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Determinants of bank performance: evidence for Latin America

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Abstract

Purpose – The purpose of this paper is to analyze the impact of macroeconomic-industrial and bank-specific factors on Latin American banks' performance.

Design/methodology/approach – Using the data panel system estimator version of the generalized method of moments, the authors estimate the determinants of return on assets and interest margin for a sample of 78 commercial banks from Argentina, Brazil, Chile, Colombia, México, Paraguay, Peru, and Venezuela over the period from 1995 to 2010.

Findings – On the one hand, the results show that bank performance is positively related to both idiosyncratic factors, such as service diversification, size, capital ratio, and specialization degree, and to macroeconomic-industrial factors such as economic growth, inflation, and bank concentration. On the other hand, the results show that bank performance is negatively related to credit risk, liquidity risk, and operational inefficiencies.

Originality/value – The authors provide new evidence from the Latin American bank industry and incorporate the effect of diversification through noninterest activities.

Keywords Performance, Diversification, Credit risk, Industry concentration, Interest margin, Latin American bank industry

Paper type Research paper

1. Introduction

From a historic point of view, bank systems in Latin America have had a relevant and influential role in local economies especially during times of crises, such as Mexico in 1994, Argentina in 2001, Venezuela in 1994 and 1995, and Uruguay in 2007, among others. These events, along with other events that have shaken the industry around the world, such as the Asian and the subprime crises, led to important structural changes in the bank industry. In fact, as de la Torre *et al.* (2012) state, the main changes in the banking industry in Latin America in the area of volume and intermediation are mainly explained by past financial crisis. However, the deregulation process, an increase in competition in the industry, and a strengthening of local capital markets also played a part. As a result of all these changes,

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government property in the bank industry has decreased and foreign investment has increased.

Deregulation has eliminated some entry barriers for major foreign banks coming into the region, giving foreigners more autonomy to participate in a wide range of activities related to business strategies that generate higher integration of financial services (Moguillansky *et al.*, 2004). In fact, one of the main objectives of empirical bank studies is to explain the influence of legal and institutional conditions on the industry strategies as well as the influence of those strategies (e.g. diversification of bank services) on different factors related to performance. The Latin American market has a French civil law tradition (Djankov *et al.*, 2008; La Porta *et al.*, 1998) and is a clear example of how an industry can evolve to global banking with higher degrees of diversification in terms of financial services (Demirgüç-Kunt and Huizinga, 2010; Levine, 1999). Altogether this evolution has resulted in an important risk reduction in the banking system, making it less vulnerable to financial crisis (Beck, 2012). However, the effects of these changes in the operational performance of the banks in the region remains an open question.

The main objective of this study is to analyze the factors that determine the operational performance of Latin American banks. Using a sample of 78 banks from Argentina, Brazil, Chile, Colombia, Mexico, Paraguay, Peru, and Venezuela from 1995 to 2010, we find that diversification strategies positively impacts bank performance, which we measure by return on assets (ROA) and net interest margin (NIM). This influence is particularly important because it attenuates the negatives effects of crises. Other idiosyncratic factors such as size, capital level, level of deposit demand, credit and liquidity risk, and operational expenses also have a major positive effect on bank performance. Finally, we find that macroeconomic factors such as bank industry concentration level and inflation have a positive effect on performance.

Our work contributes to the existing literature in three ways. First, we use a recent sample, which allows us to analyze the effects on performance of the last financial crisis and the series of structural changes that have taken place within the industry. Second, we have incorporated the potential effect of diversification, measured as income resulting from noninterest activities, on performance, especially during financial crisis. Finally, different from previous Latin American studies, to control for potential endogeneity problems and obtain more robust results, we estimate our model using a generalized method of moments data panel system estimator (Blundell and Bond, 1998).

The remainder of the paper is structured as follows. Section 2 reviews the literature regarding Latin America bank performance. Section 3 formulates our research hypotheses. Section 4 describes the sample and the methodology. Section 5 provides the empirical results. Finally, Section 6 presents a summary of our major conclusions.

2. Literature review

When analyzing which factors have a potential effect on bank performance, it is important to consider idiosyncratic characteristics in addition to the legal, economic, and industry factors, which may affect bank performance in an exogenous way (Chen and Liao, 2011). Prior empirical studies of determinants of Latin America bank performance[1] can be classified in two main groups: those that on analyzing bank performance of a particular economy and those that focus on the Latin American banking system as a whole. Although some previous works e.g. de la Torre *et al.* (2012)

analyze the Latin American banking context, the literature on the factors that affect Latin American bank performance is scarce.

2.1 Idiosyncratic factors

At least five idiosyncratic factors are relevant for explaining banks performance: size, capital ratio, risk-liquidity combination, credit risk, operational expenses, deposit demand, and diversification of services.

Bank size has been generally used as a proxy for economies of scale (Berger and Humphrey, 1997). However, the evidence is not conclusive, and the relation is not so clear if better profitability (i.e. more than an increase in size *per se*) can be explained by better industry practices in terms of technology and management. In fact, Goddard *et al.* (2004) suggest that economies of scale disappear when important size increases occur (see Smirlock, 1985; Berger and Hannan, 1989; Jackson, 1992), which can affect negatively bank performance[2]. Inversely, intuition suggests that banks with greater size are able to raise capital at a lower cost, and thus they appear to be more profitable (Bikker and Hu, 2002; Goddard *et al.*, 2004; Short, 1979).

In terms of capital ratio, the empirical evidence suggests a positive relation between performance and solvency. On the one hand, a higher capital level results in lower interests payments on unsecured debt (Berger, 1995b). On the other hand, banks represent the quality of its projects by means of its capital proportion (Angbazo, 1997; Athanasoglou *et al.*, 2008; Demirguc-Kunt and Huizinga, 1999; Drakos, 2003; Goddard *et al.*, 2004; Maudos and Fernández de Guevara, 2004; Pasiouras and Kosmidou, 2007; Saunders and Schumacher, 2000). Similarly, Lin *et al.* (2012) suggest that capital ratio has a positive relation with interest margin due to increases in financing costs related to equity capital. Consequently, the demand for interest margins is higher in an attempt to compensate for the increase in the average cost of capital.

Although lack of liquidity and poor quality of financial assets are the main causes of failure both in banking systems and economies (Beck, 2012; Laeven and Valencia, 2008), we can suppose that lower risk exposure, combined with high liquidity, has a negative effect on bank performance. For instance, Rhoades (1985) finds that risk increments have a positive effect on performance for a sample of North American banks during the period from 1969 to 1978. However, for an international sample, Bourke (1989) finds a positive relation between liquidity and performance, which contradicts the classic argument that higher liquidity levels imply higher costs.

The banking industry, due to its nature, is generally exposed to higher levels of credit risk than nonfinancial institutions. Consequently, it potentially has more due loans and irrecoverable debt, and thus lower rates of return and performance may be expected (Athanasoglou *et al.*, 2008).

Operational expense is also important as it is often considered an indicator of administrative efficiency. Therefore, ceteris paribus, more efficiency means better performance. In fact, empirical evidence shows that higher administrative bank quality has a positive effect on performance. Thus, administrative efficiency is one of the key factors in a bank's success (Bourke, 1989; Molyneux and Thornton, 1992).

Demand for deposits is usually considered as a proxy for growth opportunities. However, evidence suggests that higher growth opportunities also have a positive effect on performance (Berger, 1995a, b; Berger and Bonaccorsi di Patti, 2006; Goddard *et al.*, 2004). Nevertheless, Berger (1995b) argues that demand for deposits represents the primary source for agency costs generation derived from government protection. These costs can also reduce expected bank profitability.

Finally, Maudos and Solís (2009) claim that demand for deposits can explain the specialization level of the banking institution.

As for diversification of bank services, de la Torre *et al.* (2011a) point out that high competition levels in capital and intermediary markets lead to more bank dependence on income generated by other types of financial services besides traditional intermediation. Although diversification of services provides numerous advantages such as cost reduction through economies of scale and better risk distribution, the empirical evidence is not conclusive with respect to the effect of diversification on bank performance. Chiorazzo *et al.* (2008) find for a sample of Italian banks that diversification has a positive impact on returns adjusted by risk. In the same line, Lin *et al.* (2012) show that when banks implement diversification strategies, they put their emphasis on new business lines, thereby decreasing their idiosyncratic risk. Brunnermeier *et al.* (2012) suggest that income from nontraditional activities significantly reduces banks' systemic risk. However, DeYoung and Roland (2001) find that US banks that adopt diversification strategies exhibit increases in income volatility, operational and financial leverage, and performance. Similarly, DeYoung and Rice (2004) show that marginal increments in noninterest income are associated with a higher level of profitability and volatility, thus displaying a deteriorating risk-return equilibrium. Finally, Lepetit *et al.* (2008), Maudos and Solís (2009) find that more diversified banks have lower margins due to the crossed subsidy by nontraditional activities.

2.2 Macroeconomic and industrial environment

At a macroeconomic level, the literature has primarily focussed on two factors: inflation and economic growth. Revell (1979) suggests that inflation may significantly affect bank performance by increasing industry operational expenses. Perry (1992) suggests that the effect of inflation on bank performance depends on the degree of precision of the industry in estimating its inflationary expectations.

As for economic growth, an important volume of literature has shown how bank performance is positively influenced by economic growth[3]. For instance, Short (1979) uses the growth rate of monetary offer per country. Other studies, such as Demirguc-Kunt and Huizinga (2000) use the annual growth rate of gross domestic product (GDP) and gross national product per capita as a measurement of economic growth, and Bikker and Hu (2002) use measurements as GDP, employment rates, and spread of interest rates. Similarly, de la Torre *et al.* (2011a) indicate that GDP growth is important in the promotion of bank credit, thereby reducing bank liquidity. This negative impact is logically consistent with the positive impact on credit.

At an industry level, the literature has generally focussed on the industry concentration level and the main property structures in this type of institution. Bank concentration level can be addressed with the market power hypothesis or the efficient structure hypothesis. Both propose a positive relation between the concentration level of the industry and bank performance (Athanasoglou *et al.*, 2008). The market power hypothesis suggests that a greater concentration level within the industry implies higher monopolistic returns for its participants (Bourke, 1989; Molyneux and Thornton, 1992). The efficient structure hypothesis suggests that those banks with superior production or administration technologies have lower costs, reach a higher concentration level, and, consequently, have higher returns. Nonetheless, more concentrated industries do not necessarily develop more efficient structures, but a higher degree of competition

may lead to greater efficiency. In any case, we may expect a positive relation between bank industry concentration and performance.

2.3 Latin American evidence

The Latin American evidence can be structured along the same two lines as previously discussed: bank performance of a particular economy and the Latin American banking system as a whole. From a perspective of individual countries, the literature has pointed out the existence of certain relations between bank spread and specific bank variables. For instance, considering a sample of Argentinean banks from June 1993 to July 1997, Catao (1998) finds evidence of a positive relation between bank spread and operational costs, liquidity costs, exchange rate risk, and nonperforming loans.

Likewise, Barajas *et al.* (1999) analyze factors that can explain the elevated spread levels during the Colombian economic pre-liberalization (1974-1988) and post-liberalization (1991-1996) periods. The authors argue that the rate's spread is a function of the market power, loan volume, wage rate, and loan rates of the bank system. Their main conclusions suggest that, on average, margins do not tend to change significantly between both periods analyzed. However, other factors such as loans portfolio, which are more accentuated in the economic during the post-liberalization period, have an important effect on margins.

Similarly, using a sample of 142 Brazilian banks for the 1997-2000 period, Afanasieff *et al.* (2002) find that idiosyncratic factors such as size and operational costs have a positive effect on interest margins. In addition, macroeconomic variables such as market interest rate and its volatility, inflationary rate, and economic growth also considerably affect performance.

Chumacero and Langoni (2001) do not find any basis to establish a relation between concentration and risk for their sample of Chilean banks. Conversely, Basch and Fuentes (1998) analyze the determinants of bank spread for a sample of 22 Chilean banks from August 1991 to December 1997 and report a decrease in bank profitability, which is mainly due to a major financial disintermediation. In addition, the authors find that bank spread and anticipated inflation are positively related and that financial leverage has a negative effect on spread.

Following the second line of investigation that analyzes the Latin American banking system as a whole, Brock and Rojas-Suarez (2000) estimate which factors affect the NIM of seven Latin American countries (Argentina, Bolivia, Chile, Colombia, Mexico, Peru, and Uruguay). They find that liquidity ratio and cost ratio have a positive effect on NIM. They also find that reserve requirements in some countries act as taxes for banks, producing higher spreads.

Martinez Peria and Mody (2004), following the methodologies of Ho and Saunders (1981), Allen (1988), Angbazo (1997), analyze how foreign participation and market concentration affect Latin American (Argentina, Chile, Colombia, Mexico, and Peru) banks' spread. The results suggest that foreign banks can support lower spreads than local banks. In this sense, foreign participation level seems to affect spreads indirectly, mainly through an effect in administrative costs. As a final point, the authors find a positive relation between bank concentration and spreads as well as in terms of costs.

Gelos (2009) explains the difference between spread levels in the Latin American banking system and other emerging countries (14 Latin American countries and 71 countries belonging to other emerging economies). The author concludes that, in

comparative terms, Latin American countries spreads are elevated. These higher spreads are mainly explained by bank lower efficiency caused by higher (general) expenses as a result of lower competition, high interest rates, and higher reserves requirements. Conversely, Latin American countries do not differ considerably from the rest of emerging economies in terms of inflation, tax level, and bank size, which are important determinates of spreads.

de la Torre *et al.* (2011b) point out that Latin American and Caribbean banks are under reference levels in terms of volume and intermediation costs; that is, banks within the region have fewer and more expensive loans, generating a gap mainly explained by past bank crisis, lower credit demand, and factors related to legal and institutional conditions such as enforcement and legal protection of creditors' rights. In addition, the authors find that crises have no effect on interest margins, assets profitability, and other financial solvency indicators.

Finally, for a sample of nine Latin American countries, Chortareas *et al.* (2011) evaluate the market power model (structure-conduct-performance and relative market power) and the market efficient structure model (X-efficiency and scale efficiency). Their results suggest evidence in favor of the efficient structure hypothesis. They argue that capitalization ratio and size have a major effect on bank performance in each of the nine Latin American countries in their sample.

3. Hypothesis development

Following the arguments previously outlined, we develop the following five hypotheses that address the main factors that can potentially affect bank performance – namely, diversification, specialization and growth opportunities, risk, bank concentration, and crisis, respectively – within our sample of Latin American countries:

H1. Given the mixed evidence with respect to whether a bank obtains a premium or discount for diversification, the relation between the diversification measures and bank performance may be positive or negative and this a relation may be strengthened in the presence of financial crisis.

H2. A higher specialization level, measured by the relation between deposits and total assets, positively affects bank performance.

H3. Liquidity risk and credit risk are negatively related to bank performance.

H4. Bank concentration level is positively related to bank performance.

H5. Crisis, as proxied specific crisis periods, is negatively related to bank performance.

4. Sample, variables, and methodology

4.1 Sample

To select the sample used in our analysis, we first obtained the list of institutions belonging to the bank industry from the Bankscope database. We considered industry criteria, activity level, size, and country so only those banks relevant for the analysis were included. Once this information was obtained, we gathered annual observations for the period from 1995 to 2010 for banks from Argentina, Brazil, Chile, Colombia, Mexico, Paraguay, Peru, and Venezuela. We also obtained a series of macroeconomic variables representative of each country from the web site of the World Bank. Finally,

we gathered information about specific characteristics of the bank industry of each country from the database used by Beck and Demirguc-Kunt (2009).

As a result of this process, we obtained an unbalanced panel of 642 observations from 78 banks with activities in Argentina, Brazil, Chile, Colombia, Mexico, Paraguay, Peru, and Venezuela from 1995 to 2010[4]. Table I provides a detailed description of the sample including the companies and observations per country[5]. Our sample is representative of the Latin American market because it includes the largest banks in the region, which represent a large portion of the total assets of the banking system. For example, 2010 the sample includes the five largest banks of each country with the exception of Peru and Colombia, which are represented by the four and three largest banks, respectively. In terms of percentage of total assets, the numbers for 2010 are 54 percent for Argentina, Brazil for 70 percent, Chile for 73 percent, Colombia for 63 percent, Mexico for 74 percent, Paraguay for 67 percent, Peru for 87 percent, and 62 percent for Venezuela.

4.2 Variables

We considered as dependent variables two performance measures: ROA and NIM. Previous literature validates using ROA as a performance measure because it shows that ROA is a proxy of the banks' ability to manage their assets in such a way that they produce benefits (Athanasoglou *et al.*, 2008; Goddard *et al.*, 2008). Similarly, the literature also affirms the use of NIM inclusion to measure the cost of financial intermediation (Brock and Rojas-Suarez, 2000), because NIM can explain banks' purely operational efficiencies and own competitive nature of the bank industry. We calculate NIM as the difference between interest income and outcome to total assets (Kasman *et al.*, 2010). However, these variables have limitations as performance measures. The last financial crisis taught us that some measurements of profitability are not, in fact, effective. For example, Allen and Carletti (2008) find that if banks' assets were at a market value, in case of crisis, these would reflect the liquidity amount available in the market plus the assets' economic value, resulting. This situation would result in high volatility of values in financial statements. However, if assets were at base of historical cost, they would show higher stability and solvency.

As specific explanatory variables[6] for each bank, we include a variable as a proxy for credit risk and liquidity. We define rate between provisions for credit losses to total loans (CDT) and ratio between liquid assets to total loans LIQ (Lin *et al.*, 2012). To be consistent with literature, the variable DEPTA, defined as deposits to total assets (Berger and Bonaccorsi di Patti, 2006; Maudos and Solís, 2009), is incorporated as a proxy of specialization and growth opportunities.

País	No. of banks	No. of obs.
Argentina	6	48
Brazil	21	183
Chile	5	22
Colombia	3	17
México	14	118
Paraguay	18	182
Peru	4	31
Venezuela	7	41
Total	78	642

Table I.
Sample composition

We use two variables related to each country's specific bank industry. First we include the concentration level of the bank industry (CONBANK), defined as percentage of total assets of the three main banks of each country in relation to industry total assets. Second, we define the dummy variable CRISIS, which equals 1 for the periods 1998-2000 and 2008-2009, and zero otherwise. We include this variable to account for the possible effect of the economic crises on the Latin American bank industry, such as the Asian crisis and subprime crisis in the USA.

To capture the possible effect that diversification strategies have on Latin American bank performance, we use the income level nonrelated to interest payment to total assets (NINTTA), as proposed by previous studies (Chiorazzo *et al.*, 2008; Maudos and Solís, 2009), to approximate those diversification strategies.

Finally, we include a set of control variables based on the banking literature previously discussed. First, we incorporate a variable proxy of capital (CAR), defined as ratio between equity to total assets (Goddard *et al.*, 2008). To control possible economies of scale effects, we use a size variable (LNLOANS), which is the natural logarithm of total loans (Maudos and Solís, 2009; Kasman *et al.*, 2010). As previously discussed, to measure approximate credit risk and liquidity, we use CDT and LIQ (Lin *et al.*, 2012). We include the EXP variable, defined as the rate between operational expenses[7] to total assets (Maudos and Fernández de Guevara, 2004; Maudos and Solís, 2009), to account for banks' administrative efficiency. To control the effect of economic conditions per country, we include inflation (INFLATION) and annual growth rate of GDP (CRECPIB). Finally, we control potential effects for each country by defining a set of dummy variables per country, and we control temporary effects by defining a set of dummy variables per year.

All variables are defined in the Appendix.

4.3 Methodology

To analyze the relation between factors that potentially have an effect on Latin American bank performance, we propose Equation (1), where those independent variables that keep a closer relation with our proposed hypotheses have been included symbolically:

$$\begin{aligned} ROA_{it}\, o\, NIM_{it} = {} & \beta_0 + \beta_1 \cdot NINTTA_{it} + \beta_2 \cdot NINTTA_{it} \cdot CRISIS_t + \beta_3 \cdot LNLOANS_{it} \\ & + \beta_4 \cdot CAR_{it} + \beta_5 \cdot DEPTA_{it} + \beta_6 \cdot RIESGO_{it} + \beta_7 \cdot EXP_{it} + \beta_8 \cdot CRECPIB_{it} \\ & + \beta_9 \cdot CONBANK_{it} + \beta_{10} \cdot INFLATION_{it} + \beta_{11} \cdot CRISIS_t + dummy\ paises \\ & + dummy\ temporales + \eta_i + \eta_t + \varepsilon_{it}, \end{aligned} \tag{1}$$

where η_i represents the fixed individual effect, η_t is the time effect, and ε_{it}, the stochastic error. The individual effect refers to a set of specific characteristics of each company that are constant over time. The time effect includes the macroeconomic factors that impact all the firms simultaneously. The stochastic error term combines both the measurement errors of any independent variable and the omission of explanatory variables.

$Risk_{it}$ represents both liquidity risk (LIQ) and credit risk (CDT) for each bank i for period t. Consequently, the estimation of Equation (1) includes each risk variable separately in each one of the estimations for the corresponding performance variables.

We estimate Equation (1) using data panel methodology. Specifically, we use the generalized method of moments approach. In making the decision to follow this method, we consider two main factors. First, data panel methodology has certain advantages related to the ability to control by means of individual heterogeneity. This control is crucial when analyzing specific factors per bank that can potentially affect performance. In other words, this methodology allows us to control unobservable heterogeneity and provides estimators with a superior efficiency compared with other estimation methods (Arellano, 2003; Baltagi, 1995). Second, presence of endogeneity may cause inference errors. In our case, some variables may cause endogeneity problems, invalidating the consistency of fixed effects estimators (Alonso-Borrego and Arellano, 1999). The most common way to solve this problem is instrumentalization of variables by changing exogenous regressors by themselves and the endogenous variable. Thus, we use all independent variables with two, three, and four years delay as instruments in differences for those equations in levels, as we use the estimators system by Blundell and Bond (1998) and Bond (2002).

The consistency of the estimators depends critically on the absence of second-order serial autocorrelation of the remainders and on the validity of instruments (Arellano and Bond, 1991). Thus, in our estimations we present a statistic test of the absence of a second-order serial autocorrelation, Auto(2). To prove the instruments' validity, we use the Hansen test on overidentifying restrictions under the null hypothesis of no correlation between instruments and error term. For each estimate, we also present Wald statistics, $z1$ and $z2$, to measure the joint meaning of estimated coefficients and annual dummy variables, respectively.

5. Results

5.1 Descriptive analysis

Table II, panel A, shows the average, standard deviation, and maximum and minimum values the variables. Panels B and C provide the average ROA and NIM, respectively, of the segmented variables (standard deviations) in function of the superior and inferior tertile for each performance variable used in this study. These panels also provide the *t*-statistics estimated to analyze the existence of major differences between the t2ertiles.

Panel B of Table II shows that, in general, banks with superior profitability to assets have higher loan collocation volume and higher income from nontraditional bank activities (NINTTA). Similarly, higher profitability is related to lower operational expenses in relation to banks' total assets, suggesting better administrative efficiency. However, those banks with higher levels of financial solvency as a result of a CAR and CDT show higher profitability to their assets. That is, those banks with lower liquid assets in relation to their total bonds (revealing a higher liquidity risk) have higher profitability levels. Finally, high level of specialization in banking institutions, shown as higher DEPTA, is associated with higher profitability level in the Latin American banks.

Panel C of Table II shows that, in general, banks with higher NIM have higher loan collocation volume and lower NINTTA. Similarly, a higher level of financial spread is linked to higher operational expenses in relation to banks' total assets, suggesting less administrative efficiency.

In addition, as in the case of profitability to assets, banks with higher levels of financial solvency as a result of a higher capitalization level (CAR) and with lower credit risk (CDT) perform better in relation to financial intermediation margin. Also, banks with lower liquid assets in relation to their total bonds (revealing a higher

Panel A: total sample

Variables	Mean	Estimated deviation	Minimum	Maximum
ROA	0.015	0.020	−0.120	0.115
NIM	0.060	0.033	−0.057	0.269
NINTTA	0.041	0.069	−0.035	0.782
LNLOANS	10.839	1.766	4.983	15.969
CAR	0.109	0.049	0.023	0.426
DEPTA	0.602	0.200	0.0002	0.951
CDT	0.028	0.035	0.0002	0.647
LIQ	0.363	0.175	0.003	0.978
EXP	0.084	0.077	0.011	0.814
CRECPIB	0.031	0.038	−0.108	0.182
CONBANK	0.530	0.149	0.322	1.00
INFLATION	0.088	0.093	−0.011	0.998
Total	642			

Panel B: ROA extreme tertile splitting criteria

	ROA		Means comparison Upper vs lower
	Upper	Lower	(*t*-statistic)
NINTTA	0.051 (0.064)	0.032 (0.054)	3.23***
LNLOANS	11.14 (1.944)	10.06 (1.784)	2.87***
CAR	0.129 (0.055)	0.096 (0.047)	6.71***
DEPTA	0.689 (0.138)	0.602 (0.014)	4.40***
CDT	0.026 (0.021)	0.035 (0.051)	−3.02***
LIQ	0.362 (0.013)	0.407 (0.011)	−2.45**
EXP	0.084 (0.005)	0.096 (0.004)	−1.75*
CRECPIB	0.034 (0.002)	0.027 (0.002)	1.67*
CONBANK	0.513 (0.009)	0.579 (0.011)	4.47***
INFLATION	0.112 (0.008)	0.091 (0.006)	1.89*
Total	214	214	

Panel C: NIM extreme tertile splitting criteria

	NIM		Means comparison Upper vs lower
	Upper	Lower	(*t*-statistic)
NINTTA	0.037 (0.003)	0.049 (0.005)	−1.70*
LNLOANS	10.87 (1.570)	10.39 (1.892)	2.88***
CAR	0.118 (0.043)	0.106 (0.064)	2.23**
DEPTA	0.634 (0.014)	0.589 (0.014)	2.20**
CDT	0.018 (0.022)	0.041 (0.050)	−7.36***
LIQ	0.373 (0.014)	0.420 (0.012)	−2.50**
EXP	0.108 (0.066)	0.062 (0.079)	6.46***
CRECPIB	0.039 (0.044)	0.019 (0.030)	5.30***
CONBANK	0.544 (0.154)	0.487 (0.127)	4.10***
INFLATION	0.116 (0.130)	0.070 (0.049)	4.80***
Total obs.	214	214	

Notes: Panel A reports the mean, median, lower and upper quartile, and the standard deviation of each variable of the total sample. Panels B and C reports mean (standard deviation) and test of means comparison using sample splitting criteria by extreme thirds of ROA and NIM, respectively. All variables are defined in the appendix. ***,**,*99, 95, and 90 percent confidence levels, respectively

Table II.
Descriptive statistics and test of means comparison

liquidity risk) have higher financial spread levels. Finally, high levels of specialization in banking institutions, shown as higher deposit participation in banks' total assets (DEPTA), is associated to a higher NIM in the Latin American banks.

5.2 Multivariate analysis

Table III presents our estimates of Equation (1). Columns (1) to (3) show a negative and statistically significant relation between credit risk (CDT) and ROA, which supports *H3*. This result suggests that a higher level of provisions due to credit losses negatively affects banks' results and profitability. Column (2) shows that an increase in liquid assets, in relation to bank bonds, decreases assets profitability due to resource immobilization, representing a significant cost to institutions (Molyneux and Thornton, 1992).

In terms of diversification through nontraditional bank activities developed by the Latin American bank industry, the results in Table III show a positive and statistically significant relation between NINTTA and ROA, revealing the beneficial effect of diversification strategies on the performance of Latin American banks (Baele *et al.*, 2007; Chiorazzo *et al.*, 2008; DeYoung and Rice, 2004; Elsas *et al.*, 2010). Diversification strategies for the banks clearly plays an important role for reducing risk from banking activities. Column (3), which shows the coefficient of the interacted variable (NINTTA $\times$ CRISIS), indicates that the diversification effect is even more pronounced during financial crisis. Moreover, we run test $t1$ of lineal restrictions to contrast the importance of the sum of coefficients for diversification and for the crossed variable of financial crisis (NINTTA $\times$ CRISIS). The test confirms that the coefficients' sum is positive and statistically significant, and thus the net effect of diversification during crisis time is better performance.

Table III also shows that the Latin American bank specialization level (DEPTA), reflected in a higher concentration level in the pure industry operations, has a positive effect on assets profitability. Economic crises have a negative and statistically significant relation to ROA, which is consistent with *H5*. If we analyze the particular characteristics of the bank industries, such as industry concentration level, results in columns (1)-(3) show a positive and statistically significant relation between bank industry concentration (CONBANK) and ROA, which supports *H4*. These results are consistent with international (Bourke, 1989; Berger, 1995a; Molyneux and Thornton, 1992) and Latin American (Chortareas *et al.*, 2011) empirical evidence and allow us, preliminary, not to reject the market power hypothesis or the efficient structure hypothesis.

Columns (4)-(6) of Table III shows a positive and statistically significant relation between credit risk and NIM, which contradicts *H3* as well as important evidence reported by previous studies (Hawtrey and Liang, 2008; Maudos and Fernández de Guevara, 2004; Maudos and Solís, 2009). However, the finding is consistent with the evidence by Brock and Rojas-Suarez (2000), who argue that inverse relation between credit risk and NIM can be explained by the inadequate provision level made by the Latin American banks[8]. In terms of liquidity risk, the results observed in column (4) validate *H3*, in the sense that by increasing liquid assets in relation to bonds, liquidity risk diminishes. This would be appreciated in a reduction of the prize for liquidity on the interest margin (Lin *et al.*, 2012).

In terms of diversification level though nontraditional bank activities made by the Latin American bank industry, columns (3) and (4) of Table III report a negative and statistically significant relation between NINTTA and NIM, which suggests that

Dependent variable	ROA (1)	ROA (2)	ROA (3)	NIM (4)	NIM (5)	NIM (6)
Diversification						
NINTTA	0.295***	0.328***	0.270***	−0.512***	−0.529***	−0.510***
	(9.90)	(11.29)	(9.01)	(16.08)	(−22.53)	(−17.85)
NINTTA × CRISIS			0.012*			0.012
			(1.94)			(0.47)
Deposit demand						
DEPTA	0.009*	0.016**	0.008*	0.003**	0.012**	0.004**
	(1.76)	(2.35)	(1.90)	(2.37)	(2.27)	(2.09)
Risk, credit, and liquidity						
CDT	−0.064***		−0.063***	−0.012***		−0.013***
	(−4.02)		(−3.59)	(−3.47)		(3.33)
LIQ		−0.019***			−0.025***	
		(−3.77)			(−5.32)	
Macroeconomic factors						
CONBANK	0.017***	0.025***	0.014***	0.037***	0.050***	0.038***
	(3.68)	(3.75)	(2.96)	(4.89)	(7.1)	(4.91)
CRISIS	−0.003**	−0.006***	−0.004***	0.002	−0.006***	0.003
	(−2.45)	(−3.97)	(−3.19)	(1.13)	(−3.58)	(1.46)
Control variables						
CAR	0.141***	0.128***	0.136***	0.167***	0.181***	0.154***
	(7.43)	(5.23)	(5.75)	(5.86)	(8.25)	(5.54)
LNLOANS	0.003***	0.002***	0.002***	0.004***	0.003***	0.004***
	(6.60)	(5.02)	(5.98)	(8.07)	(5.13)	(7.76)
EXP	−0.283***	−0.325***	−0.265***	0.524***	0.555***	0.520***
	(−9.08)	(−10.97)	(−8.74)	(15.30)	(23.70)	(15.56)
INFLATION	0.037***	0.030**	0.021*	0.074***	0.055***	0.081***
	(2.84)	(1.99)	(1.74)	(3.16)	(2.75)	(3.59)
CREPIB	0.038***	0.0435***	0.041***	−0.019	−0.021	−0.034
	(3.58)	(3.73)	(3.87)	(−1.48)	(−1.13)	(−1.04)
Intercept	−0.013	0.006	0.005	−0.014	0.010	−0.014
	(−1.48)	(0.78)	(0.63)	(−0.94)	(0.87)	(−1.07)
Country effect	Yes	Yes	Yes	Yes	Yes	Yes
Temporal effect	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	642	642	642	642	642	642
Auto(2)	1.45	1.31	1.45	−1.13	−0.60	−1.12
*t*1	–	–	10.30***	–	–	–
*z*1	131.48 (31)***	168.17 (31)***	162.88 (32)***	120.44 (31)***	177.28 (31)***	129 (32)***
*z*2	17.08 (14)***	31.42 (14)***	21.05 (14)***	13.51 (14)***	22.38 (14)***	18.63 (14)***
Hansen test	76.11 (197)	60.11 (197)	54.45 (197)	74.88 (197)	68.92 (197)	41.52 (197)

Notes: Estimated coefficients (*t*-statistics) of the estimation of the Equation (1) through the generalized method of moments. The dependent variable is return on assets (ROA) and net interest margin (NIM). The independent variables are defined in the appendix. We control for country effect and temporal effect. *t*1 is a test of lineal restrictions of the joint significance of ownership variables and the interacted variables. Auto(2) is the test of second-order serial autocorrelation of the residuals. *z* is the Wald tests of significance of the explanatory and temporal dummy variables. Hansen test is a test of overidentifying restrictions which distributes as χ^2 (degrees of freedom).***,**,*99, 95, and 90 percent confidence levels, respectively

Table III.
Generalized method of moments estimations of the determinants of bank performance

banks with elevated income from nontraditional bank activities may lose a certain ability to obtain earnings derived from credit activities, especially in segmented markets and under inadequate competition. These results may be the result of a crossed subsidy with traditional bank activities. Our findings are consistent with those

reported by previous studies of European countries, such as Carbo-Valverde and Rodriguez-Fernandez (2007) and Lepetit *et al.* (2008).

Table III shows that specialization variable (DEPTA) has a positive and statistically significant relation with NIM, which confirms that specialization in traditional bank activities promotes earnings from credit activities. With regard to macroeconomic variables, economic crises, as indicated in column (5), has a negative effect on performance as measured by NIM. This finding supports *H5*. Similarly, the results in columns (4)-(6) are consistent with *H4*.

All of our control variables are significant when we use ROA as the dependent variable and have the predicted signs. In the specification that uses the NIM, only the growth variable is not statistically significant.

5.3 Sensitivity analysis

As a robustness check, we estimate Equation (1) using two-stage least squares regressions, and we incorporate two exogenous instruments to deal with the potential endogeneity problem that arise from the ROA-EXP relation. First, we use percentage of foreign banks in the system based on the literature that argues that foreign banks improve the efficiency of the financial system in terms of industry competitiveness, costs, and technology, among others (de Haas and van Lelyveld, 2006; Micco *et al.*, 2007). We also consider the ratio of private bond market capitalization over GDP as a proxy for capital market development. In fact, Raddatz (2006) argues that when capital markets are more developed, borrowers and lenders have better tools to deal with information asymmetries, and bond markets become an attractive alternative to raise capital. Consequently, an increase in bank efficiency may be expected to maintain their market share given the increase in alternatives for capital raising. The results in Table IV do not alter our interpretations from the previous section.

6. Conclusions

In the last decades, there has been a growing interest in bank performance in emerging markets. This concern is mainly motivated by the major importance that the bank industry has on the economies of each country. As a result, a vast literature examines banks behavior from different points of view, including bank performance. However, a gap exists in terms of the literature associated with the Latin American performance analysis, with the exception of a few works such as de la Torre *et al.* (2011b).

Keeping in mind the limitations associated with using profitability measurements (ROA) as a proxy for performance; we offer evidence that identifies some aspects that affect bank performance within the Latin American context. Specifically, we analyze bank performance through two main factor groups based on particular bank characteristics, namely, idiosyncratic and macroeconomic factors. We also provide arguments related to market structure and specific institutional and legal factors for each country, including the possible effect of financial services diversification on banks performance.

As for idiosyncratic factors, our results provide evidence that size and capital levels have a positive and statistically significant relation with operational performance, while credit risk and administrative efficiency affect it negatively.

The process during these last years in terms of bank industry deregulation has brought a change both in focus and orientation. It has also has produced higher competence in capital and intermediary markets. Thus, the current banking industry has a higher level of diversification level and thus those activities or services differ

Dependent variable	ROA (1)	(2)	(3)
Diversification			
NINTTA	0.391*	0.433**	0.411***
	(1.80)	(2.50)	(2.35)
NINTTA × CRISIS			0.060**
			(2.03)
Deposit demand			
DEPTA	0.024**	0.028***	0.027**
	(2.06)	(2.69)	(2.56)
Risk, credit and liquidity			
CDT	−0.020*		−0.022*
	(−1.72)		(−1.84)
LIQ		−0.008**	
		(−2.28)	
Macroeconomic factors			
CREPIB	0.100*	0.108*	0.102***
	(1.66)	(1.75)	(1.65)
CRISIS	−0.001**	−0.002***	−0.001**
	(−2.12)	(−2.78)	(−2.36)
Control variables			
CAR	0.126***	0.130***	0.128***
	(5.79)	(5.66)	(5.67)
LNLOANS	0.001*	0.004*	0.003*
	(1.70)	(1.66)	(1.69)
EXP	−0.387*	−0.431**	−0.397*
	(−1.67)	(−2.45)	(−1.95)
INFLATION	0.021**	0.022**	0.022**
	(2.40)	(2.49)	(2.46)
CREPIB	0.100*	0.108*	0.102***
	(1.66)	(1.75)	(1.65)
Intercept	0.0034	0.006	0.005
	(0.31)	(0.53)	(0.43)
Country effect	SI	SI	SI
Temporal effect	SI	SI	SI
Obs.	642	642	642
F-test	4.28***	3.85***	4.23***
*t*1	–	–	2.69***
Adj R^2	0.2541	0.2211	0.2386

Notes: Estimated coefficients (*t*-statistics) of the estimation of equation (1) through the two stages least squares method. The dependent variable is return on assets (ROA). We assume that operational expenses is endogenous (EXP), so in the first stage we use as exogenous variables the *Percentage of Foreigner Banks* and the *Private Bond Market Capitalization over GDP* ratio. Independent variables are defined on Table II. Both stages are controlled by *Country Effect* and *Temporal Effect*. All variables are defined in the appendix. ***,**,*99, 95, and 90 percent confidence levels, respectively

Table IV.
Determinants of bank performance (2SLS estimations)

from traditional intermediation. Our results therefore show that diversification played a crucial role in achieving better bank performance. Better performance can be influenced by cost decreases through services integration as well as economies of scale.

Although our results provide evidence that financial crisis has a negative effect on bank performance; they also show that when diversification strategies are adopted, the severity of problems in times of crisis time decrease. Hence, we find that diversification

is essential for good industry operation as well as for the stability of the financial system and, specifically, for systemic risk reduction.

Our results may have implications from a regulatory point of view, which deserve to be analyzed more carefully. First, our results provide an empirical basis for liquidity requirements and provisions given their positive relation with performance. Further, our study suggests the need to be careful when we establish the parameters for the nonfinancial activities of banks.

We suggest two possible research lines for future works. First, according to previous literature (Albertazzi and Gambacorta, 2009; Bolt *et al.*, 2012), it would be interesting to study in more depth the relation between Latin American performance and economic cycles. Second, as we previously stated, it is important to understand the process through which banks are governed and the consequences of these banks power distribution on performance. This topic warrants further consideration.

Notes

1. Significant size increase may carry along a series of factors related to performance. For instance, Demirguc-Kunt and Huizinga (2000) suggest that factors such as organizational complexity, bureaucracy, and corruption can potentially affect efficiency.
2. In these works, bank performance is generally measured by bank spread.
3. There is vast literature which analyzing the critic importance of financial systems on economic growth (see King and Levine, 1993; Levine, 2005; Beck, 2012, among others).
4. It is noteworthy that those observations which did not have data have been excluded from the sample, as well as those atypical values, defined as 2 percent of the superior and inferior levels for each variable.
5. With the purpose of easily comparing variables, financial information used is expressed using the same currency and the respective local accounting regulation. As a consequence, any effect that accounting regulation or institutional factor per country may cause on our results, will be included by the whole control variables per country.
6. Due to information availability problems, it is necessary to explain that a limit for the present work has been the fact that variables related to banks' ownership structure have not been considered. Some studies that have analyzed banks' property on performance are Martinez Peria and Mody (2004), Micco *et al.* (2007), Claessens and Van Horen (2013), among others.
7. Operational expenses exclude any interest payment.
8. Brock and Rojas-Suarez (2000) use as a credit risk proxy the ratio between nonperforming loans to total loans. They evidence a negative relation between credit risk and NIM for the bank industry from Argentina, Bolivia, Chile, and Peru, but a positive relation only in the case of Colombia.

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Appendix

Table AI.
Definition of the variables

Abbreviation	Variable	Definition
Dependent variables		
ROA	Return on assets	Net income/total assets
NIM	Net interest margin	Net interest profit/total assets
Independent variables		
Idiosyncratic		
NINTTA	Diversification	Noninterest income/total assets
LNLOANS	Size	Natural logarithm of loans
CAR	Capital	Equity/total assets
DEPTA	Deposits' demand	Total deposits/total assets
CDT	Credit risk	Credit loss provisions/total loans (gross)
LIQ	Liquidity risk	Convertible current assets/total liabilities
EXP	Administrative efficiency	Total operational expenses/total assets
Macroeconomic and industry		
CONBANK	Concentration	Percentage of total assets of the three main banks of each country in relation to industry total assets
CRISIS	Financial crisis	Equals 1 for years 1998-2000, and 2008-2009, and zero otherwise
INFLATION	Inflation	Increase in the general price level of goods and services

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