly fallen since 1996, as well as the deposit rate ( $i_D$ ).

Reserve requirements are partly remunerated, with a non-remunerated 14% requirement and a higher one for remunerated reserves. This cost ( $r \cdot i_L$ ) represents an average of 3.6% for the period, in terms of deposits. Loan loss provisions were estimated using the information on provisioning levels from the balance sheet, and this shows an average of 0.8%, which is not a good measure of the performance of loans given the methodology used by banks in their construction of provisions. In fact, non-performing loans<sup>27</sup> represented 15% of the total loan portfolio of Guatemalan banks in December 1997.

By far the most important component of the spread is operating expenses, taking up an average of 7.6% and increasing by more than two percentage points throughout the decade. The reserve requirement cost generally follows in terms of importance, and has decreased by more than two percentage points of the spread in the last seven years. Given that the residual obtained

---

<sup>25</sup> Guatemalan banks follow accounting rules that do not include loan loss charges in the income statement. The ratio of these charges in terms of assets could not be constructed.

<sup>26</sup> Interest rates are actual rates, as opposed to those derived implicitly from the income statement.

<sup>27</sup> Includes all loans in arrears.

by the estimation is sometimes large, one should view the specific figures presented in the breakup of the spread with care. They should be used predominantly as measures of relative importance of the various factors that make up the spread.

### ***Regression results***

Regression results are shown on table III. The panel analysis is carried out for the period June 1997-May 1998. The panel set is unbalanced due to two bank entries in August 1997 and January 1998, and the liquidation of a public bank, which presented irregularities in the reported information and was therefore not included.

Public banks were removed from estimation and the models were reestimated, but no qualitative effects were observed in terms of the results. An outlier observation was removed from the results presented here, as this observation appeared to be driving them; outcomes were highly sensitive to the inclusion of this bank.

### Operating cost ratio

Operating costs appear to be significant at the 1% level in all instances, in both the spread and lending rate models, except for the individual deviation in model D. Its effect on the spread and the lending rate is positive, and shocks to the industry average are transferred to the dependent variable with more than eight times the magnitude of the individual deviation from this average. This indicates that individual banks do not have significant market power, as they are only half as capable of transforming increases in their costs into increases in the spread and the lending interest rate.

### Reserve requirement ratio

This ratio does not appear to have a significant relationship with the dependent variable.

### Non-performing loans ratio

The results are quite interesting. The industry average presents the positive relationship expected among the variables. The overall and industry deviation, however, presents a negative relationship with the spread/lending rate. That is to say, a positive shock on credit risk for the industry as a whole is associated with an increase in the spread and the lending rate in the order

of 53-61% and 129-138%, respectively. A similar shock on the credit risk, however, confronted by an individual bank has a negative and rather small (around 9%) effect on the spread/lending rate. This may be the result of weak banks having to pay a higher interest rate to their depositors, while not being able to charge a higher interest rate on their debtors, that could cause those clients to go into default.

#### Capital-to-assets and assets-to-total industry assets ratios

The capital ratio shows a negative and significant relationship with the spread and the lending rate. This is an indication that capital levels are not an accurate measure of the degree of shareholders' control of management, probably because capital is not measured appropriately and it is concentrated in related and holding companies. Size, as measured by the asset ratio, appears to be significant and to have a negative impact on the dependent variable; larger banks can offer a lower interest rate for their loans, and holding the deposit interest rate fixed, obtain a lower spread

#### Macroeconomic factors

The effect of the inflation rate is statistically significant in all instances, and the coefficient on the variable is negative. The effect of economic growth also appears to be significant and negative, though not in the models with the industry averages and individual deviations.

### **D. Honduras**

The banking system of Honduras is composed of 26 banks, three of which are under public ownership,<sup>28</sup> and all of which are commercial banks. There is currently no indication that the public banks will be privatized in the future.

The growth in the number of participants in the industry is the result of the reforms implemented in this decade. Just before 1992 the banking system had only 14 private banks. Today, the number has nearly doubled. A 1990 law created a separate entity for the regulation and supervision of the financial system. It aims to regulate the organization, constitution, and activities of the financial institutions, and in particular, establish rules in matters such as

minimum capital requirements and bank ownership. This law represented a significant change, as the financial system had been heavily regulated until then, with such things as controlled interest rates and maximum levels for the lending portfolio, while the Central Bank gave out loans at preferential rates targeted at benefiting specific sectors of the economy. Nevertheless, Honduras has still a long way to go in terms of modifying its regulations so that they more closely resemble the Basle Committee's recommendations on banking supervision.

During the last year the banking system continued to grow. Assets increased around 45%, deposits 55% and net loans 67%, as shown in graph 7.

### ***Structure of the spread***

Table 4.a<sup>29</sup> shows the major income statement items in terms of assets for the period 1996 and 1997. The average interest margin is 6.2%. Operating expenses in terms of assets have declined during the last year, averaging in the period 5.2%, as well as profitability which presents an average of 1.7%.

Table 4.b shows the application of our descriptive model for the interest rate spread.<sup>30</sup> The lending interest rate ( $i_L$ ) appears to be quite high, with an average of 30.8% during the last two years, while the spread also sits at a high average level of 17.3%.

As the minimum reserve requirements have decreased substantially, the cost to the financial institutions ( $r^* i_L$ ) have gone down from 9.7% to 3.0% in terms of deposits. In fact, in December 1996 the reserve requirement for foreign currency sight deposits was 100%. As of April 1997, the reserve requirement was 29% of deposits, of which 12% had to be deposited at the Central Bank and the leftover 17% was remunerated at the average deposit rate of the financial system.

Loan loss charges show an average of 2.2%, but given that there is no information available on the non-performing loan portfolio, it is hard to say how representative this is of the actual default suffered by banks.

By far the most important component of the spread is operating costs, which average 10.1% of deposits (for the period), and also show a reduction of 0.8% in the last year. Due to the

---

<sup>28</sup> Banco Nacional de Desarrollo Agrícola (BANADESA), Banco Municipal Autónomo (BANMA) and Fondo Nacional para la Producción y Vivienda (FONAPROVI).

<sup>29</sup> As Honduran banks follow accounting rules which do not include loan loss charges in the income statement, the ratio of these charges in terms of assets could not be constructed.

<sup>30</sup> The interest rates used to calculate this spread are actual rates, as opposed to those rates derived implicitly from the income statement.

significant decrease in reserve requirements mentioned earlier, the second most important component of the spread has now become the profits margin, with an average of 3.3%. There is one caveat with respect to the percentages presented here; they only represent a very rough measure of the true values, as evidenced in the rather high residual, and should be seen as indicators of the relative weights that the diverse components have on the constitution of the spread.

### ***Regression results***

Table IV<sup>31</sup> shows the regression results for the period January 1996 to December 1997. Information for January and February 1997 was not available due to technical problems at the Central Bank. The exclusion of these months from the regression should therefore not affect the estimates, because it is reasonable to assume the information was lost by random.<sup>32</sup> Public banks are not included since the information was not available. Throughout the period under review there are no bank disappearances and two banks begin operations, one in January 1997 and another in July 1997, thus creating an unbalanced panel.

### **Operating cost ratio**

The cost ratio appears to be significant at the 1% level in all instances. When the impact is disaggregated, shocks to average costs at the industry level appear to have more than twice the impact on the spread and the lending interest rate than the individual bank deviations from this average, which is evidence of competitive forces at work in the market.

### **Reserve requirement ratio**

This cost appears to be significant at the 1% level in all instances, except for the industry average in the lending rate model. The impact of this variable on the spread is positive when the variable is not disaggregated, and though it is also positive for the individual bank deviations, it is negative for the industry average.

---

<sup>31</sup> The data for Honduras was particularly restrictive in terms of the available breakup to construct the variables used in the regression estimation.

<sup>32</sup> Furthermore, the month of October 1996 is not included because there was no information on the reserves for that month.

### Non-performing loans ratio

This variable is usually not significant in the lending rate model. When it is broken up into the industry and bank deviation components, however, it shows significance and a positive impact on the dependent variable at the individual bank level. Unfortunately, no other suitable data was available to use as default risk. Therefore, the provisioning information contained in the balance sheet was used to construct the variable. Yet, this may not be indicative of the true level of credit risk faced by the bank, as it depends on how appropriate the rules governing the constitution of reserves for bad loans are.

### Capital-to-assets and assets-to-total industry assets ratios

These variables do not generally appear to be significant. In the case of the capital ratio, the results may reflect the fact that capital is not measured accurately. The assets ratio does have a positive and significant relationship with the lending rate in model D.

### Macroeconomic factors

Inflation is significant and has a negative effect on the spread in the model for the disaggregated variables. No data was available to construct the variable economic growth.

## **E. Nicaragua**

The banking system of Nicaragua has undergone remarkable changes in the 1990s moving from full public ownership in 1990 to almost full private ownership in 1998. In fact, Nicaragua did not have a bank supervisory institution until 1991, following almost a decade of absolute lack of a regulatory and supervisory authority.

The change in the structure of ownership was by far the greatest reform. Other significant modifications include the large reduction of reserve requirements from a level of up to 100% on foreign currency deposits and other high rates on domestic currency deposits, as well as the spectrum of coverage. Furthermore, interest rates, which were determined by the Central Bank of Nicaragua up to 1990 and usually caused negative real interest rates, were fully liberalized in 1993.

The industry is made up of twelve banking institutions, of which only two are publicly owned, and continues to grow in terms of private ownership. The financial companies represent a tiny fraction of the Nicaraguan financial system, with only two institutions. They therefore do not constitute any significant alternative sources of financing and are not included in the analysis of this paper.

In only six years, since 1992,<sup>33</sup> the size of the banking system has grown steadily by more than 3 times in terms of assets, and deposits growing more than 6 times, after adjusting for inflation. Loans (net of provisioning), though having grown more than 200% since 1992, lag significantly behind the growth of the liabilities. (See graph 8)

### ***Structure of the spread***

Table 5.a presents the major items of the income statement for the banking system of Nicaragua for 1992-Mar.1998 in terms of end-of-period assets. The interest margin presents an average of 3.7%, and it has actually increased throughout the period by more than two percentage points.

Operating costs are the most significant component of the interest margin, according to the income statement. Operating expenses per unit of asset decreased from 6.7% in 1992 to 4.3% in 1997. Loan loss charges appear to be small, with an average of 0.6%. This does not accurately reflect the degree of problem loans due to the methodology used in calculating loan loss charges. Profitability, measured as the return on assets, has been rather poor, averaging 0.6%.

Table 5.b shows the application of the descriptive model of the interest rate spread for 1992-1998. The spread<sup>34</sup> averages around 10 percentage points and shows no decreasing trend. Surprisingly, the immense growth of the banking system has not been accompanied by a reduction in the lending and borrowing rates, and therefore a reduction in the spread, as one would expect if growth brings an increase in market competition.

Operating costs constitute by far the largest portion of the spread, but seems to be decreasing over time (the increase as of March of 1998 may only represent a seasonal effect through the annualization of the quarterly figure). The section of the spread taken up by

---

<sup>33</sup> Private banks initiated their operations in 1991. Therefore the only available statistics date from 1992.

<sup>34</sup> This spread is calculated on the basis of actual interest rates charged and paid by banks, as opposed to those rates obtained implicitly from the income statement.

operating costs has shown a declining trend and an average of 8.8 percentage points for the period. Loan loss in terms of deposits presents an average of 1.0%.

The reserve cost has become the second most important component of the spread in the last few years. It reaches an average of 3.5 percentage points within the spread, with no remuneration of reserves available in the present. With the unification of the reserve requirement in November 1997, which since then roughly sits at 17% of deposits (compared to 15% and 25% on domestic and foreign currency, respectively, before this date), there has been a reduction of 0.9% in this cost in the first quarter of 1998.

### ***Regression results***

The results appear in table V for January 1997-May 1998. This includes 17 periods of analysis for each of 12 banking institutions. During this time there was little movement in terms of its participants, with no entries, mergers, acquisitions, disappearances or privatizations, with the exception of one liquidated public bank, which is not included in the estimation.<sup>35</sup> The panel data set would therefore be balanced if it were not for a single bank, which did not report information in August 1997.

#### Operating cost ratio

This ratio appears to be significant overall and at the individual level (usually at the 1% level), showing a positive effect on the spread and the lending interest rate.

#### Reserve requirement ratio

This ratio appears to be significant and negative in the case of the individual deviation from the industry average in the spread model. Again, this may represent another case where the reduction in the reserve requirements by the Central Bank combines with a rather increasing spread through time.

#### Non-performing loans ratio

This ratio of credit risk appears to be significant at the 1% level in all instances in the spread model. Its effect on the spread is positive, and the fact that the magnitude for the industry

---

<sup>35</sup> Even though the public Banco Nacional de Desarrollo was liquidated in December 1997, the bank presented irregularity in its reporting and its data for the period under review here.

average is several times higher than that at the individual bank level, reinforces the view that banks operate in a rather competitive environment.

#### Capital-to-assets and assets-to-total industry assets ratios

The capital ratio shows significance in the lending rate model at the industry level, and a positive coefficient. As pointed out earlier, this is what one would expect when accounting capital is accurately measured and therefore is not distorted by clever ways to elude regulations on capital requirements. It is highly doubtful, however, that this is actually indicative of a sound banking system in the case of Nicaragua. The assets ratio does not show statistical significance in the spread model, but the coefficient of the variable is negative and significant in the lending rate model.

#### Macroeconomic factors

Inflation is significant and affects the spread and the lending rate negatively. No monthly indicator to stand in for economic growth was available.

### **V. SUMMARY OF RESULTS**

This paper applies a descriptive and a regression model to the determination of interest rate spreads in Central America. The banking systems in each Central American country vary significantly in size. As measured by assets in December 1997, Nicaragua had the smallest banking system and El Salvador had the largest. (See graph 9.) Although Honduras is smaller than Costa Rica in terms of assets, it has more loans (net of provisioning) than Costa Rica. This could be related to the fact that the Costa Rican banking system is mostly publicly owned and therefore differs from the other Central American systems that are largely private.

Table 6.a presents the major income statement items in terms of assets for the Central American countries in December 1997. Honduras presents the highest interest margin of 6.1%, while Nicaragua and El Salvador show the lowest levels of 3.6% and 3.8%. In terms of operating expenses, El Salvador presents the lowest level with 3.2%, while Honduras shows the highest level with 5.2%. Given Honduras' high level of operating expenses, it may be somewhat surprising that Honduras also shows the highest profitability, with a level of 1.6% in terms of assets.

Table 6.b presents the results from the descriptive model as of December 1997 for the five Central American countries. When analyzing these results, it is important to keep in mind that the actual interest rates utilized are not fully comparable, as they are derived from different calculations, according to the available information by country. A further caveat to be aware of is that the analysis merely represents an approximation of the actual values that the various components constitute as part of the spread, as it is evidenced in the existence of the residual derived from the breakup of the spread.

### *Components of the Spread*

This descriptive model suggests that operating expenses represent the greatest portion of the interest rate spread for all the countries under review, with an average of 7.0% in terms of deposits (OC/D) (see graph 10). Reserve requirements costs ( $r \cdot i_L$ ) average 3.4%, and Nicaragua and Costa Rica show the highest level with a little over 4.1%. The reserve requirement cost usually constitutes the second largest component of the spread in Central America. Loan loss charges, though relatively a small portion of the spread, may be underestimated given the methodology used by banks in computing this figure.

Table 7 summarizes the general regression results for the model of the spread (the dependent variable) as a function of operating costs, reserve requirements costs and credit risk and other variables. (This table findings from models A and B in Tables I through V, which depict results for each of the countries.) Operating costs have a positive impact on the spread in every country, all of which show a strong, positive relationship between operation cost and the spread. The reserve cost ratio is mixed in terms of how it affects the spread, as well as credit risk.

More specifically, in the case of **Costa Rica**, costs appear to have a very strong, positive relationship with the spread and the lending rate. The estimation results indicate that as operating costs fall, the interest rate spread should go down correspondingly by approximately 31%. Moreover, individual banks appear to be able to transfer onto the spread a larger portion of operating costs than for the overall cost variable. This may evidence of a somewhat large degree of monopoly power of banks, which is not surprising given the current structure of bank ownership, which is mostly in public hands.

**El Salvador** also shows a strong association between operating costs and the spread, in the order of 28-41%. Reserve costs also appear to be positively related to the spread, but with a

much smaller magnitude, of about 4%. The regression results do not make clear what degree of market power the banks hold.

**Guatemala** shows a positive relationship between operating costs and the spread in the order of 9-10%, indicating that as operating costs decline, the spread should also decline by about 9-10%. The results also strongly suggest that the Guatemalan banking system operates under rather a competitive environment. Remarkably, positive shocks to the costs of the industry translate into an increase in the spread of 45-49%, while shocks to individual banks appear to have an impact on costs of only 8%. A similar pattern is observed in the case of credit risk. As measured by the non-performing loans ratio, shocks to the industry average are positively associated with the spread, in the order of 53-61%. In contrast, the credit risk of individual banks appears to be negatively related to the spread, by a small magnitude of 9%.

In **Honduras**, average operating costs have a positive effect on the spread in the order of 42-43%. The reserve requirement cost also has a positive effect of 6-7%. Individual banks appear to be less able to transfer cost increases onto the spread, in the order of 27-30%, while changes in the industry average affect the spread by around 75-76%. The results indicate that the financial system of Honduras is rather competitive, although individual banks hold some control as they can transfer, to some degree, shocks to their own costs and risks into the spread and the lending interest rate. It is important to keep in mind, however, that the data available for Honduras was rather restrictive and this affected the construction of some of the variables (in particular, default risk and the way capital is measured).

**Nicaragua** presents a positive relationship between operating costs and the spread with a coefficient on costs of 31-34%. Credit risk is also positively associated with the spread. The disaggregation of averages and deviations shows evidence of competitive forces. Individual banks appear to be able to transfer around 30% of a unit increase in default onto the spread, whereas such an increase in the industry average would have an effect of more than 260% on the spread, which makes the estimate a little suspicious.

A positive and, excepting Guatemala, very strong association between the operating costs and the interest rate spread exists across Central America. Policy efforts aimed at reducing the spread should thus concentrate on **reducing operating costs**. In particular, increased competition would lead to lower operating costs. The removal of barriers that delay and interfere with the entrance of new banks into the market could increase competition. While there are other policy

options, the removal of entry barriers is a relatively simple policy to implement as well as likely highly effective. However, it is important to study in more depth the structure of the banking cost functions, as the existence of economies of scale and economies of scope may affect the choice of the optimal policy in regards to the banking system as a whole.

The estimation results appear to indicate that the market structure present in Costa Rica is rather monopolistic, as a result of the majority public ownership. In the rest of the countries, excepting El Salvador where regression results are uncertain in this respect, banks seem to be less able to transfer into the spreads and the lending interest rates shocks to their own costs and risks, despite the different degrees of market power held by individual banks. This suggests the existence of a more competitive environment.

A second policy option is to try to **reduce the credit risk of the financial system**, which is a significant factor affecting the spread. Increasing the amount of information available to decision-makers involved in the credit market, especially banks, through the establishment of credit bureaus or similar databases with commercial information on the borrowers of the financial system is one means to reduce risk.

A third policy to reduce the spread would target **reserve costs**. Further analysis, however, is required in order to infer whether they should be increased or decreased. Not only are the results of this paper not conclusive in this respect, but reserve requirements are also related to issues of monetary policy and banking regulation that are not incorporated in the current analysis and are beyond the scope of this paper. Still, it may be profitable to allow part of the reserves to be remunerated, as this would reduce the opportunity cost that the allocation of these funds has to the banking institutions.

## **VI. CONCLUSION**

This paper represents a first attempt at studying the behavior of banking spreads in Central America. The indisputable single factor affecting the structure of the interest rate spread is operating costs, which usually has a significant, positive effect on the evolution of the spread and the lending interest rate.

From a policy perspective, these results suggest that **reforms that provide additional incentives for the entrance of new participants should continue** in order to increase the

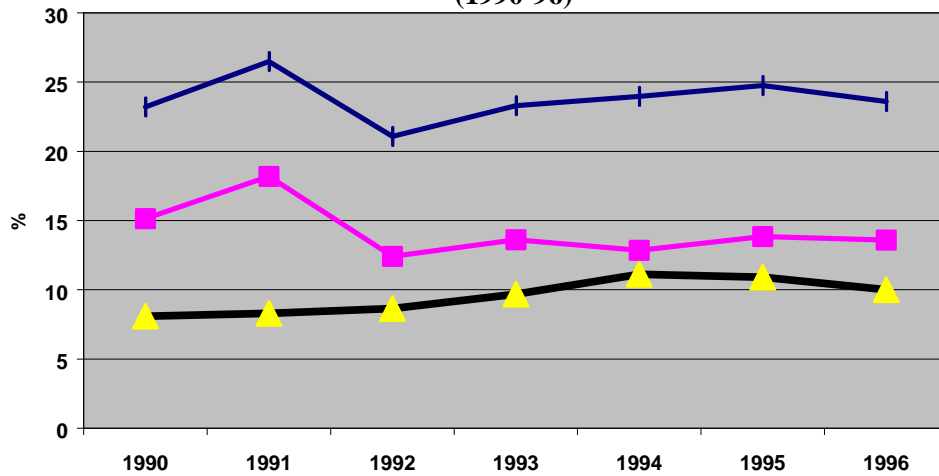
degree of competition in the industry. Greater competition means banks will need to fight for customers more aggressively, and need to decrease their operating costs in order to survive. Thus, **increased competition should translate into decreases in the spread.** Likewise, further gains in macroeconomic stability and the continuation of economic reforms should also help to reduce the interest rate spread by increasing the ability of borrowers to repay their loans.

Central American financial systems are still undergoing a process of change and growth, and are far from being mature systems. Though the process of reform has already taken off, these countries still need to strengthen supervision and regulation of their financial systems. Therefore, the interpretation of the results obtained in the empirical analysis carried out in this paper must certainly be considered with care. Moreover, it is necessary to study in more depth the cost structure of the financial institutions in the region, because the possible existence of economies of scale should be better understood and considered when determining the optimal structure of the banking industry should be.

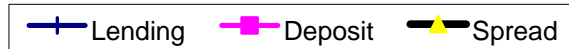
## References

- Baltagi, B.H., 1995, "Econometric Analysis of Panel Data," John Wiley & Sons, Chichester.
- Baltensperger, E., 1980, "Alternative approaches to the theory of the banking firm," *Journal of Monetary Economics* 6, 1-37.
- Brock, P., and L.Rojas-Suarez, 1998, "Understanding the Behavior of Bank Spreads in Latin America," Fourth Annual Bank Conference on Development in Latin America and the Caribbean, San Salvador, June.
- Camacho, Arnaldo, 1996, *Mercados Financieros en la Encrucijada: la Reforma y Supervisión de la Banca en América Latina*, INCAE, San José.
- Camacho Mejía, E. and L. Mesalles Jorba, 1994, *Regulación, Competencia y Eficiencia en la Banca Costarricense*, Ed. González Vega and Camacho Mejía, Academia de Centroamérica, San José.
- Edwards, J. and S. Ogilvie, 1995, "Universal banks and German industrialization: A reappraisal," Working paper no. 1171, Centre for Economic Policy Research, London.
- Freixas, X. and J. Rochet 1997, *Microeconomics of Banking*, The MIT Press, Cambridge.
- Gerschenkron, A., 1962, *Economic backwardness in theoretical perspective*, Harvard University Press, Cambridge.
- Ho, T.S.Y., and A. Saunders, 1981, "The determinants of bank interest margins: theory and empirical evidence," *Journal of Financial and Quantitative Analysis*, November.
- Powell, A., A. Broda, and T. Burdisso, 1997, "An Analysis of Lending Interest Rates in Argentina: A Panel Interpretation of a Search Model with Bargaining," Banco Central de la República Argentina, April.
- Pringle, J., 1973, "A Theory of the Banking Firm," *Journal of Money, Credit, and Banking*, 5, November.
- Randall, R., 1998, "Interest Rate Spreads in the Eastern Caribbean," Working Paper of the International Monetary Fund, April.
- Sealey, Jr., C.W., and J.T.Lindley, 1977, "Inputs, outputs, and a theory of production and cost at depository financial institutions," *The Journal of Finance*, XXXII, No.4, September.

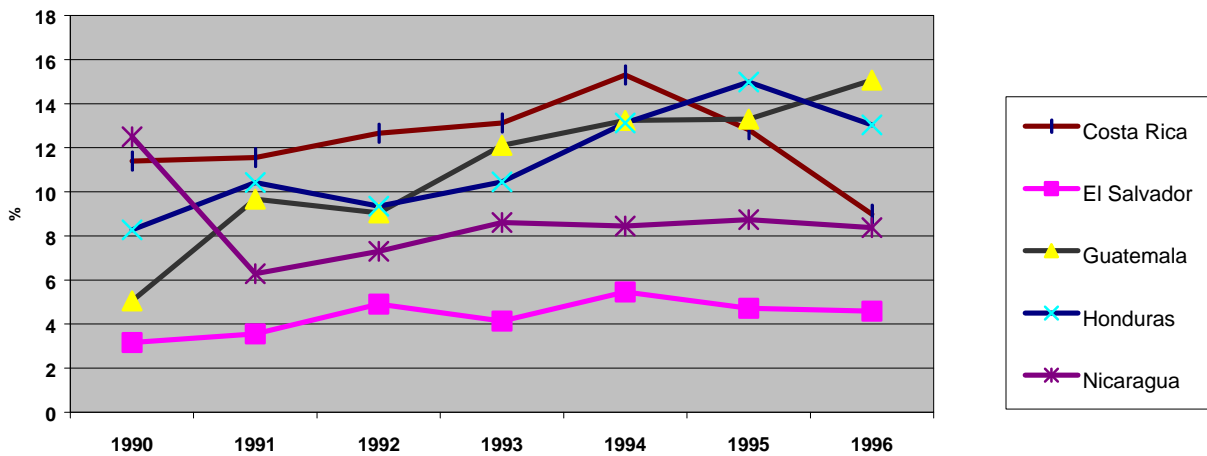
**Graph 1: Average Lending, Deposit Interest Rates and Spreads in Central America (1990-96)**



Note: Lending interest rate is the rate charged by banks on loans to prime customers; deposit interest rate is the rate paid by commercial or similar banks for time deposits; spread is the difference between these two rates.  
Source: OECD Financial Statistics.--These rates are chosen for comparability reasons.

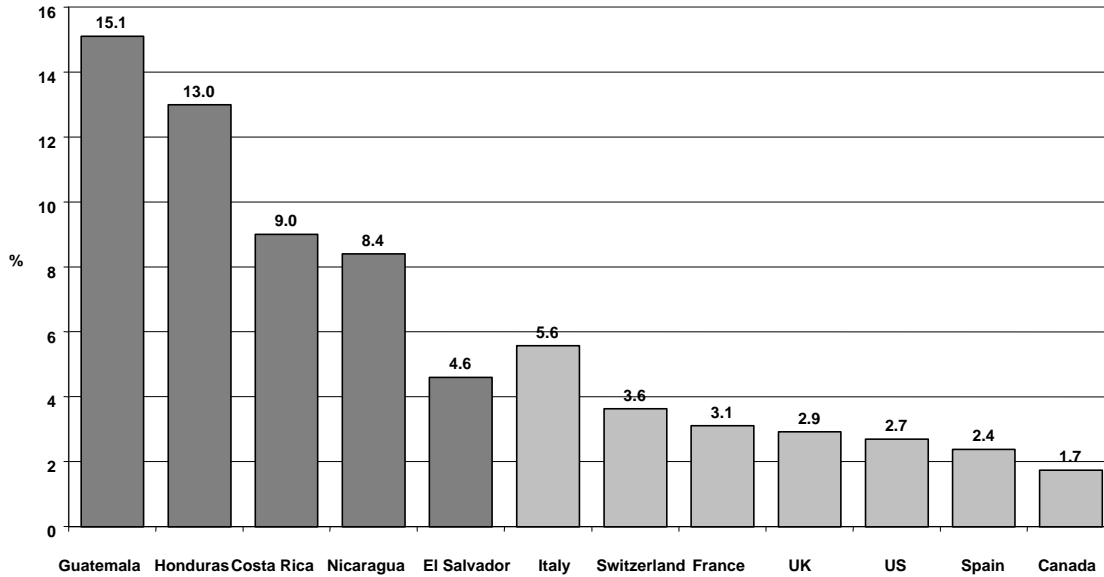


**Graph 2: Interest Rate Spreads in Central America (1990-96)**



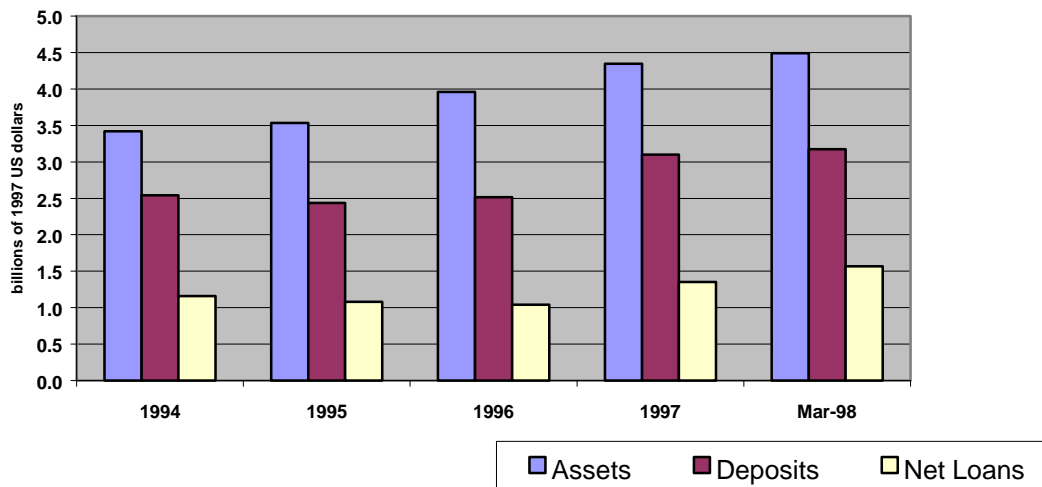
Note: The spread is the difference between the the lending rate charged by banks on loans to prime customers and the deposit interest rate paid by commercial or similar banks for time deposits.  
Source: OECD Financial Statistics. --These rates are chosen for comparability reasons.

**Graph 3: Interest Rate Spreads in Central America vs. Some Selected OECD Countries (1996)**



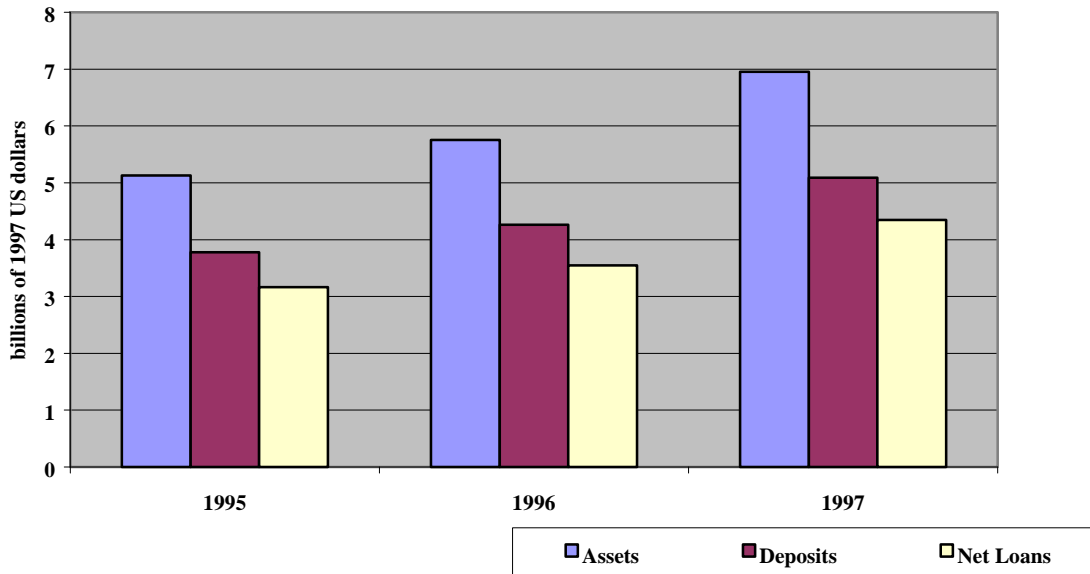
Source: OECD Financial Statistics.

**Graph 4: Costa Rica: Assets, Deposits and Net Loans (1994-1998)**



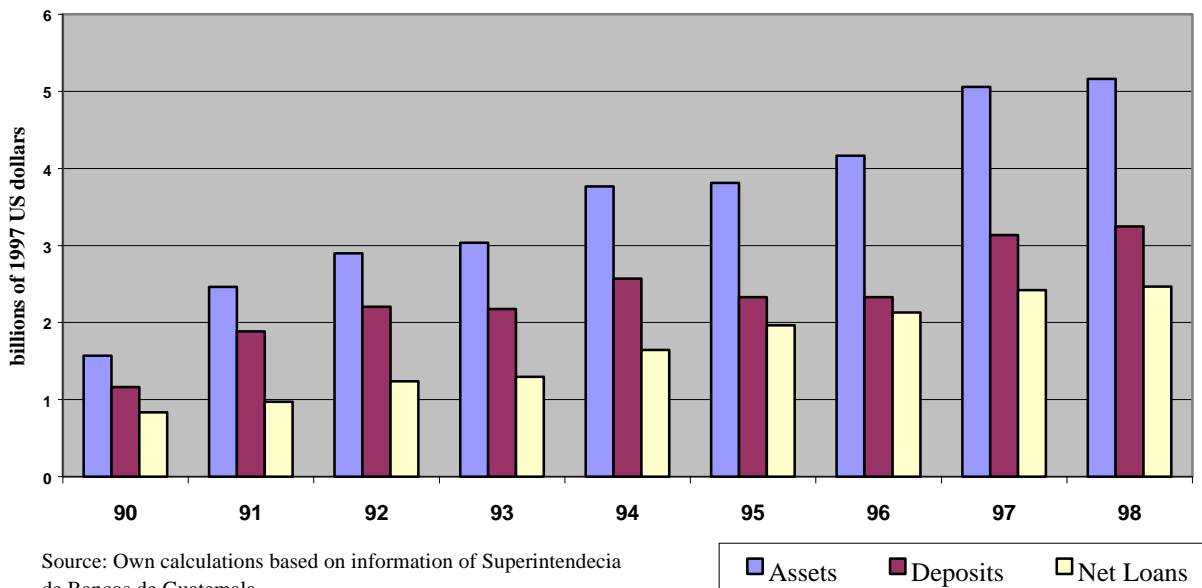
Source: Own calculations based on information of Superintendencia del Sistema Financiero (SUGEF).

**Graph 5: El Salvador: Assets, Deposits and Net Loans (1995-1997)**



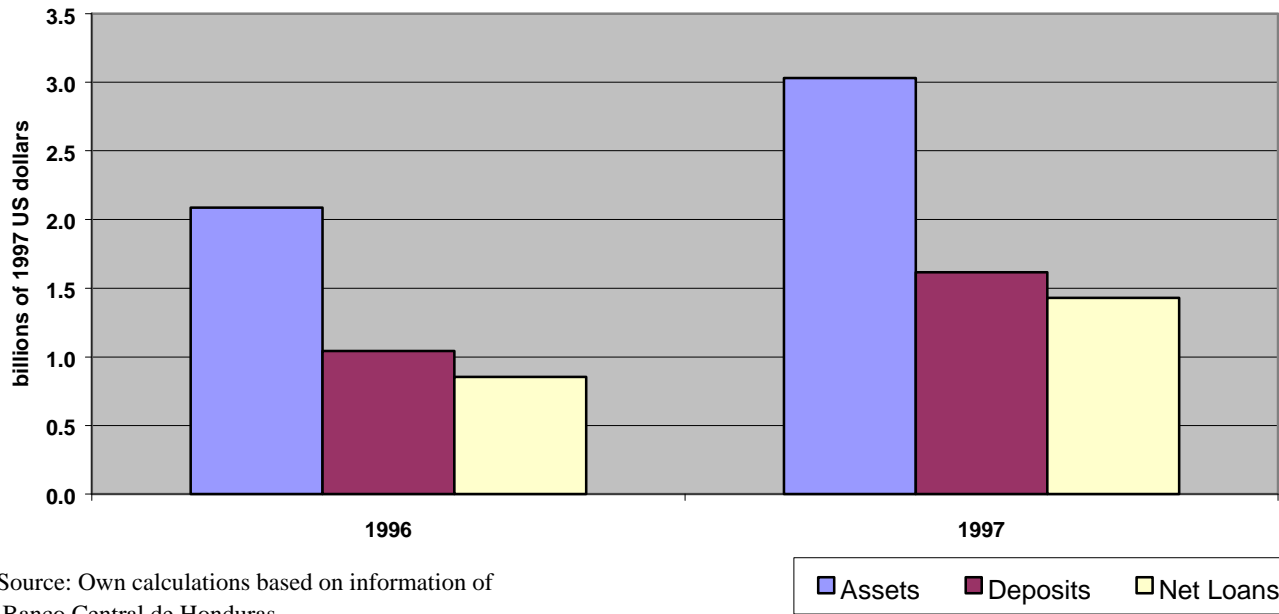
Source: Own calculations based on information of Superintendencia del Sistema Financiero de El Salvador.

**Graph 6: Guatemala: Assets, Deposits and Net Loans (1990-98)**



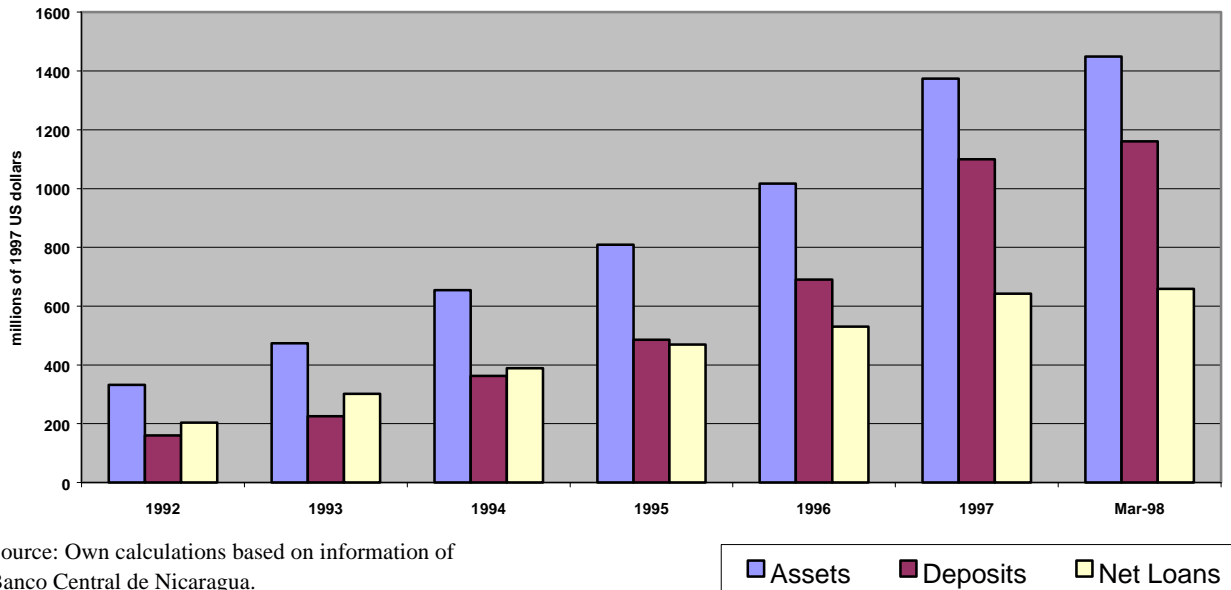
Source: Own calculations based on information of Superintendencia de Bancos de Guatemala.

**Graph 7: Honduras: Assets, Deposits and Net Loans (1996-1997)**



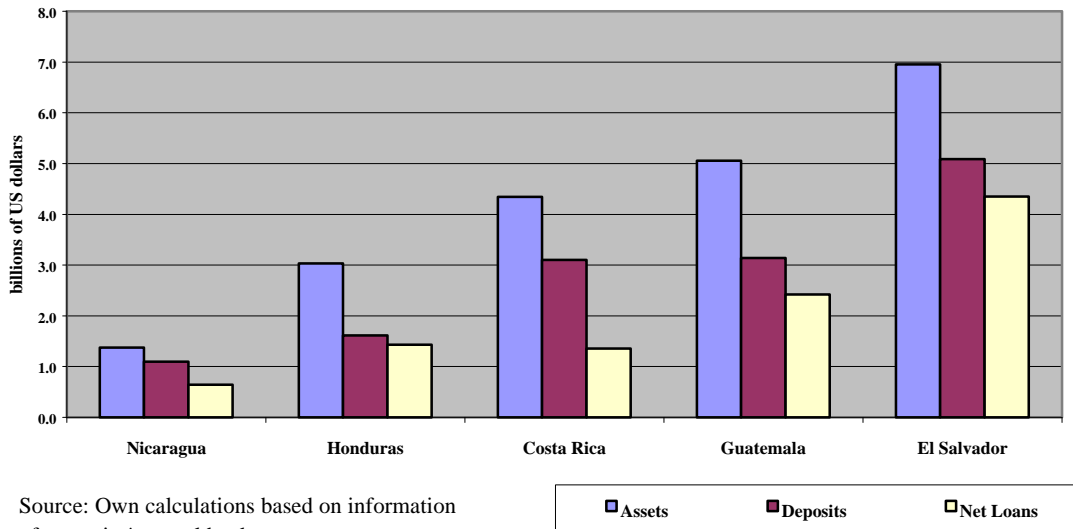
Source: Own calculations based on information of Banco Central de Honduras.

**Graph 8: Nicaragua: Assets, Deposits and Net Loans (1992-98)**

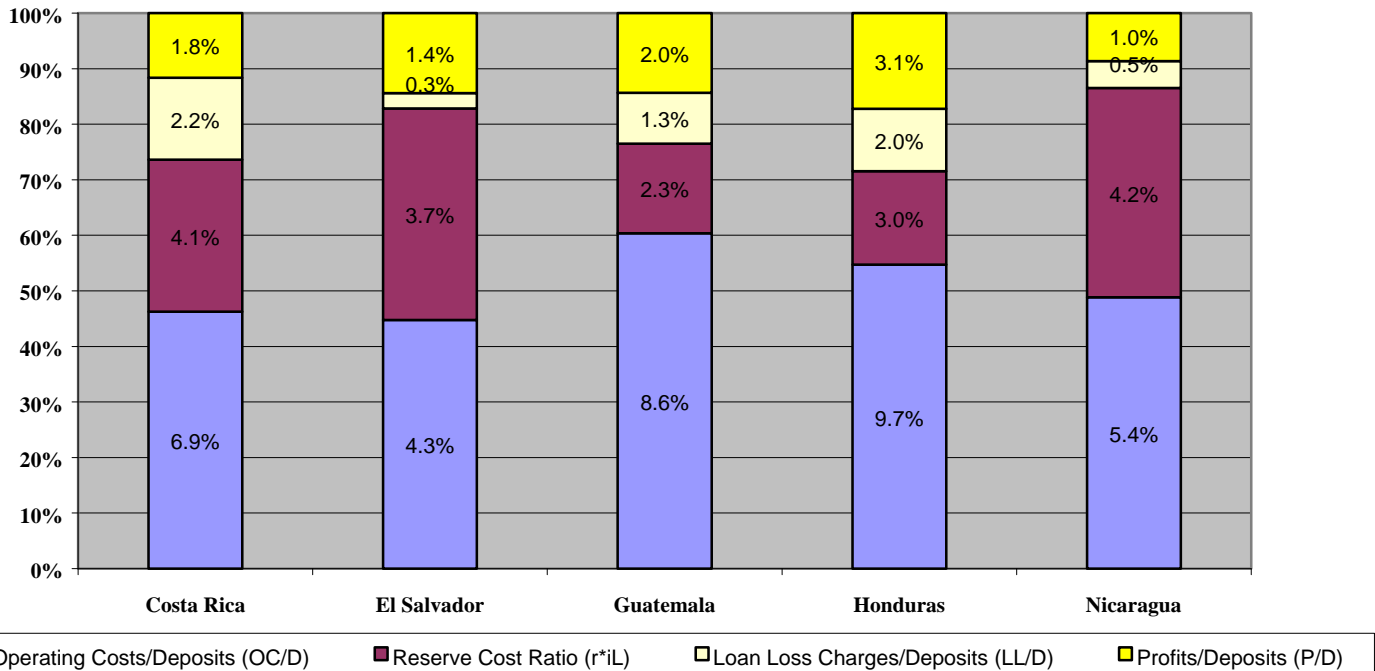


Source: Own calculations based on information of Banco Central de Nicaragua.

**Graph 9: Selected Balance Sheet Items  
December 1997**



**Graph 10: Selected Spread Components - Relative Importance (1997)**



See table 6.b for more details.

<i>Percentages</i>						
	1994	1995	1996	1997	1998	Average
					(march)	
Interest income	12.02	15.32	11.85	13.80	13.81	13.36
Interest expense	7.54	10.46	8.51	9.86	9.83	9.24
<b>Interest margin</b>	4.48	4.86	3.35	3.94	3.97	4.12
Net fee income	1.19	1.37	1.68	1.69	1.90	1.57
Net other income	0.86	0.84	1.16	0.84	0.86	0.91
<b>Net non-interest income</b>	2.05	2.20	2.84	2.54	2.75	2.48
<b>Loan loss charges</b>	1.05	0.85	0.78	0.46	0.11	0.65
<b>Operating expenses</b>	4.72	5.29	4.72	4.96	5.33	5.00
Extraordinary items	0.11	0.09	0.32	0.19	0.13	0.17
<b>Profit before taxes</b>	0.87	1.02	1.01	1.25	1.42	1.11
Income tax	0.13	0.00	0.04	0.05	0.04	0.05
<b>Net profit/loss</b>	0.87	1.02	0.97	1.20	1.38	1.09
Note: 1) Figures for 1998 are annualized. 2) In 1996 there was a change in accounting methodology, which may affect sometimes the exact comparability of the information for 1994-95 with that of 1996-98.						
Source: Own calculations based on data of Superintendencia del Sistema Financiero de Costa Rica (SUGEF).						

<i>Percentages</i>						
	1994	1995	1996	1997	1998	Average
					(march)	
iL	33.03	36.70	26.27	25.66	22.09	28.75
iD	17.72	23.88	17.29	14.93	11.24	17.01
Spread	15.30	12.82	8.98	10.73	10.85	11.74
r*iL	8.26	10.16	4.55	4.11	3.31	6.08
OC/D	6.35	7.67	7.43	6.95	7.55	7.19
LL/D	1.63	2.21	2.32	2.21	2.13	2.10
P/D	1.17	1.47	1.58	1.75	2.01	1.60
NI/D	2.91	3.34	4.97	3.82	1.02	3.21
residual	0.80	-5.37	-1.92	-0.46	-3.13	-2.02
Note: 1) Rates for 1998 are a weighted average of the different lending and deposit rates. The rest of the years present the interest rates charged by banks on loans to prime customers and the interest rate paid by banks for time deposits. 2) Loan loss charges were estimated from the information contained in the balance sheet (provisioning), as it is more representative given the construction of the loan loss item ("Charges, fines, penalties and estimations"). 3) The reserve requirement cost only includes the requirements on obligations on domestic currency, and it is an arithmetic average of the different requirements by term of obligation.						
Source: Own calculations based on data of Superintendencia del Sistema Financiero de Costa Rica (SUGEF) and Banco Central de Costa Rica.						

<b>Table 2.a: El Salvador: Income statement items in terms of end-of-period assets</b>				
<i>Percentages</i>				
	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>Average</b>
Interest income	12.81	13.42	11.34	12.52
Interest expense	8.73	9.07	7.56	8.46
<b>Interest margin</b>	<b>4.08</b>	<b>4.34</b>	<b>3.78</b>	<b>4.07</b>
Net fee income	0.19	0.08	0.06	0.11
Net other income	0.64	0.48	0.43	0.52
<b>Net non-interest income</b>	<b>0.82</b>	<b>0.56</b>	<b>0.49</b>	<b>0.63</b>
<b>Loan loss charges</b>	<b>0.11</b>	<b>0.10</b>	<b>0.20</b>	<b>0.14</b>
<b>Operating expenses</b>	<b>3.09</b>	<b>3.19</b>	<b>3.15</b>	<b>3.14</b>
Extraordinary items	0.04	0.08	0.08	0.07
<b>Profit before taxes</b>	<b>1.74</b>	<b>1.69</b>	<b>1.01</b>	<b>1.48</b>
Income tax	0.13	0.17	0.26	0.19
<b>Net profit/loss</b>	<b>1.62</b>	<b>1.52</b>	<b>0.75</b>	<b>1.30</b>
Source: Own calculations based on information of Superintendencia del Sistema Financiero de El Salvador.				

<b>Table 2.b: El Salvador: Structure of the interest rate spread</b>				
<i>Percentages</i>				
	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>Average</b>
iL*	20.36	19.32	17.90	19.19
iD*	10.63	10.06	9.07	9.92
Spread	9.73	9.26	8.83	9.27
r*iL	4.07	4.11	3.66	3.95
OC/D	4.19	4.31	4.30	4.27
LL/D	0.16	0.14	0.27	0.19
P/D	2.37	2.29	1.39	2.01
NI/D	1.18	0.87	0.79	0.94
residual	0.12	-0.71	0.00	-0.20
*Note: The interest rates utilized are constructed from the income statement, such that iL=interest income/total loans, iD=financial expenses/total deposits+other liabilities, as the actual interest rate data did not appear to be appropriate (representative of the overall lending portfolio and deposit structure) for this exercise.				
Source: Own calculations based on information of Superintendencia del Sistema Financiero de El Salvador and Banco de Reserva de El Salvador.				

**Table 3.a: Guatemala: Income statement items in terms of end-of-period assets**

<i>Percentages</i>										
	1990	1991	1992	1993	1994	1995	1996	1997	1998	Average
									(march)	
Interest income	12.89	12.63	11.56	13.84	11.72	13.25	14.92	11.63	11.33	12.64
Interest expense	7.54	7.68	6.43	7.84	6.14	6.42	7.94	5.66	5.63	6.81
<b>Interest margin</b>	5.35	4.94	5.13	6.01	5.58	6.83	6.98	5.98	5.70	5.83
Net fee income	0.86	0.76	0.51	0.29	0.47	0.49	0.48	0.55	0.60	0.56
Net other income	-0.04	-0.02	-0.02	0.01	0.01	0.02	0.02	0.01	0.03	0.00
<b>Net non-interest income</b>	0.83	0.74	0.49	0.29	0.49	0.51	0.50	0.55	0.63	0.56
<b>Operating expenses</b>	4.49	4.01	4.56	5.14	4.96	5.65	6.01	5.31	5.18	5.04
Extraordinary items	0.96	0.83	1.06	0.64	0.62	-0.55	0.04	0.05	0.06	0.41
<b>Profit before taxes</b>	2.64	2.51	2.12	1.80	1.72	1.14	1.51	1.26	1.22	1.77
Income tax	0.47	0.39	0.32	0.19	0.19	0.33	0.36	0.26	0.02	0.28
<b>Net profit/loss</b>	2.17	2.12	1.80	1.61	1.54	0.81	1.16	1.00	1.20	1.49
Source: Own calculations based on data of Superintendencia de Bancos de Guatemala.										

**Table 3.b: Guatemala: Structure of the interest rate spread**

<i>Percentages</i>										
	1990	1991	1992	1993	1994	1995	1996	1997	1998	Average
									(march)	
iL	22.60	22.10	21.20	25.70	20.20	22.20	22.40	16.40	16.22	21.00
iD	14.50	14.00	11.30	13.70	7.60	10.60	11.00	6.40	5.42	10.50
Spread	8.10	8.10	9.90	12.00	12.60	11.60	11.40	10.00	10.79	10.50
r*iL	4.52	4.42	4.24	5.53	2.83	3.11	3.14	2.30	2.27	3.59
OC/D	6.07	5.23	6.00	7.17	7.27	9.25	10.73	8.57	8.23	7.61
LL/D	0.72	0.46	0.49	0.53	0.53	0.84	1.24	1.30	1.37	0.83
P/D	3.57	3.28	2.78	2.52	2.52	1.86	2.70	2.04	1.93	2.58
NI/D	2.41	2.06	2.04	1.30	1.61	-0.05	0.96	0.97	1.10	1.38
residual	-4.37	-3.23	-1.57	-2.44	1.07	-3.51	-5.45	-3.23	-1.91	-2.74
Note: 1) Figures for 1998 are annualized. 2) Loan loss charges were estimated from the information contained in the balance sheet, as Guatemalan banks follow accounting rules which do not include these charges in the income statement, but rather penalize capital in the balance sheet (provisioning). 3) Interest rates are the weighted average rates published by the Banco de Guatemala.										
Source: Own calculations based on data of Superintendencia de Bancos de Guatemala.										

<b>Table 4.a: Honduras: Income statement items in terms of end-of-period assets</b>						
<i>Percentages</i>						
		<b>1996</b>	<b>1997</b>	<b>Average</b>		
Interest income		14.09	13.55	13.82		
Interest expense		7.67	7.49	7.58		
<b>Interest margin</b>		6.42	6.06	6.24		
Net fee income		0.70	0.72	0.71		
Net other income		0.79	0.98	0.89		
<b>Net non-interest income</b>		1.50	1.70	1.60		
<b>Operating expenses</b>		5.26	5.18	5.22		
Extraordinary items		0.04	-0.11	-0.03		
<b>Profit before taxes</b>		2.70	2.48	2.59		
Income tax		0.89	0.85	0.87		
<b>Net profit/loss</b>		1.81	1.63	1.72		
Note: Loan loss charges are included in the income statement but the necessary break-up was not available.						
Source: Own calculations based on information of Banco Central de Honduras and Superintendencia de Bancos de Honduras.						

<b>Table 4.b: Honduras: Structure of the interest rate spread</b>						
<i>Percentages</i>						
		<b>1996</b>	<b>1997</b>	<b>Average</b>		
iL		29.54	32.12	30.83		
iD		11.65	15.45	13.55		
Spread		17.89	16.67	17.28		
r*iL		9.67	2.99	6.33		
OC/D		10.51	9.71	10.11		
LL/D		2.33	2.00	2.16		
P/D		3.61	3.05	3.33		
NI/D		3.07	2.99	3.03		
residual		-5.16	1.92	-1.62		
Note: 1) Loan loss charges were estimated from the information contained in the balance sheet (provisioning), as the necessary break-up in the income statement was not available to obtain the information. 2) Interest rates are weighted averages published by Banco Central de Honduras.						
Source: Own calculations based on information of Banco Central de Honduras and Superintendencia de Bancos de Honduras.						

<b>Table 5.a: Nicaragua: Income statement items in terms of end-of-period assets</b>									
<i>Percentages</i>									
	1992	1993	1994	1995	1996	1997	1998	Average	
							(march)		
Interest income	5.73	7.84	7.11	9.54	9.51	9.27	11.36	8.62	
Interest expense	3.13	4.09	4.49	5.28	5.22	5.62	6.67	4.93	
<b>Interest margin</b>	<b>2.60</b>	<b>3.75</b>	<b>2.62</b>	<b>4.26</b>	<b>4.29</b>	<b>3.64</b>	<b>4.69</b>	<b>3.69</b>	
Net fee income	3.23	2.45	2.72	1.62	1.70	1.52	1.62	2.12	
Net other income	1.12	1.64	0.55	0.44	0.42	0.38	0.05	0.65	
<b>Net non-interest income</b>	<b>4.34</b>	<b>4.09</b>	<b>3.28</b>	<b>2.06</b>	<b>2.12</b>	<b>1.90</b>	<b>1.67</b>	<b>2.78</b>	
Loan loss charges	0.06	0.93	0.49	1.00	0.70	0.43	0.49	0.59	
<b>Operating expenses</b>	<b>6.69</b>	<b>5.81</b>	<b>4.98</b>	<b>4.81</b>	<b>4.77</b>	<b>4.35</b>	<b>4.99</b>	<b>5.20</b>	
Extraordinary items	0.02	0.05	0.11	-0.02	-0.04	0.13	0.19	0.06	
<b>Profit before taxes</b>	<b>0.20</b>	<b>1.15</b>	<b>0.54</b>	<b>0.49</b>	<b>0.90</b>	<b>0.90</b>	<b>1.07</b>	<b>0.75</b>	
Income tax	0.05	0.21	0.16	0.23	0.13	0.09	0.07	0.13	
<b>Net profit/loss</b>	<b>0.16</b>	<b>0.94</b>	<b>0.38</b>	<b>0.26</b>	<b>0.77</b>	<b>0.81</b>	<b>1.00</b>	<b>0.62</b>	
Note: Figures for 1998 are annualized.									
Source: Own calculations based on data of Banco Central de Nicaragua and Superintendencia de Bancos.									

<b>Table 5.b: Nicaragua: Structure of the interest rate spread</b>									
<i>Percentages</i>									
	1992	1993	1994	1995	1996	1997	1998	Average	
							(march)		
iL	19.57	19.16	16.77	17.58	19.11	19.64	19.54	18.77	
iD	8.59	8.25	8.39	8.76	9.35	8.56	8.48	8.62	
Spread	10.98	10.91	8.38	8.82	9.76	11.08	11.07	10.14	
r*iL	3.11	3.31	2.95	3.29	4.04	4.18	3.32	3.46	
OC/D	13.88	12.21	8.98	8.03	7.03	5.43	6.23	8.83	
LL/D	0.13	1.96	0.89	1.67	1.03	0.54	0.61	0.97	
P/D	0.38	2.32	0.77	0.84	1.38	0.96	1.10	1.11	
NI/D	9.05	8.71	6.12	3.40	3.06	2.54	2.32	5.03	
residual	2.52	-0.17	0.91	-1.60	-0.67	2.51	2.13	0.80	
Note: 1) Figures for 1998 are annualized. 2) Though loan loss charges in the income statement may not be fully representative of the quality of the loan portfolio, there was no data available on provisioning levels for the period which could be used to obtain a better estimate. 3) Interest rates are a weighted average of actual rates.									
Source: Own calculations based on data of Banco Central de Nicaragua and Superintendencia de Bancos.									

**Table 6.a: Central America: Income statement items in terms of end-of-period assets in 1997**

<i>Percentages</i>							
	Costa Rica	El Salvador	Guatemala	Honduras	Nicaragua	Average	
Interest income	13.80	11.34	11.63	13.55	9.27	11.92	
Interest expense	9.86	7.56	5.66	7.49	5.62	7.24	
<b>Interest margin</b>	3.94	3.78	5.98	6.06	3.64	4.68	
Net fee income	1.69	0.06	0.55	0.72	1.52	0.91	
Net other income	0.84	0.43	0.01	0.98	0.38	0.53	
<b>Net non-interest income</b>	2.54	0.49	0.55	1.70	1.90	1.44	
<b>Loan loss charges</b>	0.46	0.20			0.43	0.36	
<b>Operating expenses</b>	4.96	3.15	5.31	5.18	4.35	4.59	
Extraordinary items	0.19	0.08	0.05	-0.11	0.13	0.07	
<b>Profit before taxes</b>	1.25	1.01	1.26	2.48	0.90	1.38	
Income tax	0.05	0.26	0.26	0.85	0.09	0.30	
<b>Net profit/loss</b>	1.20	0.75	1.00	1.63	0.81	1.08	

Source: Own calculations based on information of central banks and superintendencies of the different countries.

**Table 6.b: Central America: Structure of the interest rate spread (1997)**

<i>Percentages</i>							
	Costa Rica	El Salvador*	Guatemala	Honduras	Nicaragua	Average	
iL	25.66	17.90	16.40	32.12	19.64	22.34	
iD	14.93	9.07	6.40	15.45	8.56	10.88	
<b>Spread</b>	10.73	8.83	10.00	16.67	11.08	11.46	
r*iL	4.11	3.66	2.30	2.99	4.18	3.45	
OC/D	6.95	4.30	8.57	9.71	5.43	6.99	
LL/D	2.21	0.27	1.30	2.00	0.54	1.26	
P/D	1.75	1.39	2.04	3.05	0.96	1.84	
NI/D	3.82	0.79	0.97	2.99	2.54	2.22	
<b>residual</b>	-0.46	0.00	-3.23	1.92	2.51	0.15	

\*Note: The interest rates for El Salvador are constructed from the income statement, such that  $iL$ =interest income/total loans,  $iD$ =financial expenses/total deposits+other liabilities, as the actual interest rate data did not appear to be appropriate (representative of the overall lending portfolio and deposit structure) for this exercise.

Source: Own calculations based on information of central banks and superintendencies of the different countries.

**Table 7: Summary of Regression Results: Spread (models A and B)**

	Operating Cost Ratio	Reserve Cost Ratio	Non-performing Loan Ratio
<b>Costa Rica</b>	+ (31%)	- (17-18%)	Not significant
<b>El Salvador</b>	+ (28-41%)	+ (4%)	Not significant
<b>Guatemala</b>	+ (9-10%)	Not significant	- (9%)
<b>Honduras</b>	+ (42-43%)	+ (6-7%)	Not significant
<b>Nicaragua</b>	+ (31-34%)	Not significant.	+ (30-32%)

Significance is determined at  $p < 10\%$ .

*For Tables 1c –5c and Tables I-V*

**DEFINITION OF VARIABLES:**

Spread = Implicit lending interest rate – Implicit deposit interest rate

Implicit deposit interest rate = Interest income / total loans

Implicit deposit interest rate = Financial expense / total deposits + other liabilities (credit lines, debts)

Operating cost ratio = Administrative expenses / total loans

Reserve requirement ratio = Liquid Assets / total deposits + other liabilities (credit lines, debts)

Non-performing loans ratio = Past-due loans / total loans

Inflation and Economic growth based on past monthly rates

**Table 1.c: Costa Rica: Regression variables summary statistics (annualized)**

		1996QIII	1996QIV	1997QI	1997QII	1997QIII	1997QIV	1998QI
Implicit lending interest rate	ave	0.284	0.281	0.288	0.312	0.261	0.249	0.250
	max	0.411	0.404	0.402	0.826	0.650	0.509	0.450
	min	0.181	0.223	0.206	0.116	0.109	0.122	0.116
Implicit deposit interest rate	ave	0.210	0.202	0.193	0.213	0.185	0.182	0.167
	max	0.281	0.257	0.276	0.444	0.398	0.455	0.447
	min	0.056	0.035	0.023	0.073	0.073	0.066	0.053
Spread	ave	0.074	0.079	0.095	0.099	0.076	0.067	0.082
	max	0.229	0.223	0.263	0.382	0.309	0.226	0.245
	min	-0.049	-0.013	-0.040	0.000	-0.043	-0.080	-0.038
Operating cost ratio	ave	0.169	0.153	0.159	0.152	0.142	0.124	0.123
	max	0.833	0.384	0.612	0.618	0.580	0.425	0.358
	min	0.068	0.061	0.066	0.039	0.042	0.049	0.048
Reserve requirement ratio	ave	0.118	0.116	0.125	0.149	0.156	0.167	0.146
	max	0.358	0.363	0.180	0.234	0.304	0.377	0.285
	min	0.000	0.000	0.091	0.099	0.100	0.096	0.086
Non-performing loans ratio	ave	0.052	0.052	0.066	0.039	0.037	0.034	0.029
	max	0.146	0.132	0.582	0.131	0.134	0.126	0.086
	min	0.000	0.002	0.002	0.002	0.005	0.001	0.002
Capital-to-assets ratio	ave	0.168	0.159	0.146	0.142	0.135	0.126	0.134
	max	0.373	0.336	0.337	0.376	0.321	0.228	0.280
	min	0.036	0.038	0.041	0.044	0.046	0.048	0.047
Assets-to-total industry assets	ave	0.036	0.038	0.036	0.036	0.036	0.038	0.037
	max	0.408	0.418	0.382	0.373	0.372	0.371	0.368
	min	0.001	0.001	0.001	0.001	0.002	0.002	0.002
Inflation rate		0.123	0.137	0.153	0.106	0.063	0.109	0.148
Economic growth		0.038	0.027	0.030	0.068	0.051	0.040	0.048
Number of banks included*		28	26	28	28	28	26	27
		(3 public)	(3 public)	(3 public)	(3 public)	(3 public)	(3 public)	(3 public)
*The number of banks included in the regressions is determined by the number of banks reporting information in the particular time period and/or some other data availability limitation or irregularity.								
Source: Own calculations based on data from Superintendencia del Sistema Financiero de Costa Rica (SUGEF) and Banco Central de Costa Rica.								

**Table 2.c: El Salvador: Regression variables summary statistics (annualized)**

		1995QI	1995QII	1995QIII	1995QIV	1996QI	1996QII	1996QIII	1996QIV	1997QI	1997QII	1997QIII	1997QIV
Implicit lending interest rate	ave	0.186	0.187	0.190	0.204	0.215	0.211	0.202	0.193	0.180	0.184	0.180	0.179
	max	0.231	0.230	0.242	0.322	0.412	0.329	0.363	0.306	0.304	0.325	0.300	0.308
	min	0.109	0.132	0.141	0.136	0.137	0.137	0.147	0.128	0.114	0.108	0.126	0.123
Implicit deposit interest rate	ave	0.101	0.104	0.105	0.106	0.112	0.108	0.106	0.101	0.094	0.086	0.095	0.091
	max	0.153	0.177	0.129	0.137	0.137	0.134	0.136	0.123	0.115	0.108	0.123	0.122
	min	0.040	0.064	0.077	0.065	0.081	0.072	0.074	0.073	0.067	0.058	0.058	0.055
Spread	ave	0.085	0.084	0.085	0.097	0.104	0.103	0.096	0.093	0.086	0.097	0.085	0.088
	max	0.131	0.108	0.140	0.202	0.275	0.200	0.227	0.185	0.195	0.218	0.182	0.197
	min	0.006	0.021	0.047	0.067	0.056	0.065	0.051	0.055	0.047	0.050	0.050	0.050
Operating cost ratio	ave	0.064	0.063	0.057	0.061	0.057	0.060	0.059	0.061	0.059	0.059	0.056	0.065
	max	0.146	0.140	0.141	0.138	0.168	0.146	0.116	0.122	0.148	0.159	0.126	0.163
	min	0.040	0.035	0.036	0.044	0.033	0.037	0.037	0.044	0.041	0.036	0.037	0.037
Reserve requirement ratio	ave	0.391	0.352	0.315	0.319	0.338	0.362	0.362	0.329	0.326	0.289	0.232	0.249
	max	0.580	0.612	0.445	0.422	0.502	0.530	0.582	0.409	0.477	0.392	0.379	0.350
	min	0.260	0.236	0.242	0.232	0.237	0.241	0.161	0.190	0.202	0.150	0.111	0.164
Non-performing loans ratio	ave	0.042	0.042	0.043	0.033	0.041	0.034	0.039	0.044	0.052	0.044	0.047	0.049
	max	0.361	0.363	0.371	0.272	0.318	0.179	0.235	0.343	0.386	0.346	0.352	0.354
	min	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Capital-to-assets ratio	ave	0.118	0.114	0.106	0.102	0.099	0.096	0.099	0.100	0.097	0.095	0.101	0.094
	max	0.427	0.423	0.380	0.362	0.363	0.351	0.318	0.338	0.328	0.316	0.312	0.185
	min	0.051	0.056	0.047	0.060	0.056	0.057	0.064	0.064	0.060	0.063	0.061	0.065
Assets-to-total industry assets	ave	0.071	0.067	0.067	0.067	0.067	0.066	0.063	0.063	0.063	0.063	0.063	0.063
	max	0.226	0.223	0.215	0.218	0.226	0.217	0.215	0.210	0.213	0.209	0.215	0.216
	min	0.004	0.003	0.006	0.007	0.008	0.008	0.004	0.005	0.007	0.007	0.006	0.006
Inflation rate		0.122	0.089	0.187	0.040	0.092	0.107	0.099	-0.010	0.095	0.009	-0.009	-0.017
Economic growth		0.093	0.115	0.064	0.051	0.009	-0.027	0.000	0.035	0.036	0.065	0.042	0.027
Number of banks included*		14	15	15	15	15	15	16	16	16	16	16	16
		(1 public)	(1 public)	(1 public)	(1 public)	(1 public)	(1 public)	(1 public)	(1 public)	(1 public)	(1 public)	(1 public)	(1 public)

\*The number of banks included in the regressions is determined by the number of banks reporting information in the particular time period and/or some other data availability limitation or irregularity.

Source: Own calculations based on data from Superintendencia del Sistema Financiero de El Salvador and Banco de Reserva de El Salvador.

**Table 3.c: Guatemala: Regression variables summary statistics (annualized)**

		Jun-97	Jul-97	Aug-97	Sep-97	Oct-97	Nov-97	Dec-97	Jan-98	Feb-98	Mar-98	Apr-98	May-98
Implicit lending interest rate	ave	0.179	0.163	0.151	0.162	0.146	0.142	0.179	0.144	0.157	0.165	0.154	0.162
	max	0.288	0.261	0.315	0.300	0.294	0.303	0.294	0.602	0.595	0.661	0.655	0.668
	min	0.108	0.093	0.082	0.091	0.071	0.088	0.056	0.085	0.083	0.086	0.083	0.061
Implicit deposit interest rate	ave	0.072	0.070	0.062	0.060	0.056	0.054	0.058	0.055	0.057	0.060	0.054	0.057
	max	0.128	0.158	0.155	0.118	0.113	0.108	0.139	0.115	0.121	0.150	0.131	0.118
	min	0.033	0.039	0.008	0.020	0.019	0.018	0.018	0.017	0.015	0.016	0.016	0.017
Spread	ave	0.107	0.093	0.089	0.102	0.090	0.089	0.121	0.089	0.100	0.105	0.100	0.105
	max	0.196	0.152	0.217	0.244	0.216	0.205	0.222	0.487	0.508	0.511	0.524	0.564
	min	0.048	0.034	0.011	0.047	0.025	0.041	0.028	0.039	0.041	0.035	0.039	0.024
Operating cost ratio	ave	0.134	0.129	0.133	0.133	0.130	0.142	0.196	0.146	0.153	0.167	0.155	0.153
	max	0.296	0.215	0.449	0.262	0.254	0.483	1.056	0.920	0.880	0.924	0.832	0.673
	min	0.056	0.063	0.066	0.057	0.061	0.057	0.052	0.048	0.057	0.057	0.057	0.056
Reserve requirement ratio	ave	0.130	0.148	0.143	0.127	0.144	0.125	0.123	0.146	0.124	0.149	0.136	0.128
	max	0.205	0.280	0.245	0.184	0.289	0.172	0.176	0.246	0.177	0.482	0.233	0.231
	min	0.017	0.023	0.052	0.018	0.017	0.019	0.013	0.019	0.013	0.019	0.017	0.013
Non-performing loans ratio	ave	0.108	0.108	0.106	0.091	0.096	0.091	0.067	0.074	0.077	0.065	0.069	0.074
	max	0.445	0.411	0.386	0.355	0.364	0.325	0.253	0.265	0.264	0.314	0.379	0.376
	min	0.000	0.011	0.000	0.001	0.001	0.000	0.014	0.001	0.006	0.000	0.000	0.000
Capital-to-assets ratio	ave	0.088	0.082	0.086	0.089	0.085	0.085	0.087	0.098	0.099	0.120	0.109	0.106
	max	0.240	0.145	0.225	0.220	0.211	0.204	0.210	0.571	0.471	0.868	0.646	0.508
	min	0.040	0.045	0.037	0.038	0.038	0.037	0.048	0.047	0.049	0.049	0.048	0.049
Assets-to-total industry assets	ave	0.032	0.037	0.032	0.032	0.032	0.032	0.032	0.031	0.031	0.030	0.030	0.030
	max	0.091	0.090	0.090	0.090	0.089	0.087	0.090	0.094	0.096	0.097	0.097	0.096
	min	0.005	0.005	0.004	0.004	0.005	0.005	0.005	0.001	0.001	0.001	0.001	0.001
Inflation rate		0.006	0.054	0.125	0.072	0.061	0.044	0.044	0.148	0.068	0.079	0.088	0.061
Economic growth		0.042	0.059	0.017	0.042	0.025	0.042	0.025	0.113	0.055	0.051	0.154	0.140
Number of banks included*		31	31	31	31	31	31	31	32	32	33	33	33
		(2 public)	(2 public)	(2 public)	(2 public)	(2 public)	(2 public)	(1 public)	(1 public)	(1 public)	(1 public)	(1 public)	(1 public)

\*The number of banks included in the regressions is determined by the number of banks reporting information in the particular time period and/or some other data availability limitation or irregularity.

Source: Own calculations based on data from Banco de Guatemala and Superintendencia de Bancos de Guatemala.



**Table 4.c (cont.): Honduras: Regression variables summary statistics (annualized) 1997**

1997*		Mar-97	Apr-97	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97	Nov-97	Dec-97
Implicit lending interest rate	ave	0.376	0.370	0.368	0.363	0.369	0.349	0.346	0.346	0.332	0.381
	max	0.636	0.645	0.658	0.647	0.646	0.607	0.582	0.536	0.532	0.612
	min	0.247	0.205	0.190	0.213	0.235	0.230	0.230	0.230	0.230	0.262
Implicit deposit interest rate	ave	0.185	0.180	0.173	0.166	0.168	0.160	0.156	0.156	0.148	0.146
	max	0.425	0.430	0.458	0.412	0.384	0.367	0.355	0.316	0.308	0.306
	min	0.055	0.074	0.061	0.066	0.059	0.057	0.050	0.083	0.058	0.060
Spread	ave	0.191	0.190	0.195	0.198	0.201	0.189	0.190	0.190	0.183	0.235
	max	0.383	0.389	0.381	0.373	0.369	0.341	0.331	0.323	0.289	0.457
	min	-0.008	-0.028	-0.052	0.009	0.017	0.037	0.036	0.078	0.094	0.110
Operating cost ratio	ave	0.134	0.136	0.143	0.142	0.152	0.145	0.142	0.144	0.144	0.198
	max	0.202	0.221	0.230	0.228	0.264	0.244	0.220	0.217	0.271	0.387
	min	0.076	0.072	0.070	0.074	0.078	0.090	0.088	0.090	0.088	0.103
Reserve requirement ratio	ave	0.082	0.083	0.079	0.084	0.091	0.078	0.085	0.076	0.079	0.071
	max	0.131	0.143	0.122	0.145	0.206	0.130	0.177	0.116	0.125	0.111
	min	0.038	0.051	0.056	0.047	0.035	0.048	0.049	0.049	0.054	0.053
Non-performing loans ratio	ave	0.021	0.021	0.021	0.021	0.021	0.020	0.019	0.019	0.018	0.019
	max	0.051	0.051	0.053	0.051	0.051	0.053	0.053	0.052	0.050	0.049
	min	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002
Capital-to-assets ratio	ave	0.092	0.091	0.095	0.092	0.094	0.093	0.090	0.094	0.092	0.090
	max	0.181	0.172	0.189	0.176	0.182	0.184	0.174	0.176	0.180	0.159
	min	0.046	0.042	0.046	0.046	0.043	0.041	0.038	0.041	0.037	0.038
Assets-to-total industry assets	ave	0.051	0.052	0.051	0.051	0.049	0.049	0.049	0.049	0.049	0.050
	max	0.115	0.113	0.113	0.119	0.119	0.116	0.120	0.120	0.120	0.122
	min	0.015	0.015	0.016	0.014	0.015	0.014	0.015	0.014	0.014	0.014
Inflation rate		0.094	0.070	0.151	0.154	0.169	0.147	0.039	-0.032	0.092	0.026
Economic growth		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Number of banks included**		18	18	18	18	19	19	19	19	19	19
		(non public)***	(non public)	(non public)	(non public)	(non public)	(non public)	(non public)	(non public)	(non public)	(non public)

\*Data for the reserve requirement for Oct. 1996 are not available, and as a result this month is not included in the estimation. Data for Jan. and Feb. 1997 have been lost due to a technical problem at the Banco Central de Honduras.

\*\*The number of banks included in the regressions is determined by the number of banks reporting information in the particular time period and/or some other data availability limitation or irregularity.

\*\*\*Data on public banks are not available.

Source: Own calculations based on data from Banco Central de Honduras.



**Table 5.c (cont.): Nicaragua: Regression variables summary statistics (annualized) 1998**

1998		Jan-98	Feb-98	Mar-98	Apr-98	May-98
Implicit lending interest rate	ave	0.195	0.184	0.194	0.185	0.193
	max	0.310	0.259	0.255	0.249	0.265
	min	0.151	0.143	0.148	0.147	0.143
Implicit deposit interest rate	ave	0.078	0.070	0.078	0.078	0.076
	max	0.098	0.089	0.091	0.099	0.092
	min	0.057	0.055	0.057	0.056	0.058
Spread	ave	0.118	0.114	0.116	0.108	0.117
	max	0.217	0.178	0.164	0.161	0.173
	min	0.074	0.078	0.075	0.048	0.074
Operating cost ratio	ave	0.117	0.115	0.120	0.116	0.119
	max	0.197	0.176	0.184	0.172	0.180
	min	0.067	0.066	0.081	0.086	0.073
Reserve requirement ratio	ave	0.188	0.174	0.177	0.186	0.180
	max	0.228	0.194	0.216	0.226	0.213
	min	0.155	0.135	0.148	0.133	0.137
Non-performing loans ratio	ave	0.029	0.030	0.028	0.027	0.029
	max	0.096	0.086	0.087	0.090	0.088
	min	0.005	0.004	0.006	0.005	0.006
Capital-to-assets ratio	ave	0.054	0.052	0.051	0.053	0.054
	max	0.136	0.130	0.122	0.113	0.111
	min	0.030	0.029	0.027	0.025	0.026
Assets-to-total industry assets	ave	0.083	0.083	0.083	0.083	0.083
	max	0.139	0.132	0.131	0.129	0.128
	min	0.016	0.016	0.017	0.019	0.019
Inflation rate		0.104	0.173	0.121	0.254	0.244
Economic growth		N/A	N/A	N/A	N/A	N/A
Number of banks included*		12	12	12	12	12
		(2 public)	(2 public)	(2 public)	(2 public)	(2 public)
*The number of banks included in the regressions is determined by the number of banks reporting information in the particular time period or some other data availability limitation or irregularity.						
Definition of variables: Spread=Implicit lending interest rate-implicit deposit interest rate						
Implicit lending rate=Interest income/total loans						
Implicit deposit interest rate=Interest expense/total deposits						
Operating cost ratio=Administrative expenses/total loans						
Reserve requirement ratio=Reserves/total deposits						
Non-performing loans ratio=Past-due loans/total loans						
Inflation based on monthly rate						
Source: Own calculations based on data from Banco Central de Nicaragua and Superintendencia de Bancos de Nicaragua.						

**TABLE I: COSTA RICA**

Period: 1996: 09-1998:03

Periodicity: Quarterly

	Dependent variable							
	Spread				Lending Interest Rate			
	Model A	Model B	Model C	Model D	Model A	Model B	Model C	Model D
<b>Operating Cost Ratio</b>	0.313 0.000	0.313 0.000			0.381 0.000	0.398 0.000		
<b>Operating Cost Ratio: Industry Average</b>			-1.207 0.172	-2.916 0.625			0.440 0.671	-10.845 0.120
<b>Operation Cost Ratio: Individual Bank Deviation from Industry Average</b>			0.324 0.000	0.318 0.000			0.328 0.000	0.342 0.000
<b>Reserve Requirement Ratio</b>	-0.165 0.040	-0.182 0.031			-0.097 0.335	-0.083 0.440		
<b>Reserve Requirement Ratio: Industry Average</b>			-0.659 0.333	-0.172 0.924			-0.122 0.879	3.063 0.146
<b>Reserve Requirement Ratio: Individual Bank Deviation from Industry Average</b>			-0.201 0.019	-0.207 0.019			0.016 0.877	0.010 0.928
<b>Non-Performing Loans Ratio</b>	0.031 0.673	0.031 0.676			-0.052 0.574	-0.037 0.690		
<b>Non-Performing Loans Ratio: Industry Average</b>			1.882 0.021	3.510 0.536			1.236 0.196	11.968 0.071
<b>Non-Performing Loans Ratio: Individual Bank Deviation from Industry Average</b>			0.025 0.743	0.025 0.742			-0.138 0.135	-0.125 0.175
<b>Capital-to-Assets Ratio</b>		-0.050 0.578				-0.002 0.985		
<b>Capital-to-Assets Ratio: Industry Average</b>				1.726 0.772				11.374 0.102
<b>Capital-to-Assets Ratio: Individual Bank Deviation from Industry Average</b>				-0.008 0.928				-0.062 0.611
<b>Assets-to-Total Industry Assets Ratio</b>		0.008 0.936		0.024 0.806		-0.266 0.083		-0.260 0.089
<b>Inflation Rate</b>	0.212 0.093	0.211 0.095	-0.029 0.903	-0.133 0.757	0.239 0.118	0.243 0.111	0.149 0.593	-0.538 0.286
<b>Economic Growth</b>	0.765 0.007	0.756 0.008	1.605 0.005	2.313 0.359	0.904 0.009	0.912 0.008	1.571 0.020	6.263 0.033
<b>Constant</b>	0.000 0.988	0.009 0.782	0.201 0.311	0.043 0.940	0.167 0.000	0.171 0.000	0.086 0.711	-0.935 0.165

<b>No. of observations (7 time periods)</b>	191	191	191	191	191	191	191	191
<b>Hausman test (p-value)</b>	6.55 0.26	6.83 0.45	5.89 0.66	8.90 0.63	6.62 0.25	5.23 0.63	5.09 0.75	3.68 0.98
<b>Model</b>	Rando							
	m Random Random Random Random Random Random Random							
<b>R-squared within</b>	0.12	0.12	0.15	0.15	0.19	0.19	0.26	0.27
<b>R-squared between</b>	0.54	0.52	0.54	0.53	0.09	0.17	0.08	0.15
<b>R-squared overall</b>	0.34	0.33	0.35	0.35	0.09	0.14	0.11	0.17

**TABLE II: ECUADOR**

Period: 1995: 03-1997:12

Periodicity: Quarterly

	Dependent variable							
	Spread				Lending Interest Rate			
	Model A	Model B	Model C	Model D	Model A	Model B	Model C	Model D
<b>Operating Cost Ratio</b>	0.275 0.018	0.410 0.007			0.105 0.550	0.378 0.023		
<b>Operating Cost Ratio: Industry Average</b>			0.065 0.751	0.147 0.738			-0.333 0.368	-0.390 0.332
<b>Operation Cost Ratio: Individual Bank Deviation from Industry Average</b>			0.135 0.198	0.309 0.032			0.026 0.879	0.298 0.037
<b>Reserve Requirement Ratio</b>	0.037 0.082	0.043 0.069			0.035 0.287	0.092 0.000		
<b>Reserve Requirement Ratio: Industry Average</b>			0.060 0.399	0.053 0.530			0.126 0.339	0.131 0.091
<b>Reserve Requirement Ratio: Individual Bank Deviation from Industry Average</b>			0.008 0.735	0.024 0.341			-0.039 0.252	0.060 0.032
<b>Non-Performing Loans Ratio</b>	-0.017 0.711	0.038 0.436			0.002 0.972	-0.146 0.068		
<b>Non-Performing Loans Ratio: Industry Average</b>			-0.471 0.256	-0.416 0.450			-1.137 0.136	-0.602 0.231
<b>Non-Performing Loans Ratio: Individual Bank Deviation from Industry Average</b>			0.036 0.500	0.095 0.049			0.058 0.300	-0.049 0.531
<b>Capital-to-Assets Ratio</b>		-0.130 0.022				-0.188 0.003		
<b>Capital-to-Assets Ratio: Industry Average</b>				-0.039 0.882				0.284 0.237
<b>Capital-to-Assets Ratio: Individual Bank Deviation from Industry Average</b>				-0.158 0.007				-0.228 0.000
<b>Assets-to-Total Industry Assets Ratio</b>		0.004 0.930		-0.014 0.776		0.055 0.852		0.016 0.955
<b>Inflation Rate</b>	-0.014 0.545	-0.010 0.712	-0.053 0.326	-0.043 0.505	0.061 0.119	0.040 0.146	-0.037 0.710	-0.037 0.531
<b>Economic Growth</b>	-0.116 0.001	-0.105 0.011	-0.119 0.001	-0.120 0.024	-0.173 0.003	-0.142 0.001	-0.133 0.049	-0.187 0.000
<b>Constant</b>	0.071 0.000	0.070 0.000	0.097 0.004	0.096 0.026	0.179 0.000	0.165 0.000	0.228 0.000	0.177 0.000

<b>No. of observations (12 time periods)</b>	185	185	185	185	185	185	185	185
<b>Hausman test (p-value)</b>	0.66 0.99	11.08 0.14	0.66 0.99	9.13 0.61	7.14 0.21	43.77 0.00	3.10 0.93	30.37 0.00
<b>Model</b>	Random	Random	Random	Random	Random	Fixed	Random	Random
<b>R-squared within</b>	0.17	0.15	0.18	0.18	0.17	0.25	0.22	0.34
<b>R-squared between</b>	0.02	0.10	0.02	0.15	0.00	0.02	0.07	0.00
<b>R-squared overall</b>	0.05	0.10	0.06	0.13	0.04	0.00	0.11	0.04

**TABLE III: GUATEMALA**

Period: 1997: 06-1998: 05

Periodicity: Monthly

	Dependent variable							
	Spread				Lending Interest Rate			
	Model A	Model F	Model C	Model I	Model A	Model F	Model C	Model I
<b>Operating Cost Ratio</b>	0.089	0.096			0.107	0.115		
	0.001	0.001			0.001	0.001		
<b>Operating Cost Ratio: Industry Average</b>			0.489	0.448			0.790	0.796
			0.005	0.013			0.000	0.000
<b>Operation Cost Ratio: Individual Bank Deviation from Industry Average</b>			0.075	-0.062			0.099	-0.052
			0.009	0.427			0.003	0.564
<b>Reserve Requirement Ratio</b>	-0.037	0.006			0.039	0.090		
	0.523	0.922			0.573	0.218		
<b>Reserve Requirement Ratio: Industry Average</b>			0.020	0.069			0.250	0.184
			0.917	0.763			0.258	0.488
<b>Reserve Requirement Ratio: Individual Bank Deviation from Industry Average</b>			-0.034	0.006			0.004	0.050
			0.579	0.932			0.954	0.507
<b>Non-Performing Loans Ratio</b>	-0.090	-0.090			-0.048	-0.048		
	0.015	0.015			0.272	0.267		
<b>Non-Performing Loans Ratio: Industry Average</b>			0.608	0.534			1.291	1.383
			0.013	0.081			0.000	0.000
<b>Non-Performing Loans Ratio: Individual Bank Deviation from Industry Average</b>			-0.090	-0.092			-0.089	-0.085
			0.019	0.017			0.046	0.058
<b>Capital-to-Assets Ratio</b>		-0.157				-0.190		
		0.046				0.043		
<b>Capital-to-Assets Ratio: Industry Average</b>				-0.186				0.106
				0.637				0.718
<b>Capital-to-Assets Ratio: Individual Bank Deviation from Industry Average</b>				-0.140				-0.157
				0.076				0.088
<b>Assets-to-Total Industry Assets Ratio</b>		-1.495		-1.544		-1.859		-1.834
		0.062		0.053		0.051		0.048
<b>Inflation Rate</b>	-0.190	-0.193	-0.125	-0.141	-0.259	-0.263	-0.169	-0.163
	0.000	0.000	0.018	0.016	0.000	0.000	0.006	0.017
<b>Economic Growth</b>	-0.088	-0.094	-0.031	-0.034	-0.148	-0.155	-0.008	-0.023
	0.008	0.005	0.464	0.441	0.000	0.000	0.874	0.655
<b>Constant</b>	0.120	0.176	-0.015	0.064	0.176	0.245	-0.085	-0.024
	0.000	0.000	0.780	0.335	0.000	0.000	0.159	0.753

<b>No. of observations (12 time periods)</b>	380	380	380	380	380	380	380	380
<b>Hausman test (p-value)</b>	125.78	151.56	137.05	160.80	16.82	76.50	78.10	82.74
<b>Model</b>	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
<b>R-squared within</b>	0.15	0.17	0.17	0.19	0.18	0.20	0.24	0.25
<b>R-squared between</b>	0.67	0.16	0.62	0.13	0.57	0.21	0.58	0.22
<b>R-squared overall</b>	0.28	0.13	0.24	0.12	0.22	0.19	0.21	0.21

**TABLE IV: HONDURAS**  
**Period:** 1996: 01-1997: 12\*  
**Periodicity:** Monthly

	Dependent variable							
	Spread				Lending Interest Rate			
	Model A	Model B	Model C	Model D	Model A	Model B	Model C	Model D
<b>Operating Cost Ratio</b>	0.415 0.000	0.431 0.000			0.388 0.000	0.413 0.000		
<b>Operating Cost Ratio: Industry Average</b>			0.752 0.000	0.758 0.000			0.783 0.000	0.752 0.000
<b>Operation Cost Ratio: Individual Bank Deviation from Industry Average</b>			0.298 0.000	0.270 0.001			0.231 0.012	0.274 0.004
<b>Reserve Requirement Ratio</b>	0.064 0.002	0.070 0.001			0.072 0.004	0.085 0.001		
<b>Reserve Requirement Ratio: Industry Average</b>			-0.091 0.016	-0.087 0.022			-0.046 0.304	-0.052 0.253
<b>Reserve Requirement Ratio: Individual Bank Deviation from Industry Average</b>			0.144 0.000	0.173 0.000			0.131 0.000	0.158 0.000
<b>Non-Performing Loans Ratio</b>	-0.054 0.924	-0.095 0.867			1.303 0.137	0.998 0.265		
<b>Non-Performing Loans Ratio: Industry Average</b>			0.940 0.595	0.510 0.820			2.671 0.209	3.725 0.163
<b>Non-Performing Loans Ratio: Individual Bank Deviation from Industry Average</b>			0.603 0.256	0.745 0.330			2.002 0.026	1.713 0.060
<b>Capital-to-Assets Ratio</b>		-0.081 0.555				-0.125 0.468		
<b>Capital-to-Assets Ratio: Industry Average</b>				0.415 0.735				-1.164 0.425
<b>Capital-to-Assets Ratio: Individual Bank Deviation from Industry Average</b>				-0.100 0.488				-0.099 0.564
<b>Assets-to-Total Industry Assets Ratio</b>		0.316 0.328		0.706 0.133		0.766 0.167		1.080 0.054
<b>Inflation Rate</b>	-0.087 0.001	-0.089 0.001	0.010 0.785	0.008 0.819	-0.033 0.299	-0.037 0.250	0.037 0.391	0.040 0.354
<b>Economic Growth</b>	-	-	-	-	-	-	-	-
<b>Constant</b>	0.126 0.000	0.116 0.000	0.067 0.127	0.006 0.955	0.262 0.000	0.236 0.000	0.183 0.000	0.219 0.074

<b>No. of observations (21 time periods)</b>	391	391	391	391	391	391	391	391
<b>Hausman test (p-value)</b>	2.61 0.62	3.86 0.70	10.49 0.16	26.15 0.00	16.31 0.00	49.61 0.00	14.19 0.05	36.35 0.00
<b>Model</b>	Rando m	Rando m	Rando m	Fixed	Fixed	Fixed	Fixed	Fixed
<b>R-squared within</b>	0.11	0.14	0.22	0.23	0.09	0.10	0.14	0.15
<b>R-squared between</b>	0.24	0.31	0.13	0.08	0.09	0.04	0.03	0.00
<b>R-squared overall</b>	0.25	0.28	0.15	0.11	0.08	0.04	0.04	0.01

\* Due to a technical problem at the Banco Central de Honduras, data for January and February 1997 have been lost. Data on reserves for October 1996 are not available and as a result this month is not included in the estimation.

**TABLE V: NICARAGUA**

Period: 1997: 01-1998: 05

Periodicity: Monthly

	Dependent variable							
	Spread				Lending Interest Rate			
	Model A	Model B	Model C	Model D	Model A	Model B	Model C	Model D
<b>Operating Cost Ratio</b>	0.339	0.305			0.348	0.336		
	0.000	0.001			0.000	0.000		
<b>Operating Cost Ratio: Industry Average</b>			0.202	0.100			0.481	0.334
			0.374	0.676			0.029	0.157
<b>Operation Cost Ratio: Individual Bank Deviation from Industry Average</b>			0.279	0.279			0.243	0.247
			0.001	0.001			0.004	0.003
<b>Reserve Requirement Ratio</b>	-0.108	-0.087			-0.059	-0.060		
	0.113	0.219			0.381	0.389		
<b>Reserve Requirement Ratio: Industry Average</b>			0.069	0.039			0.116	0.073
			0.751	0.858			0.581	0.738
<b>Reserve Requirement Ratio: Individual Bank Deviation from Industry Average</b>			-0.166	-0.168			-0.124	-0.123
			0.018	0.019			0.073	0.083
<b>Non-Performing Loans Ratio</b>	0.316	0.302			0.149	0.201		
	0.002	0.010			0.152	0.067		
<b>Non-Performing Loans Ratio: Industry Average</b>			2.611	2.791			1.659	1.925
			0.001	0.000			0.024	0.012
<b>Non-Performing Loans Ratio: Individual Bank Deviation from Industry Average</b>			0.300	0.299			0.146	0.176
			0.003	0.005			0.152	0.100
<b>Capital-to-Assets Ratio</b>		0.093				0.091		
		0.299				0.282		
<b>Capital-to-Assets Ratio: Industry Average</b>				0.386				0.565
				0.137				0.028
<b>Capital-to-Assets Ratio: Individual Bank Deviation from Industry Average</b>				-0.020				0.016
				0.821				0.850
<b>Assets-to-Total Industry Assets Ratio</b>		0.131		-0.065		-0.260		-0.302
		0.406		0.496		0.007		0.002
<b>Inflation Rate</b>	-0.026	-0.023	-0.042	-0.035	-0.031	-0.029	-0.034	-0.024
	0.017	0.039	0.005	0.026	0.004	0.011	0.018	0.124
<b>Economic Growth</b>	-	-	-	-	-	-	-	-
<b>Constant</b>	0.088	0.072	0.011	0.006	0.163	0.179	0.073	0.083
	0.000	0.001	0.728	0.866	0.000	0.000	0.022	0.016

<b>No. of observations (12 time periods)</b>	203	203	203	203	203	203	203	203
<b>Hausman test (p-value)</b>	3.46	86.81	4.49	13.82	5.29	9.20	8.60	12.59
<b>Model</b>	Random	Fixed	Random	Random	Random	Random	Random	Random
<b>R-squared within</b>	0.13	0.14	0.21	0.22	0.13	0.14	0.21	0.23
<b>R-squared between</b>	0.60	0.44	0.63	0.64	0.55	0.60	0.62	0.64
<b>R-squared overall</b>	0.44	0.33	0.47	0.49	0.44	0.51	0.43	0.55