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Determinants of interest rate spread in Costa Rica

José Pablo Barquero Romero
Carlos Sequra Rodríguez

Fotografía de portada: "Presentes", conjunto escultórico en bronce, año 1983, del artista costarricense Fernando Calvo Sánchez. Colección del Banco Central de Costa Rica.

Determinantes del margen de intermediación financiera en Costa Rica^{*}

José Pablo Barquero Romero[†], Carlos Segura Rodríguez[‡]

Las ideas expresadas en este documento son de los autores y no necesariamente representan las del Banco Central de Costa Rica.

Resumen

El presente trabajo examina qué factores determinan el margen de intermediación financiera de los bancos en Costa Rica para el período 1994-2011. Este trabajo presta especial atención a cuáles de estos factores pueden ser influenciados por el Banco Central de Costa Rica a través de su política monetaria. Dentro de los resultados más importantes de las estimaciones se establece que los márgenes de intermediación tienen en el corto plazo una conducta inercial al alza. Existe poder de mercado y es utilizado para transferir costos a los consumidores; por ejemplo, cambios en el Encaje Mínimo Legal provocan aumentos en los márgenes de intermediación, igual efecto se observa ante incrementos en los costos de líneas de crédito en el exterior.

Palabras clave: Diferencial de tasas de interés, Tasas de interés.

Clasificación JEL: E43, E44, G21.

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[†] Departamento de Investigación Económica. División Económica, BCCR. barquerorj@bccr.fi.cr

[‡] Departamento de Investigación Económica. División Económica, BCCR. segurarc@bccr.fi.cr

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José Pablo Barquero Romero[§], Carlos Segura Rodríguez^{**}

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Abstract

This paper examines which factors determine the financial intermediation margin for Costa Rican banks for the period 1994-2011. This work pays special attention to which of these factors can be influenced by the Central Bank of Costa Rica through its monetary policy. Among the most important results from the estimations it is established that the intermediation margin tends in the short term to have an inertial tendency to increase. There is market power and it is used to transfer costs to consumers, for example, changes in the legal reserve requirements lead to increases in the intermediation margins, the same effect is observed when there are increases in the cost of foreign credit lines lead.

Key words: Interest rate spread, Interest rates.

JEL codes: E43, E44, G21.

[§] Department of Economic Research. Email address barquerorj@bccr.fi.cr

^{**} Department of Economic Research. Email address segurarc@bccr.fi.cr

Determinants of interest rate spread in Costa Rica: Panel Estimation

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Determinants of interest rate spread in Costa Rica: Panel Estimation

1. Background

The financial system of an economy has a strong and recognized correlation with the development of it. There is still a discussion on the channel or direction of the relationship of influence. However, few authors doubt the importance of improvements in the efficiency of the financial system for a country's economy.

In this sense there are many efficiency measures for a financial system, including the amount of loans or deposits as a ratio of GDP, the amount of financial institutions in the country or the margin of financial intermediation. This research will be focus on this last measurement and its main determinants. Barajas et al. (1999) held that a key variable for the financial system is the difference between interest rates on deposits and interest rates on credits. The authors note that when this difference is large, it is regarded as an impediment to the expansion and development of the financial intermediation system, since this discourages savers and limits funding to entrepreneurs/investors in loans.

This study was created to review which factors determine the margin of financial intermediation in the country and in particular, which of these factors can be influenced by the Central Bank through its monetary policy. In fact, the Organic Law of the Central Bank of Costa Rica mentions as a subsidiary objective in the Article 2, Paragraph d, "To promote a stable, efficient and competitive system of financial intermediation".

Furthermore, this study seeks to contribute to the 2010-2014 Strategic Plan, which mentions as one of its institutional objectives: stability, competitiveness and efficiency in financial intermediation system, in particular to reduce the financial intermediation margin by 20% during the period 2010 -2014, without disturbing the stability of the domestic financial system, and also mentions as the first step to create a measurement of the financial intermediation margin by components.

Moreover, as a request of the Board the Economic Division, had already been working on the topic in the study made by Rojas and Slon (2010). In contrast to this study, the current project has

an optimization rather than accounting theoretical approach and includes panel estimations for the total of banks.

The main objective of this study is to analyze the evolution and factors that influence the financial intermediation margin, with special attention in those who may be affected by the Central Bank.

2. Previous Studies

The literature on the subject of the determinants of the interest rate spreads is diverse in its approaches and applications. In this summary of the pertinent literature, methods and findings will be reviewed in studies ranging from attempts to determine the factors that define the pure intermediation margin, to studies that seek to identify whether a country's institutional factors determine it. These studies will be reviewed in the cases of a single country or a group of countries at specific times or over time. All of this revision is given in order to comprehend the phenomenon and to gain perspective into the most appropriate approach for the case of Costa Rica.

First, Demirguc-Kunt et al. (2004) study the relationship between the regulatory framework, market structure and institutions, with the cost of financial intermediation, measured as the overhead of the bank. The authors state that the use of the net margin interest rate approaches the problem in the traditional lending and deposit operations of the bank as well as the competitive nature of the market, while the general and administrative expenses more closely reflect the pure efficiency of the bank. However, the results show that the effects of the variables are indifferent in both cases.

In addition Demirguc-Kunt et al. (2004) execute tests to evaluate the consistency of the results including control variables for several theories of the role of macroeconomic policies on the margins of interest rates. The specification presented in this paper contains a measure for the concentration of the banking sector in the country, a vector of variables specific to the characteristics of each bank, a vector of macroeconomic and financial control variables, and a vector of indicators of institutional development in the country.

The results for this case show that the own bank characteristics explain a substantial part of the financial intermediation costs. High intermediation margins tend to be associated with small

banks, banks with low fractions of liquid assets, banks with relatively small amounts of capital, banks with lower service revenue and banks with large market share. Additionally, the authors find that harder regulations lead to higher margins.

Moreover, Ho and Saunders (1981) in their work about the determinants of the intermediation margins present a model where the bank is seen as a trader who demands a type of deposit and offers a type of credit; and to perform these functions it faces a high degree of uncertainty and therefore a cost. This cost is explained mainly because deposits are seen as stochastic, thus they arrive at different times to the demand for loans. The stochastic nature of the deposits makes banks incur in to costs in order to maintain a certain position in the markets of liquidity. The model indicates that the optimal intermediation margin depends on four factors: the degree of risk aversion of the bank, the market structure in which the bank operates, the average size of transactions undertaken by the bank and the variability of rates of interest, rather than its level. The authors also mention that while this transaction cost linked to the uncertainty exists, interest rate spread will exist too.

In another document in question, Demirguc-Kunt and Huizinga (1999) present international evidence on the determinants of the interest rate spread but this time related to the profitability of banks. The authors argue that financial intermediation directly affects the return on savings and investment, and that the difference between these two reflects the margins of intermediation, without leaving aside transaction costs and taxes. Therefore, the net interest margin can be interpreted as an efficiency indicator in resource allocation in a financial system, this is the motivation for the authors to investigate how the tax system, the structure of the financial system and financial regulations affect the interest rate spread. This study is innovative because it includes tax indicators and a good part of the variables are weighted by GDP per capita to test whether the country's development level also matters. Other results show that banks with not banking income relatively high are less profitable, and also banks which depend on deposits for their funding are also less profitable, this is because both involve a greater number of subsidiaries. The nature of ownership of banks also has a significant effect on the intermediation margins; foreign banks have higher margins than domestic banks in developing countries.

The study also finds that the inflation rate is associated with higher margins, because banks tend to raise more revenue than costs when inflation increases, consistent with these finding higher interest rates are strongly associated with higher intermediation margins. This effect is more noticeable in developing countries where rates on deposits are lower than market or even zero. Finally, banks with greater market concentration also tend to have higher margins and profits.

Doliente (2005) in his study of the intermediation margins in South Asia suggests that when using a data panel for different countries can be made two kinds of estimations, one for the observed margin of intermediation and one for the pure margin of intermediation; the first estimation includes the intercept variable that will then be used to calculate the pure intermediation margin. It also includes dummy variables to capture the effects of each year and financial variables for each entity. After making this first estimation, following Saunders and Schumacher (2000) the pure margin is calculated as the intercept variable plus all the significant dummy variables from the first estimation. Next the authors proceed to perform the regression for the pure margin explained by the standard deviations of a group of interest rates and another group of variables included to control for each country's financial market structure. This drives to the conclusion that the variable that best explains the pure intermediation margin is the volatility of interest rates.

Carbó Valverde y Rodríguez Fernández (2006) in their work on the determinants of interest rates spread in the European banking system focus on testing different measures of interest rate spread (dependent variable) to see if this produces changes in the significant explanatory variables. After testing for specifications where the margin is measured as the difference between the deposit rate and lending rate, the difference between the rate of credit and market rate, the gross margin, the Lerner index and the over price on marginal costs, they find that the explanatory variables do not change significantly with the change of definition.

Finally, focusing on the theoretical modeling of the problem, Barajas et al. (1999) in his study on margin of intermediation in the Colombian banking system suggest a theoretical model, similar to the one that will be followed in this study and originally introduced by Bresnahan (1989), which examines the competitiveness of a bank but applied specifically to the determination of margin of intermediation. The authors present an equation for the profit maximization problem faced by the bank and show the relationship between the loan interest rate, the rate for deposits and the marginal costs of intermediation. The resulting representation is transformed so that the implied

coefficients can be calculated as a regression, allowing the final explicit specification to depend on the assumptions made by the authors regarding the roles of cost and deposit markets and credits.

3. Theoretical Model

One way to explain the existence of an interest rate spread for all banks in a financial system is following the classical representation similar to model presented by Gonzalez-Vega (1984), which derives the relationship between interest rate and lending costs¹.

The expected benefits for the bank would be represented by:

$$E\pi_i = r \sum^n L_{si} - \sum^n EC_i(L_{si}, X_i) \quad (1)$$

Where the bank assigns i loans each with a L sizes, at an interest rate r with expected costs EC . This profit maximization has the following restrictions:

$$L_{si} - L_{di} \leq 0 \quad (2)$$

$$L_{si} \geq 0 \quad (3)$$

$$r \geq 0 \quad (4)$$

This maximization with restrictions can be represented and solved by the following Lagrange maximization:

$$K = r \sum^n L_{si} - \sum^n EC_i(L_{si}, X_i) - \sum^n \lambda_i (L_{si} - L_{di}) \quad (5)$$

The first order conditions would be given by:

$$\frac{\partial K}{\partial L_s} = r - \frac{\partial EC_i(L_{si}, X_i)}{\partial L_s} - \lambda_i = 0 \quad (6)$$

$$\frac{\partial K}{\partial r} = \sum^n L_{si} - \sum^n \lambda_i \frac{\partial L_{di}}{\partial r} = 0 \quad (7)$$

¹ This section of paper will follow Gonzalez-Vega variable's names and definitions

$$\lambda_i(L_{si} - L_{di}) = 0 \quad (8)$$

$$\sum^n \lambda_i (L_{si} - L_{di}) = 0 \quad (9)$$

Only when $L_{si} - L_{di} = 0$, the shadow price λ_i will have a value greater than 0 since the restriction would in fact restrict the maximization process. These equations can be combined to find the following relation in the optimal,

$$r - \lambda_i = \frac{\partial EC_i(L_{si}, X_i)}{\partial L_s} \quad (10)$$

Additionally, it is possible to define the derivative of the expected costs and expected marginal costs faced by the bank to assign a bank loan, ie

$$EMC(L_s, X) = \frac{\partial EC_i(L_{si}, X_i)}{\partial L_s} \quad (11)$$

Therefore,

$$r - \lambda_i = EMC(L_s, X) \quad (12)$$

According to this equation, the interest rate r must be greater than or equal to the marginal cost of allocating a loan. In fact it would be greater than the marginal cost as long as the credit supply equals the demand for credit from the households. Thus, the equilibrium condition of the credit market will be represented by the following relation,

$$r \geq EMC(L_s, X) \quad (13)$$

This difference between the interest rate and the marginal cost of credit is a theoretical reason for the existence of financial intermediation margin even under equilibrium conditions. The net interest margin, is influenced by many internal and external factors to the financial entity. On many of these factors, the Central Bank of Costa Rica has some degree of interference and could pursue to influence this equilibrium relationship in a consistent direction with its monetary policy, to find the best way to influence these variables it is needed to develop econometric estimations with data from the national financial system.

For the specific case of these estimations it is proposed to follow the model presented by Shaffer (1989 and 1993) and replicated by Barajas, Steiner and Salazar (1999), which is consistent with the former model and where a bank or financial entity maximizes its profits by choosing an optimal amount of credits granted. These utilities are generated by interest income, called $i * L$, minus financial expenses, $r * D$, and a net non-financial result, $C(L, w)$. In this case it is assumed that financial revenues depend on the amount of loans granted and the average rate. Financial costs depend on the amount of deposits and the average deposit rate. Finally, the result depends on the amount of financial transactions recorded by the entity, which depends directly on the volume of loans granted as well as other fixed costs of the bank,

$$\pi = i * L - r * D - C(L, w) \quad (14)$$

$$Max_L \pi = i * L - r * D - C(L, w) \quad (15)$$

Taking the first order conditions,

$$\frac{d\pi}{dL} = i + \frac{di}{dL} * L - r * \frac{dD}{dL} - D * \frac{dr}{dL} - \frac{dC}{dL} = 0 \quad (16)$$

Assuming dD/dL tends to unit value in order to maintain the required ratio of reserves by the regulator entity, and rearranging the above equation we have that in the optimum,

$$i - r = -\frac{di}{dL} L + \frac{dr}{dL} D + \frac{dC}{dL} \quad (17)$$

Where, $i-r$, represent a measure of interest rate spread of the financial entity. Thus an econometric estimation of this equation can take the following form,

$$MIF = \beta_0 + \beta_1 L + \beta_2 D + \beta_3 \frac{dC}{dL} \quad (18)$$

$$MIF = \beta_0 + \beta_1 L(x_1, x_2, x_3, \dots) + \beta_2 D(y_1, y_2, y_3, \dots) + \beta_3 \frac{dC}{dL}(z_1, z_2, z_3, \dots) \quad (19)$$

Therefore we have an equation that includes external variables related to the bank and variables related with the demand, $L(\cdot)$, the supply, $D(\cdot)$, and with variables related to the internal operation of the financial institution dC/dL . This equation can be summarized as follows,

$$MIF = \beta_0 + \sum_i \beta_i F(x_i, y_i, z_i) \quad (20)$$

This equational form would be the basis for estimation performed in the following sections in order to obtain the coefficients that describe the relationship of interest rate spread with the independent variables.

4. Variable's Selection

Next, the variables included in the estimates are detailed, along with the definition and justification for their inclusion. First, there were included measures of bank concentration in the country since some studies (Demirguc-Kunt, Laeven and Levine, 2003; Carbó Valverde and Rodríguez Fernández, 2006; Sources and Mies, 2007) find that changes in the degree of concentration in industry throughout the period of study reduced the margin due to improvements in efficiency because of economies of scale, or else by improved competition. In the case of this study the concentration ratio was calculated using concentration measures for participation in the total portfolio credit and the total assets of the system.

Also there were included macroeconomic variables as control variables for the economic environment (Demirguc-Kunt, Laeven and Levine, 2004; Demirguc-Kunt and Huizinga, 1999), specifically including GDP monthly, quarterly and yearly as well as Monthly Production Index and inflation in the same periodicities. Another variable relevant to the whole system is the average deposit rate (Barajas, Steiner and Salazar, 1999) as higher volatility is accompanied by higher margins and this indicator it is also recommended for pure margin estimation (Ho and Saunders, 1981, Barajas, Steiner and Salazar, 1999).

Additionally, we have included the international deposit rate LIBOR (London InterBank Offered Rate) to consider broader indicators than just local interest rates (Barajas, Steiner and Salazar, 1999). As in the case of the average deposit rate and following the results of other studies (Ho and Saunders, 1981) it has been included the LIBOR rate volatility.

Among the institutional variables it has been included a proxy for state-owned banks, since previous studies (Demirguc-Kunt and Huizinga, 1999) have shown that state-owned banks do not

always pursue a goal of profit maximization and therefore tend to have higher margins due to inefficient management.

The estimates also include operational internal variables for each bank, where the variables associated with higher revenues and lower costs represent efficiency and therefore a negative relationship with interest rate spread and vice versa. For example, equity reserves reflect the quality of the loan portfolio and as mentioned by Ho and Saunders (1981) and by Mourning (2005) lower-quality loan portfolios positively affect margins. Similarly, the operating expenses are included as a proxy of internal efficiency for the institution; lower expenses mean lower margins (Barajas et al., 1999 and Brock and Suarez, 2000). In addition to these internal variables mentioned as examples, we have included service charges, assets, cash, deposits with the Central Bank, investments in financial instruments, the current loan portfolio and defaulted, liabilities, obligations with the public, short-time deposits and CDP's, assets, social capital, equity reserves, the profit or loss, total expenses, financial expenses, operating expenses, administrative expenses, personnel costs and overhead; and total revenues and financial income.

Finally, the dependent variable used for all the estimations is the margin of financial intermediation, at the Central Bank of Costa Rica there are multiple measurements for this margin of financial intermediation for the Costa Rican market. These measurements attempt to capture the essence of the difference between the profits from giving loans and the costs from obtaining funds to finance the loans. The actual calculation used by this paper defines the active rate as the financial income ratio of the productive assets and the passive rate as the financial expenses ratio of the productive assets too.

5. Methodology, Instruments and Estimating Results

The estimations will use the audited financial statements for each individual bank on a monthly basis with data from 1994, this for all regulated banks that are active at the time, creating an unbalanced panel. To estimate the panel is considered initially a group of variables mentioned in the previous section and that may affect the interest rate spread that have been calculated for each of the banks in the period under study.

Next, we proceed to estimate the correlations between the independent variables that are taken into account in the estimation in order to determine if there are variables that have very high correlations between them, this to consider only one² of the variables when estimating the full panel and avoid possible multicollinearity problems.

A variable selection process is performed from the resulting variables to determine which ones are most relevant to the case of Costa Rica. This procedure is done after you have decided which of the various estimations is statistically representative of the characteristics of the national financial system.

The panel regressions estimation take into account both temporal and heterogeneity effects present among domestic financial institutions. In the first case is considered only the presence of fixed³ effects while the second, performs the Hausman test to decide on the appropriateness of using fixed or random effects.

First, when both the fixed effects model and the random effects model are estimated, testing by appropriate F-tests, it shows that in both cases is considered more appropriate to make the estimations of the effects than using a common OLS regression⁴. Finally, we estimate the Hausman test and it turns out that the most appropriate model for the case of Costa Rican financial system is the fixed effect model.

² This variable is chosen as showing a higher R^2 to perform a simple regression of the financial intermediation margin on each of them.

³ Dummies variables are introduced for each of the test periods and it's prove that not all are statistically equal to zero.

⁴ Fixed effects models assume that the error can be decomposed into two, a fixed part, constant for each individual and another part random. The random effects model has the same specification as the fixed effects model, except that what formerly was regarded as the fixed part of the error now rather than a fixed value for each individual and consistent throughout the time is a random variable with a mean value of the fixed value and variance.

Table 1. Statistical tests to choose between random effects and fixed effects

	Breusch Pagan	Fixed Effects Test	Hausman
statistical⁵	232,05	12,01	196,78
P-value	0,0000	0,0000	0,0000
H₀	Do not use random effects	Do not use fixed effects	Use random effects

Source: Own estimates

However, when the tests of autocorrelation, heteroscedasticity and serial correlation were made, it is detected that the estimates of fixed effects panel presents these three problems. For this reason we decided to estimate the panel with a Prais-Winsten regression that corrects the standard errors under the presence of autocorrelation in the estimations.

Table 2. Statistical tests to identify autocorrelation, heteroscedasticity and serial correlation

	Autocorrelation	Wald Test	Breusch Pagan
statistical⁶	17,067	8426,34	678,335
P-value	0,0006	0,0000	0,0000
Null hypothesis	There is no autocorrelation	There is no heteroscedasticity	There is no serial correlation

Source: Own estimates

Using this procedure results obtained are consistent, where all variables, except for variations in the minimum reserve requirements are significantly different from zero at 5% level.

⁵ En el caso de la prueba Breusch- Pagan y Hausman el estadístico se trata de una Chi cuadrada, mientras que en la prueba restante se utiliza una distribución F.

⁶ En el caso del test de autocorrelación es un estadístico F mientras que en las otras dos pruebas se trata de un Chi cuadrada.

Table 3. Panel Estimates of Financial Intermediation Margin Costa Rica 1995-2010

Variable Name	Parameter	T Student	Confidence Interval 95%	
			Lower limit	Higher limit
Lag 1MonthFIM	-0,060592	-5,53	-0,0820834	0,0391022
Lag 3MonthFIM	0,0341275	3,63	0,0156841	0,0109648
Libor12Months	0,2408843	6,36	0,1666207	0,3151479
Hirschman Herfindahl	0,0021173	2,63	0,0005417	0,0036928
Minimum reserve requirements	0,1849577	1,85	-0,011018	0,3809335
Exchange rate	0,0041007	3,77	0,0019689	0,0062324
Bilateral Real Exchange Rate⁷	0,0841206	5,93	0,0563273	0,1119138
Deposits in the BCCR	13,72022	7,87	10,30355	17,13689
ROA	11,10325	39,72	10,555	11,6511
Financial Instruments Inv.	-17,25606	-18,06	-19,12912	-15,38301
Existing credits	-11,64526	-11,8	-13,57994	-9,710586
Credits expired	-8,802619	-4,6	-12,55527	-5,049968
Sight Deposits	-1,75778	-2,04	-3,449777	-0,065782
Term Deposits	-4,268778	-6,64	-5,529383	-3,008172
Equity Reserve	-9,741476	-2,44	-17,55364	-1,929309
Monthly Income	44,96618	13,93	38,64122	51,29115
Valid Credit Benefits	-104,4206	-3,16	-169,1442	-39,69693
Operative Expenses	1149,252	41,77	1095,32	1203,184
Administrative Expenses	1711,868	27,27	1588,83	1834,907
General Expenses	-877,5532	-5,29	-1202,927	-552,1791
Expenses Adm/Commissions	0,0186123	4,65	0,0107662	0,0264585

Source: Own estimates

From this regression it can be concluded that there are several important relationships to determine the margin of financial intermediation in Costa Rica. First, the lags of one and three

⁷ With the United States.

periods of interest rate spread are statistically different from zero, which shows that there is some kind of inertia in this result. The lag of one month is negatively associated with interest rate spread while the lag of three months was positively related. Considering that the directive boards of the banks usually adjust lending rates loans at intervals of three months, the result shows that net interest margins in the short term tend to decline, but in a longer term this trend is reversed by the behavior of the management of the entity. Explicitly, over time there are corrections to the trend of this variable that don't allow to reduce indefinitely the interest rate spread of the national financial system.

Increases in the international interest rates (in this case represented by the 12-month LIBOR) generate increases in the domestic intermediation margins. This may be due to the fact that increased cost of loans in foreign markets is passed on to consumers, indicating a high market power for these institutions. Additionally, this shows that local savers have limited options to save abroad and the banks take advantage of these increased international interest rates, so the market shows a more than proportional increase in the lending rate than the deposit rate.

Similarly, an increment in the market concentration (measured by Herfindahl Hirschman Index on assets) will have higher margins of financial intermediation. This result is consistent with the previous one and shows that increasing market power for the reception and allocation of resources by the entities in the market means this power will be used to extract more of the consumer surplus and increase profits.

Positive changes in the rate of the legal reserve requirements cause an increase in interest rate spread in the domestic financial system, because this increase means for financial institutions to devote more of their deposits to an idle activity, so they need to improve the level of income or reduce costs through prices. Consistent with this result, increases in the amount of money deposited by banks in the Central Bank of Costa Rica, including the legal reserve requirements lead to an increase in the financial intermediation margin. This is because the resources directed to this area reduce profitability, as these resources have costs for the bank but do not represent any income or have a lower income than if they were placed as loans, therefore the presence of market power makes possible that financial institutions may reduce the deposit rate without making the lending rate follow the same trend.

Additionally, increases in the nominal exchange rate and further more increases in the multilateral exchange rate cause increases in the financial intermediation margin. The increases in these variables for financial institutions represent an increase in costs since most of them have credit lines abroad, so that banks use their market power to pass on this cost to economic agents by increasing the lending rate, or what is the same an increase in the margin of financial intermediation.

Increases in the levels of utility (return on assets) of financial institutions are related to increases in interest rate spread. In this case, they can occur when the directors of the banks want to increase their profits in some periods and therefore promote policies that increase the profit margin, or rather when the increase in profits comes as a result of increases in the margin of intermediation, for the reasons mentioned in this document.

Variables that belong to the assets account, such as investments in financial instruments, loan portfolio, performing loans, all weighted by total assets show negative signs. Specifically, investments in financial instruments imply a lower interest rate spread since these investments are less expensive than loans; in many cases of the country's history public debt bonds have had higher returns than the expected with some credit portfolios. A greater amount of existing loans leads to a lower interest rate spread as this represents less idle resources to the financial entity. Moreover, a greater amount of bad loans should lead to a higher margin of intermediation and therefore the estimation result is not clear and may indicate that the higher cost of not receiving income from these loans is passed on to consumers in some other way.

More short-time deposits and CDP's in many cases are the result of more aggressive policies to attract savers via interest rates, and thus lead to a lower interest rate spread; this higher deposit rate is in order to persuade depositors of resources deposited in their banks.

Meanwhile largest equity reserves are in many cases product of higher profits, in the past periods, which can mean an improvement over time in the efficiency of management of financial institutions.

In the case of asset-weighted monthly income, the effect on interest rate spread is positive. In this case, we can apply the same consideration mentioned above for the case of Return on Assets, which may occur that the directors of the banks want to increase their profits or income in some

periods and therefore promote policies that increase the profit margin or also when the increase in profits comes as a result of increases in interest rate spread.

Moreover, in the case of the product of the current loan portfolio weighted by assets, an increase of this variable would mean a decrease in interest rate spread. This could be due to the fact that the increase in this variable is given by the increase of the current loan portfolio and therefore, as we saw earlier, the bank intermediation margin tends to decline.

As for the expenditure variables considered; administrative expenses, operating expenses and overhead weighted by assets, it's found that the increase in the first two impacts positively on interest rate spread while the last one does the reverse. The increase in non-financial costs incurred by the bank should be covered in part with revenues generated by financial intermediation; and thus, if the first increase, a way of meeting this increase is an increase in the margin of intermediation. Meanwhile, operating expenses are a smaller category and shows much greater volatility to be related to cyclical events which makes the sign opposite to what expected. Finally, the proportion of administrative costs is covered by fees for services, which is a efficiency variable, showing for the period average values greater than one. This means that for the aggregate of the system and the study period, banks were not efficient enough to cover these expenses. Therefore, when this proportion is increased there would be a need to generate more resources from financial intermediation to cover these expenses.

6. Discussion

One can conclude from the estimations with respect to the variables that are external to the entities we have that:

- the intermediation margins show in the short term a net inertial tendency to increase,
- the increase in the borrowing cost in foreign markets is passed on to consumers,
- a greater market concentration means a higher intermediation margin because some institutions use this market power to extract more surplus and profit,
- positive changes in the legal reserve requirements cause an increase in the interest rate spread in the domestic financial system,
- increases in the amount of money deposited by banks in the Central Bank of Costa Rica, including the legal reserve, lead to increases in the financial margin of intermediation,

- in the presence of market power is possible that financial institutions reduce their deposits rate without making the lending rate follow the same trend, and
- increases in the costs of credit lines abroad, through the exchange rate, lead to an increase in the margin of financial intermediation.

With respect to internal variables it is obtain that:

- increases in the levels of utility (return on assets) of financial institutions are related to increases in the interest rate spread,
- also investments in financial instruments imply a lower the margin of intermediation since they are less expensive than credit,
- a greater amount of existing loans leads to a lower net interest income as this represents fewer resources being idle for the financial institution,
- in the case of a larger amount of expired loans the study indicates that the higher cost of not receiving income from these loans is passed on to consumers in other ways,
- higher short term deposits and CDP's are the result of more aggressive policies to depositors via attractive interest rates and thus lead to lower interest rate spread,
- for the monthly income is applied the same logic mentioned above for the case of Return on Assets, and
- the increased of non-financial costs incurred by the bank are covered in part with revenues generated by financial intermediation, and thus if the former increase, a way of meeting this increase is a rise in the interest rate spread.

In conclusion, if the Central Bank of Costa Rica is interested in reducing the margin of intermediation of the entities, then it should focus on aspects such as: cost and access to credit lines abroad⁸, financial market concentration and market power that this entities entail, the level of legal reserve requirements for deposits in colones and the interest rate for deposits in the Central Bank of Costa Rica.

⁸ Additionally, in the near future estimates will be needed to assess the impact on net interest income of the recent amendment to the regulations of monetary policy on reserve to loans contracted financial intermediaries with foreign banks.

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