Profitability in banks affiliated to a business group. Evidence from an emerging market

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Abstract

In certain institutional contexts, where there are business groups, banks affiliated to these business networks are faced by dilemmas concerning incentives that might condition their profitability. The objective of this work is to test whether there is a difference between the performance of affiliated banks and that of banks not affiliated to groups, in the context of a developing economy. In particular, a study is made of the case of Mexico in the period 2007-2011. Estimates were made through weighted least squares, and with panel data analysis using random effects, fixed effects and Hausman-Taylor estimator. Findings suggest that banks affiliated to business groups in Mexico show less profitability than non-affiliated banks, which may be a consequence of the provision of loans in an internal capital market.

JEL classification: G21, G32
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1. Introduction

Banks are considered a special type of firm, as they face dilemmas of corporate governance unlike those of other firms. It is well known that in a bank the basic problem of agency is not limited to the relation between shareholders and managers, as it also includes depositors, borrowers and the regulating body. In the case of banks, the action of the market is limited by legal constraints on entry, fusions, corporate takeovers and numerous rules of operation

(Ciancanelli and Reyes, 2000). Regulations apply an external force that influences the profitability achieved by the bank.

In certain institutional contexts, where there are business groups, problems of incentives may arise that are different to those faced by a firm in which ownership and control are separate. In a business group it is common for ownership to be concentrated and combined with control of the firms through a business network; this situation leads to possible conflicts of interest among controlling shareholders and minority shareholders (Shleifer and Vishny, 1997; Morck and Yeung, 2003). In this type of corporative structure, the majority shareholders may take decisions that will benefit the sum of their interests, but will harm small investors in the companies of the group (Bebchuk *et al.*, 2000; Claessens *et al.*, 1999b; Johnson *et al.*, 2000; La Porta *et al.*, 1999).

Banks affiliated to business groups present some of the dilemmas referred to. In banks of this type, the search for profitability is constrained both by regulations and by the need for financial transfers within the business network; the operation of the group as a whole might require loans from the bank to be made to other firms in the network, which is known as related lending.[1] In cases such as these, if the loans are granted under the same conditions that are applied to other customers and if they satisfy the requirements made by the regulating body, related lending does not affect the bank adversely. If however the loans are given on more favorable terms than non-affiliated customers would get, the profitability of the bank is impaired, which affects the minority shareholders. That is, if banks affiliated to business groups are found to be less profitable than non-affiliated banks, this might reveal that to some extent the minority shareholders have been expropriated.

[1] Related lending refers to loans made to directors or shareholders of the bank, or to individuals or bodies related to them. In this paper we refer specifically to loans that certain banks grant to companies in the business group that they are affiliated to.

It may also happen that related loans are granted to less solid and profitable projects than those of firms not affiliated to business groups (Almeida and Wolfenzon, 2006), and they may be given without a proper evaluation or without registering adequate guarantees. Sometimes, the combination of these actions may lead to problems of non-performing loans, damaging the bank's profitability. At times of economic crisis, these deficiencies in the granting of loans may compromise the bank's solvency and even put it at risk of bankruptcy (Akerlof and Romer, 1993; La Porta et al., 2006). These situations prejudice the minority shareholders of the bank just as much, but in extreme cases can also affect depositors and employees. From another point of view, the inappropriate granting of related loans displaces credit from projects with a good economic impact to less profitable ones, which represents a social cost and obstructs economic growth. Thus, the smaller profitability of banks affiliated to business groups may indicate inadequate allocation of credit.

One aspect that stands out in the study of the different profitability of one type of bank or another, has to do with the possible efficiency of internal capital markets that form within the business groups. According to Shin and Stultz (1998), the internal capital markets are efficient when they direct resources to the best uses. On the other hand, if these resources are channeled into financing bad projects, subsidizing bad firms or profit seeking, the allocation of resources is distorted and deadweight costs are incurred. As bank loans form a part of the internal capital markets, the inappropriate granting of loans makes the market less efficient, and therefore, implies misallocated resources. Lee at al. (2005) point out that an inefficient capital market within a business group allows the controlling shareholders to transfer resources from one firm to another for personal benefit.

Is the profitability of banks affiliated to business groups the same as that of non-affiliated banks? The aim of this work is to determine whether there is a difference in the performance of

these two types of bank, in the context of a developing economy. A study is made for the case of Mexico between 2007 and 2011. The example of this country is particularly interesting because the banking system includes foreign banks that dominate the market, banks of different sizes linked to business groups with national capital, and a third kind of bank, nearly all of them small, that may be national or foreign, and occupy a particular niche in the market. Although there is plenty of literature on the effects of business group affiliation on the profitability of firms, there has been almost no research on commercial banks.[2] This study introduces initial evidence about this subject.

In the present work, estimates were made with weighted least squares and, additionally, analysis was conducted of panel data with random and fixed effects, and also with Hausman-Taylor estimator. The outputs of all the models suggest that the banks affiliated to business groups in Mexico show less profitability than the non-affiliated banks, which might be associated with the inadequate provision of related loans to other firms in the group. These loans benefit the interests of the majority shareholders in the business network, but propitiate a misallocation of resources that affects the minority shareholders of the bank and extends to other sectors of the economy, as credit to promising ventures is displaced and goes to other projects that are less advantageous for society.

The second part of this paper provides a brief explanation of the system of commercial banks that operates in Mexico, and of its relation to the system of business groups. The third part reviews the literature on affiliation to business groups and profitability, highlighting the differences between the study of non-financial firms, and that of banks. The fourth section explains the role of banks affiliated to groups as part of an internal capital market, which may

[2] We have found only one paper focusing on profitability in banks affiliated to business groups.

provide a reason for why the behavior of these banks is different to that of non-affiliated banks. The fifth section explains the data base, the models to be estimated and the associated tests for determining whether there is a statistical difference between banks affiliated to business groups, and others. The sixth part presents econometric findings. Part seven gives the conclusions.

2. Banks and business groups in Mexico

The study of contemporary banking in Mexico can start with the nationalization of the banks in 1982, when Mexican banks had been operating through a scheme of universal banking for less than ten years.[3] The period of nationalized banking lasted nearly ten years and the results were poor. At this time the activities of the banks were directed by the national government's criteria for economic policy and management consisted mainly of public officials (Del Ángel, 2007). These two factors led commercial banks to direct a large amount of their loans to financing the national government.

Another result of the situation at this time was a process of market concentration through fusions. Of the roughly 60 banks that were nationalized, only 18 were left in 1988, and these were then reprivatized in the years 1991-1992. Back in private sector hands again, the banks began to operate in line with the traditional structures of corporate governance in Mexico, that is, with ownership concentrated, few counterweights to the decisions of majority shareholders, and strong relations with groups of non-financial companies, as those who purchased the banks were precisely the controlling shareholders of these groups. In other words, the privatized bank re-accommodated itself in the system of business groups that had been around since the end of the 19th century.

[3] In 1976 a scheme of multiple banking had been initiated, allowing a bank to conduct operations in savings, deposits, financial intermediation, trust fund operations and mortgage activities.

Mexican business groups represent a particular combination of elements of corporate governance; these are business networks in which companies are connected to each other through long-term relationships, with controlling companies and interlocking directorates (Castañeda, 1998). Ownership of firms in the group is highly concentrated and the majority shareholders participate directly in the control and running of the businesses. It is very common for the firms to finance themselves through debt and not through the sale of shares, which allows the controlling shareholders to keep ownership highly concentrated.

The commercial banking system in Mexico has contributed to the system of business groups and coexists with it. One of the signs of this relation is the provision of related lending, which has been common in many Mexican banks, and was an extremely harmful practice during the macroeconomic crisis that started in 1994 (and led to the Tequila effect), as a large part of these loans was never repaid (La Porta *et al*., 2003). This macroeconomic crisis presented itself soon afterwards as a banking crisis which led to government intervention in several banks and the de-capitalizing of the system, which opened the door for the majority of the big banks of the system to be sold to foreign financial groups.

Currently there are three types of bank: a) Big banks that are subsidiaries of foreign banks, and are run by managers who are nearly always from the country of the controlling bank. b) A collection of fifteen banks belonging to a Mexican business group.[4] With just one exception,[5] these are banks that were formed after the reprivatization of the system and some of them have been operating for less than ten years; these banks are controlled by majority shareholders who form part of the management bodies. c) A group of over 20 banks who operate in specific niches,

[4] The banks in this set can be seen in Chavarín (2012), p.15.

[5] The single exception is Banorte, the only bank after the reprivatizations of 1991-1992 whose majority shareholders managed to keep their ownership following the banking crisis.

nearly all of them on small scale; some of them are foreign owned and are located in the corporative banking sector.

3. The profitability of a firm and affiliation to business groups

The functions taken into account for modeling the determinants of a firm's profitability have been used in various fields of economics, finance and the sociology of organizations (Hansen and Wernerfeld, 1989; Slade, 2004). Among the relevant explanatory variables proposed by these approaches the most outstanding are the size of the company, its age, growth of sales, leverage, its concentration ratios, the characteristics of the industry it competes in, the systemic risk it faces, some indicators for the inner workings of the organization, and certain macroeconomic variables such as inflation and per capita income. More recently the field of corporate governance has focused on estimating the impact of variables of ownership and control of the firm on its profitability (La Porta et al., 2000; Spong and Sullivan, 2007).

With the development of studies on business groups, the variable of affiliation to a group was introduced into the performance functions for analyzing firms. As mentioned above, it is common in papers of this type for certain variables of control to be considered, principally size, growth and leverage, but also the type of industry the company competes in, and certain variables of its macroeconomic and institutional environments.

Among the first studies to introduce affiliation to a group as an explanatory variable in the performance of firms, are those of Caves and Uekusa (1976), Chang and Choi (1988), Chang and Hong (2000), Keister (1998), Khanna and Palepu (2000a y 2000b), Khanna and Rivkin (2001) and Claessens *et al.* (1999a). These works report divergent evidence for the impact of group affiliation on the profitability of companies. For example, Khanna and Rivkin (2001) studied 14 countries and found that in 6 of them affiliated companies performed better than the non-affiliated, while in 3 countries they performed worse than the non-affiliated. In 5 countries they

found no difference between the two types of firm; Mexico was included in this group of countries.

In recent years there has been an abundance of papers on group affiliation and profitability at firm level in various countries. Carney et al. (2011) found 141 studies of this type on 28 countries, although many of these studies concentrated on just a few countries: Japan, South Korea, India, Taiwan and China, mainly. The only Latin American country to have been the subject of several studies is Chile. The same authors found that business group affiliation generally lessens the performance of companies, however affiliated companies perform relatively better in contexts where financial and labor market institutions are not very developed. Among the findings they report some are for various Latin American countries, economies with similar corporate structures and levels of development. The authors did not find a statistically significant effect for group affiliation on performance in Argentina, Brazil, Mexico or Peru, however they point out that findings for these four countries are not robust due to an insufficiency of data. Only in Chile and Colombia did they find significant effects, and in both cases the effect is positive.

Examples of recent literature on group affiliation and performance include studies by Chu (2004), who found a favorable effect on the performance of firms affiliated to the largest groups in Taiwan; Buysschaert et al. (2008) who reported a lesser performance by affiliated companies compared to independent companies in Belgium; Gunduz and Tatoglu (2003), who found a positive effect for group affiliation in Turkey; Shumilov (2008), who presented evidence for gains in productivity in affiliated firms in Russia, gains that do not translate into greater profitability; Singh and Gaur (2009) who found that in India and China firms affiliated to a group perform worse than non-affiliated firms, the negative effect being greater in the first of these two countries; and Silva et al. (2006) who found that affiliated companies in Chile improved their performance under certain conditions of ownership and control.

One conclusion that may be drawn from a revision of the literature is that the effect of group affiliation on performance is an empirical question and may depend on the state of institutional development in each country, even though the survey by Carney et al. (2011) emphasizes a heterogeneous set of factors that might explain the relevance or irrelevance of group affiliation, highlighting the strategic choices of the firms.

However, with only one exception (Deb and Murthy, 2010), studies conducted on the subject have focused on non-financial companies, leaving the banking industry aside. To study the effect of group affiliation on the profitability of a bank, the determinants change somewhat from those considered for non-financial companies. For the case of a bank, the control variables reflect the particularities of this activity, and there is a whole literature on the determinants of bank profitability. Examples of this literature include the works of Berger (1995) for the United States and Demigüc-Kunt and Huizinga (1999) for a collection of 80 countries. Examples of more recent works are provided by Athanasoglou et al. (2006), Bolt et al. (2012), Dietrich and Wanzenried (2014), Flamini et al. (2009), Goddard et al. (2004), Micco et al. (2007), and Staikouras and Wood (2004), who cover a variety of countries.

Studies of the determinants of bank profitability suggest the following factors need to be controlled in a function of profitability: size, capital adequacy, liquidity, credit risk, exposure to risk, activity mix, expense management, and market concentration. A model for the banking industry that will relate profitability to group affiliation, should include control variables to measure the factors mentioned.

4. Internal capital markets in business groups with affiliated banks

The role of a bank in a business group may be defined as part of an internal capital market. While these markets function in conglomerates of economies with developed financial markets

(Gertner et al., 1994; Stein, 1997), in many countries with business groups they are an alternative to poorly developed external capital markets.

In a business network, the coordinating firms organize a capital market inside the network that works above all in situations where financial markets are tight. When traditional forms of financing are limited, the surplus financial resources of each company in the network, or those obtained through banking connections, can be redistributed to the most profitable projects of the group, or to capitalizing companies with problems (Castañeda, 2005; Gopalan *et al*., 2007), as in the wider sense, an internal capital market includes not only transfers but also credit markets and equity markets (Samphantharak, 2006). Although an internal capital market can work even without a bank in the group, the presence of one adds to the possibility of banking finance through the practice of related lending.

Taking part in this type of internal market may be positive for the profitability of a bank when it has ample knowledge of the real financial situation of a particular company, and, as a product of this knowledge, finances competitive projects with a good risk profile proposed by the company – something like the "smarter-money" effect (Stein, 2003). From this point of view, the operation of internal capital markets can improve the efficiency of allocating resources to firms affiliated to business groups (Hoshi *et al.*, 1991; Khanna and Palepu, 1997; Perotti and Gelfer, 2001; Almeida and Chang, 2012).

However, in economies where family business groups prevail, capital tends to be awarded to projects that might be less profitable than those of firms not affiliated to business groups (Almeida and Wolfenzon, 2006). It may also be that loans with a high risk profile are granted, without having made a proper evaluation or without obtaining adequate collateral. According to Deb and Murthy (2010), when the interest rates do not reflect the risky profile of the loan, the firms benefiting from the loan transfer an additional risk to the bank that it would not be exposed

to from a loan agreed to on the basis of market conditions. Another inconvenience pointed out by the same authors is that the bank may concentrate its loans on firms in the group it is affiliated to, thus losing the benefits of diversifying its loan portfolio, and increasing its exposure to risk even more. Behavior such as this becomes more extreme when the nucleus of the business network is in non-financial activities, making the bank just a complementary business. Therefore, the monitoring function of the bank is weak and in favor of the interests of controlling shareholders (Gonenc, 2009; Unite and Sullivan, 2003).

It is generally assumed that banks not affiliated to business groups grant loans according to market criteria, that is, evaluating and selecting those projects they consider the most competitive and with the best risk profile. Banks affiliated to business groups might follow the same criteria as non-affiliated banks and, on average, obtain the same profitability. But affiliated banks might also provide related loans to other firms in their group, under conditions unfavorable for the bank, in which case the loans would usually be less profitable than those granted by non-affiliated banks. If however the affiliated banks should take advantage of the smarter money effect, then they could obtain a higher profitability on average than non-affiliated banks. The hypothesis to be tested in this paper is that banks affiliated to business groups are less (more) profitable than non-affiliated banks. If there is evidence to support this thesis, it might be because the affiliated banks are following one of the patterns of granting loans described above.

5. Data and empirical model

The data used come from 45 commercial banks which account for all commercial banks operating in Mexico during the period 2007-2011. Of these, 35 banks provide information for all five years; the others entered or left the market during the period. As certain accounting rules came into force at the beginning of 2007, the period considered permits the data used to be homogeneous. It should be noted that it was during the middle of this period that the international

financial crisis took place. Although this crisis contributed to reducing the economic growth of Mexico, it did not have a direct impact on the banking system of the country; the effects were more indirect, through economic activity, with no bank in danger of bankruptcy and only two that reported considerable losses.

Most of the data were obtained from the appropriate sections of the information portfolio of the National Commission of Banking and Stocks, Comisión Nacional Bancaria y de Valores, which is the regulating body of banks in Mexico. The portfolio contains information on the make-up of loans, capitalization and other indicators of banking activities; it also includes the financial statements of each bank.6 Some information that was lacking for certain banks was obtained from the annual reports on the corresponding web pages. The variable of group affiliation was constructed on the basis of information in Chavarín (2012).

The form of the data base allows various options for estimating the possible differences of profitability between affiliated and independent banks. An initial estimation approach uses weighted least squares (WLS) as this eliminates the high volatility of annual financial data and avoids problems with standard errors; it also takes into account the fact that the variable of group affiliation does not vary over time. The WLS regressions are the between regressions using average values over the sample period. As some of the banks do not have information for every year of the sample, the weights in the regressions were made on the basis of the number of annual observations of each bank. The disadvantages of this type of estimation are, firstly, that it does not exploit the information in panel form; and secondly, that the number of banks is only 45 which represents a reduced size of sample. The model is the following:

[6] Following the usual procedure, all the information available was evaluated, and some figures that presented anomalies or inconsistencies were excluded.

$$profitability_i = \beta_0 + \partial_0 group\ affiliation_i + \boldsymbol{x}_i'\boldsymbol{\beta} + u_i\ , \quad (1)$$

where:
$\boldsymbol{x}_i'$ = vector of control variables: $X_1, X_2, \ldots, X_K$
u_i = error.

A second estimation approach uses a panel structure for the data base and has the advantage of being able to employ a larger number of observations (as many as 202 with some variables). As the variable of group affiliation does not vary over time, the regression is made through random effects. The disadvantage of this type of estimation is that the estimators may be inconsistent if subsequent tests reveal that it is more appropriate to use a fixed effects model. The model is the following:

$$profitability_{it} = \alpha_i + \delta_0 group\ affiliation_i + \boldsymbol{x}_{it}'\boldsymbol{\beta} + \varepsilon_{it}\ , \quad (2)$$

where:
α_i = random individual-specific effects.
$\boldsymbol{x}_{it}'$ = vector of control variables: $X_1, X_2, \ldots, X_K$
ε_{it} = idiosyncratic error.

Generally studies of group affiliation focus on analyzing results obtained for the variable of affiliation. But here it is considered that it is also useful to identify any difference that there may be between affiliated and non-affiliated banks, testing the H_0 that all the banks follow the same regression function, against the H_1 that one or more of the slopes will be different in the two groups. To do so it is necessary to introduce the interaction effects of the group affiliation variable on control variables, and then estimate a test for the exclusion restrictions. This is done for the two estimation approaches mentioned. Regressions are made that include all possible interactions,[7] but cases with a single interaction are also estimated. The models with interactions are these:

[7] These regressions may have high collinearity due to correlation between the interactions.

$$profitability_i = \beta_0 + \delta_0 group\ affiliation_i + \boldsymbol{x}_i'\boldsymbol{\beta} + group\ affiliation_i \boldsymbol{x}_i'\boldsymbol{\delta} + u_i\ , \quad (3)$$

$$profitability_{it} = \alpha_i + \delta_0 group\ affiliation_i + \boldsymbol{x}_{it}'\boldsymbol{\beta} + group\ affiliation_i \boldsymbol{x}_{it}'\boldsymbol{\delta} + \varepsilon_{it} \quad (4)$$

Note that $\boldsymbol{\delta} = [\delta_1, \delta_2, \ldots \delta_k]$, so that the H_0 that profitability follows the same model for the two types of bank is expressed through exclusion restrictions:

$$H_0 = \delta_0 = 0, \delta_1 = 0, \delta_2, = 0, \ldots, \delta_k = 0 \quad (5)$$

Once the model (4) has been estimated, if it happens that the use of random effects is not the most appropriate, then a model of fixed effects is estimated with the aim of obtaining more consistent estimators. In which case it is not possible to include the variable of group affiliation, but the terms of interaction with this variable may be included, and this allows the indirect effects deriving from it to be evaluated as being significant or not. The models to be estimated and their tests of exclusion restrictions are these:

$$profitability_{it} = \alpha_i + \boldsymbol{x}_{it}'\boldsymbol{\beta} + group\ affiliation_i \boldsymbol{x}_{it}'\boldsymbol{\delta} + u_{it}\ , \quad (6)$$

$$H_0 = \delta_1 = 0, \delta_2, = 0, \ldots, \delta_k = 0 \quad (7)$$

Finally, should it be necessary to estimate the model (6), as it is not possible in the regressions of fixed effects to estimate the variable of group affiliation, the Hausman-Taylor estimator will be used, which is an instrumental variables estimator that enables the coefficients of time-invariant variables to be calculated. This model assumes that some regressors are not directly related to fixed effects, while other variables are treated as endogenous. This last assumption is useful for the objectives of this work, because recent literature on the determinants of bank profitability includes endogenous variables in the functions to be estimated (especially the variables that measure the level of capital). The model is the following:

$$profitability_{it} = \alpha_i + \delta_0 group\ affiliation_i + \boldsymbol{x}_{it}'\boldsymbol{\beta} + \boldsymbol{\omega}_{it}'\boldsymbol{\gamma} + \varepsilon_{it}\ , \quad (8)$$

where:
α_i = individual fixed-effect.
$\boldsymbol{x}_{it}'$ = vector of exogenous variables: $X_1, X_2, \ldots, X_K$

$\boldsymbol{w}'_{it}$ = vector of endogenous variables: W_1, W_2,…, W_K
ε_{it} = idiosyncratic error.

The dependent variables included in the analysis are return on average assets (ROAA) and return on average equity (ROAE). In the case of Mexican banks it is not possible to include measures of valuation, like Tobin's q, because almost none of the banks quote in an equity market.

The control variables included in the study of WLS are the following:

1) *Size*.- The logarithm of the number of branches was included.[8]
2) *Capital adequacy*.- The logarithm of the regulatory capital indicator (capital-to-total risk weighted assets) was included.[9]
3) *Liquidity*.- The loans-to-deposits ratio was used.
4) *Expense management*.- The ratio of operating expenses-to-total assets was included.
5) *Market concentration*.- The market share variable was included with respect to credit market.

For analysis of panel data another three control variables were included as the number of observations is greater and, above all, because the inclusion of more control variables contributes to the correlation of non-observable effects to the term of error but not to the explanatory variables. The additional variables are these:

6) *Credit risk*.- The ratio of provision for loan losses-to-total loans was used.

[8] Two variables were alternatively considered that are indicators of the size of a bank: the logarithm of assets and the logarithm of the number of branches, which present a high correlation to each other (0.5686, p-value = 0.0000). We reported the outcomes obtained with the latter.

[9] Two variables were alternatively considered that are indicators of the level of capital of a bank: the equity-to-assets ratio and the logarithm of the regulatory capital indicator (capital-to-total risk weighted assets), which present a high correlation to each other (0.7681, p-value = 0.0000). We reported the outcomes obtained with the latter.

7) *Exposure to risk*.- The ratio of risk weighted assets-to-total assets was included, to control for differences in risk across banks, as the variable used to measure credit risk only reflects the realization of past credit decisions.
8) *Activity mix*.- The ratio of non-interest revenue-to-total revenue was included.

Table 1 presents the descriptive statistics of the variables included in the reported findings. It can be see that for the sample of 45 banks, the period studied is, from the point of view of ROAE, one of modest profitability, and according to ROAA one of slightly negative profitability. These figures for profitability may seem to contradict to some extent the argument presented above that the commercial banks established in Mexico did not suffer a direct impact from the international financial crisis. However, the means of these variables were affected by the results of two banks that showed considerable losses during the period studied,[10] provoked by problems of non-performing loans. If the two banks are excluded from the sample, the mean of the ROAA is 0.0025 and that of the ROAE, 0.0705, both positive, and closer to their medians, especially in the case of ROAE. Dividing our sample into affiliated and non-affiliated banks, the former shows a smaller mean (and median) than the latter for both measures of profitability. Table 1 also presents the tests of differences in means and differences in medians. Firstly, the t-tests reject that the ROAA means are statistically equal among affiliated and non-affiliated banks, and the same applies for ROAE means. Secondly, the Wilcoxon rank-sum test also rejects that the ROAA medians are statistically equal among the two types of bank; and the same conclusion is reached for the ROAE.

INSERT TABLE 1 ABOUT HERE

[10] These are Banco Walmart de México and Banco Fácil. The former had an average ROAA of –0.4404 and an average ROAE of –0.7087. The latter had an ROAA of –0.2193 and an ROAE of –0.4051.

Table 2 presents the pairwise correlations between the measures of profitability, the variable of group affiliation and the characteristics of the 45 banks in the period 2007-2011. It can be seen that the banks linked to business groups are associated with a smaller profitability measured by the ROAA and the ROAE. The same banks tend to be larger in terms of having more branches, and to have smaller ratios of regulatory capital. There are other interesting correlations among the remaining variables. For example, the operating expenses, the provisions for loan losses and the regulatory capital are associated with smaller profitability.

INSERT TABLE 2 ABOUT HERE

6. Results

The first set of results is presented in Table 3 and corresponds to the regressions with WLS that include robust standard errors. Group affiliation is not significant for the ROAA but it is for the ROAE, though at 10 percent significance; in both cases the sign is negative. When the interactions are added, some of these turn out to be significant individually, but the most important point is that the δ_k coefficients turn out to be significant as a whole, which implies that the affiliated banks and the non-affiliated do not follow the same regression function, as one or more slopes differ between the two groups. This finding is present both for the ROAA and for the ROAE. An additional advantage of including the interactions is that these allow the value of the coefficient of group affiliation to be obtained at the level of the sample means of the control variables.[11] The coefficients of the group affiliation variable are negative and close to those obtained with regressions made without interactions, both for the ROAA and for the ROAE. In

[11] The interactions of Group* X_j are replaced by the interactions of Group*($X_j - \bar{X}_j$), where $\bar{X}_j$ is the sample mean of the variable, and then the regressions are made again. With respect to the original regression, the only changes are in the values of the coefficient and the standard error of the group affiliation variable.

both cases the coefficients are significant and present smaller standard errors than those obtained in basic outcomes.

INSERT TABLE 3 ABOUT HERE

All the procedures described in the previous paragraph were repeated with the data for Banco Walmart de México and Banco Fácil excluded, banks that reported, as mentioned, considerable losses. Table 4 shows the results of WLS for this other version of the data base. In this case there is more solid evidence for group affiliation meaning smaller profitability than for banks in the other category. For the case of ROAA, both regressions yield a negative and significant coefficient for the group affiliation variable, although the standard error obtained is smaller when the interactions evaluated in sample means are included. For the case of the ROAE, the coefficients are also negative and significant, but for regression without interactions the standard error is smaller.

INSERT TABLE 4 ABOUT HERE

The larger size of the data base in panel form allows the analysis to be widened. Table 5 presents the findings of the regressions through random effects for the whole set of banks during five years (2007-2011), taking the ROAA as a dependent variable (left side of Table) and including cluster-robust standard errors. In the first instance, group affiliation turns out to be significant at 10 percent, controlling by size, capital adequacy, liquidity, credit risk, exposure to risk, expense management, activity mix, and credit market share. Also, the majority of these variables are significant. In the second instance, to the regression base is added the interaction between group affiliation and regulatory capital. The result shows, that for higher levels of regulatory capital, banks affiliated to groups have smaller profitability than non-affiliated banks. The remaining interactions, estimated one at a time, do not present solid results that can be emphasized (results not reported). With all the interactions included in a single estimation, the

test of exclusion restrictions reveals that affiliated and non-affiliated banks do not follow the same regression function, so that in statistical terms they form different sets. The values of group affiliation evaluated at the level of the sample means of the control variables are negative and their standard errors are very similar, although greater than in the basic outcome.

Table 5 (right side) also shows the findings obtained through random effects with ROAE as a dependent variable. In this case group affiliation is negative and significant to 5 percent. Further, the values of this coefficient estimated at the level of the sample means of the control variables are very similar to those in the first case, though with slightly smaller standard errors. Among the findings shown, there is a regression with the interaction between group affiliation and regulatory capital. The coefficient is negative and significant, indicating that for the higher levels of capital, banks affiliated to groups are less profitable than the unaffiliated. Finally, the model that includes all the interactions indicates rejection of the H_0 that the two sets of banks follow the same regression function. The set of results obtained through random effects coincides with those of WLS: the banks affiliated to business groups present lower profitability (measured by ROAA and ROAE) than that of the non-affiliated. These results are very similar when extracting the two banks with significant losses (results not reported). It would be interesting to analyze all these findings making a distinction between banks of different sizes, but the data base is not large enough to be divided into three or four parts.

INSERT TABLE 5 ABOUT HERE

To verify whether the estimates made through random effects produced consistent coefficients, the Hausman test was conducted including all the control variables (which are time-varying regressors) and group affiliation. The version of the test used is one that specifies that both covariance matrices are based on the same estimated disturbance variance from the efficient estimator. According to this test, it is not clear that the results obtained by random effects can be

discarded, especially when the dependent variable is ROAE.[12] The standard Hausman test, which does not assume efficient estimators, gives basically the same results. Finally, the robust Hausman test was applied, which is more appropriate when the estimator of random effects is not totally efficient. In this case, there is indeed more evidence for making estimates with fixed effects.[13]

Considering the results of this last test, estimates were made of fixed effects (see Table 6) including, in one case, only the interaction between group affiliation and regulatory capital, and in the other, all the interactions with the aim of making tests of exclusion restrictions. In these cases, although the direct effect of group affiliation cannot be estimated, the possible combined significance of its indirect effects can be measured. Firstly, the interaction between group affiliation and regulatory capital gives results very like those obtained through random effects, both for ROAA and for ROAE; that is, the values of the coefficients are very approximate, have a negative sign, and are significant. Secondly, the regressions that include all the interactions reveal that the δ_k coefficients turn out to be significant in combination, which validates the indirect effects of group affiliation. This result remains for outcomes with ROAA and ROAE.

INSERT TABLE 6 ABOUT HERE

As a robustness check, the models of random effects and fixed effects were re-estimated with a version of the data base without the banks specialized in corporative banking. With 11 such banks removed the data base kept 34 banks with annual observations for the period 2007-2011. The findings are not reported but are consistent with those obtained for the complete data base.

[12] The results of the test were: a) for the regression with ROAA: $chi^2(8) = 13.61$, $prob>chi^2 = 0.0926$; b) for the regression with ROAE: $chi^2(8) = 8.27$, $prob>chi^2 = 0.4072$.

[13] The findings of the robust test were: a) for the regression with ROAA: $F(8,40) = 4.68$, $prob>F = 0.0004$; b) for the regression with ROAE: $F(8,40) = 3.16$, $prob>F = 0.0072$.

The coefficients of group affiliation are negative, significant and with values very close to those obtained in the previous cases. Also the δ_k coefficients turned out to be significant in combination both in random effects and in fixed effects.

Finally, estimates were made with the Hausman-Taylor model considering as endogenous the variable of capital and the ratio of provision for loan losses. These two variables are treated as endogenous in recent literature on the determinants of bank profitability, specifically in the dynamic models of panel data. In the case of capital, it is considered that an increase in profits allows an increase in capital, especially because those banks that hope to achieve better performance transmit this information to the public and thereby increase their capital (Berger, 1995). In the case of ratio provision for loan losses, this is a predetermined variable, as the regulating bodies of the banks determine certain specific standards for the level of provision against credit risks. According to these standards and observation of the performance of the loans portfolio in previous periods, the managers of each bank decide the levels for this variable (Athanasoglu, 2008).

INSERT TABLE 7 ABOUT HERE

Table 7 presents the results of the regressions through the Hausman-Taylor estimator, including all the control variables. The first two columns contain the outputs when the dependent variable is the ROAA, for the case of the total sample of the banks (first column) and for the case where the two banks reporting large losses were excluded (second column). In both versions of the sample, the variable group affiliation turns out to be significant, with a negative sign and with values that are almost identical to those obtained through WLS and random effects. The third and fourth columns contain the outputs when the dependent variable is the ROAE. Equally, for both versions of the sample of banks, the group affiliation variable turns out to be significant, with a negative sign and with values very like those obtained with other techniques of estimation.

7. Conclusions

The hypothesis in this paper has been that the profitability of banks affiliated to business groups may be different to that of non-affiliated banks, because the former are an important part of the internal capital markets of the business networks that they belong to. The participation of a bank in this type of internal market may be positive for its profitability when it makes use of the smarter money effect. However, in economies where family business groups prevail, it is common for capital to be assigned to projects that might be less profitable than those of firms not affiliated to groups, and this would harm the bank's profitability.

A data base has been analyzed for the commercial banks operating in Mexico in the period 2007-2011. The base consists of 45 banks – all the banks operating at the time. With these figures estimates were made through WLS, as well as panel data analysis with random effects, fixed effects and Hausman-Taylor estimator. The outputs of all the models are consistent with each other with respect to two main findings: 1) the group affiliation variable is negative and significant; and 2) the affiliated and the non-affiliated banks do not follow the same regression function, as one or more slopes differ between the two sets. The findings still hold for the two dependent variables employed in the analysis, ROAA and ROAE.

These findings suggest that the banks affiliated to business groups in Mexico show less profitability than the non-affiliated banks, which might be associated with the inadequate provision of related loans to other firms in the group. These loans benefit the interests of the majority shareholders in the business network, but propitiate a misallocation of resources that affects the minority shareholders of the bank and extends to other sectors of the economy, as credit to promising ventures is displaced and goes to other projects that are less advantageous for society.

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Table 1
Descriptive statistics

		All banks				
Variable	*Observations*	*Mean*	*Stand. Desv.*	*Median*	*Minimun*	*Maximun*
ROAA	202	-0.0139	0.1037	0.0074	-0.8293	0.2324
ROAE	202	0.0394	0.2256	0.0787	-1.2712	0.655
Group affiliation	202	-	-	-	0	1
Log (Number of branches)	198	3.1363	2.7557	3.0910	0	7.5294
Log (Regulatory capital)	201	3.2744	0.7944	2.9144	2.4217	5.9381
Loans-to-deposits	179	0.0159	0.0636	0.0084	0.0003	0.6503
Provision for loan losses-to-loans	182	0.0571	0.0872	0.0351	0	0.9780
Risk weighted assets-to-assets	201	0.6165	0.3013	0.5780	0.0585	1.6996
Operating expenses-to-assets	201	0.0881	0.1219	0.0346	0.0018	0.9539
Non-interest revenue-to-revenue	201	0.3907	0.9105	0.3665	-5.9018	7.4085
Market share	202	0.0247	0.0542	0.0024	0	0.2753
		Group affiliated banks				
ROAA	70	-0.0307	0.0860	0.0050	-0.3463	0.0372
ROAE	70	-0.0118	0.2241	0.0692	-0.8575	0.268
Group affiliation	70	1	0	1	1	1
Log (Number of branches)	67	4.1581	2.1566	4.7185	0	7.3626
Log (Regulatory capital)	70	3.0595	0.6466	2.7617	2.4751	4.8933
Loans-to-deposits	70	0.0102	0.0075	0.0089	0.0036	0.0608
Provision for loan losses-to-loans	70	0.0668	0.0664	0.0337	0	0.2878
Risk weighted assets-to-assets	69	0.7022	0.2524	0.6550	0.2336	1.3522
Operating expenses-to-assets	69	0.1004	0.1143	0.0401	0.0100	0.5122
Non-interest revenue-to-revenue	69	0.3322	0.8625	0.3478	-5.9018	2.2195
Market share	70	0.0197	0.0328	0.0047	0.0000	0.1239
		Non-affiliated banks				
ROAA	132	-0.0051	0.1113	0.0081	-0.8293	0.2324
ROAE	132	0.0667	0.2225	0.0817	-1.2712	0.6550
Group affiliation	132	0	0	0	0	0
Log (Number of branches)	131	2.6136	2.8866	1.3863	0	7.5294
Log (Regulatory capital)	131	3.3891	0.8431	3.0627	2.4217	5.9381
Loans-to-deposits	109	0.0196	0.0812	0.0077	0.0003	0.6503
Provision for loan losses-to-loans	112	0.0510	0.0977	0.0356	0	0.9780
Risk weighted assets-to-assets	132	0.5717	0.3156	0.5381	0.0585	1.6996
Operating expenses-to-assets	132	0.0817	0.1257	0.0322	0.0018	0.9539
Non-interest revenue-to-revenue	132	0.4212	0.9364	0.4250	-4.1690	7.4085
Market share	132	0.0274	0.0625	0.0013	0	0.2753
		p-value				
ROAA (*Difference of means*)	t-test	0.0957				
	t-test (Welch)	0.0721				
ROAE (*Difference of means*)	t-test	0.0184				
	t-test (Welch)	0.0190				
				p-value		
ROAA (*Difference of medians*)	Wilcoxon rank-sum test			0.0059		
ROAE (*Difference of medians*)	Wilcoxon rank-sum test			0.0287		

Descriptive statistics were calculated from the full sample for period 2007-2011.

Table 2

Pairwise correlation matrix of the variables used in the econometric analysis

Variable	ROAA	ROAE	Group affiliation	Log (Number of branches)	Log (Regulatory capital)	Loans-to-deposits	Provision for loan losses-to-loans	Risk weighted assets-to-assets	Operating expenses-to-assets	Non-interest revenue-to-revenue	Market share
ROAA	1.000										
ROAE	0.8868 (0.0000)	1.000									
Group affiliation	-0.1175 (0.0957)	-0.1658 (0.0184)	1.000								
Log (Number of branches)	0.0933 (0.1912)	0.1603 (0.0241)	0.2659 (0.0002)	1.000							
Log (Regulatory capital)	-0.3644 (0.0000)	-0.3954 (0.0000)	-0.1982 (0.0048)	-0.3422 (0.0000)	1.000						
Loans-to-deposits	-0.0224 (0.7659)	-0.0441 (0.5582)	-0.0718 (0.3395)	-0.0078 (0.9179)	0.3743 (0.0000)	1.000					
Provision for loan losses-to-loans	-0.1549 (0.0368)	-0.1654 (0.0256)	0.0882 (0.2362)	0.0578 (0.4437)	0.1228 (0.0996)	-0.0651 (0.3868)	1.000				
Risk weighted assets-to-assets	-0.0273 (0.7002)	-0.0604 (0.3940)	0.2062 (0.0033)	0.1954 (0.0058)	-0.2948 (0.0000)	-0.1415 (0.0595)	0.0119 0.8735	1.0000			
Operating expenses-to-assets	-0.6796 (0.0000)	-0.5843 (0.0000)	0.0728 (0.3041)	0.1184 (0.0976)	0.4869 (0.0000)	0.1233 (0.1010)	0.3804 (0.0000)	0.1149 (0.1052)	1.0000		
Non-interest revenue-to-revenue	0.0610 (0.3895)	0.0772 (0.2758)	-0.0465 (0.5120)	0.0371 (0.6045)	0.1191 (0.0930)	0.0749 (0.3207)	0.0188 (0.8021)	-0.2248 (0.0014)	-0.0496 (0.4846)	1.000	
Market share	0.1334 (0.0585)	0.2276 (0.0011)	-0.0682 (0.3351)	0.5922 (0.0000)	-0.2948 (0.0000)	-0.0583 (0.4380)	-0.0826 (0.2675)	0.1587 (0.0245)	-0.1947 (0.0056)	-0.0271 (0.7021)	1.000

Pairwise correlations were calculated from the full sample for period 2007-2011.
p-values are reported in parentheses.

Table 3
Weighted least squares regressions considering all banks

	Dependent variable			
Variable	*ROA*		*ROE*	
Log (Number of branches)	0.0115*	0.0186*	0.0249	0.0461**
	(0.0063)	(0.0105)	(0.0155)	(0.0222)
Log (Regulatory capital)	-0.0107	0.0215	-0.0475	0.0583
	(0.0201)	(0.0284)	(0.0637)	(0.0807)
Loans-to-deposits	0.4972	0.2136	0.8423	-0.1984
	(0.3625)	(0.3461)	(0.8661)	(0.8843)
Operating expenses-to-assets	-0.6132***	-0.8570**	-1.0874**	-1.6709**
	(0.2168)	(0.3337)	(0.4159)	(0.6656)
Market share	-0.4058	-0.5791	-0.5543	-1.0833
	(0.2417)	(0.4096)	(0.5628)	(0.9128)
Group affiliation	**-0.0321**	0.2499**	**-0.1061***	1.0022**
	(0.0264)	(0.1130)	(0.0562)	(0.3725)
Group*Log (Num. of branches)		-0.0199*		-0.0740**
		(0.0114)		(0.0300)
Group*Log (Regulatory capital)		-0.0775**		-0.2935***
		(0.0330)		(0.1024)
Group*Loans-to-deposits		-3.7137*		-10.5874*
		(1.9236)		(5.8089)
Group*Operating expenses-to-assets		0.6206*		1.5500**
		(0.3497)		(0.7234)
Group*Market share		0.7824		2.9613**
		(0.4706)		(1.1739)
Constant	0.0539	-0.0454	0.2563	-0.0812
	(0.0643)	(0.0940)	(0.1961)	(0.2609)
Number of observations	41	41	41	41
F	5.86	21.17	8.12	20.06
Prob > F	0.0003	0.0000	0.0000	0.0000
R^2	0.5718	0.6221	0.5365	0.6435
Test of exclusion restrictions				
F		3.32		3.70
Prob > F		0.0129		0.0075
Value of group affiliation considering		**-0.0457****		**-0.1396*****
interactions as:[a] Group*($X_j - \bar{X}_j$)		(0.0204)		(0.0421)

[a] $\bar{X}_j$ is the sample mean of variable X_j

Robust standard errors are reported in parentheses.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

Table 4
Weighted least squares regressions excluding two banks[a]

	Dependent variable			
Variable	*ROA*		*ROE*	
Log (Number of branches)	0.0029	0.0016	0.0101	0.0154
	(0.0031)	(0.0029)	(0.0145)	(0.0141)
Log (Regulatory capital)	-0.0224*	-0.0057	-0.0681	0.0093
	(0.0117)	(0.0124)	(0.0593)	(0.0671)
Loans-to-deposits	-0.0056	-0.5321**	0.0191	-1.5446*
	(0.2350)	(0.2538)	(0.8305)	(0.7724)
Operating expenses-to-assets	0.1669	0.5199*	0.2267	0.8147
	(0.2337)	(0.3045)	(0.5424)	(0.5460)
Market share	-0.0580	0.0058	0.0408	-0.0274
	(0.1012)	(0.0661)	(0.4111)	(0.4575)
Group affiliation	**-0.0445****	0.1880***	**-0.1254****	0.8865***
	(0.0177)	(0.0558)	(0.0519)	(0.3185)
Group*Log (Num. of branches)		-0.0083*		-0.0551**
		(0.0048)		(0.0242)
Group*Log (Regulatory capital)		-0.0667***		-0.2800***
		(0.0172)		(0.0886)
Group*Loans-to-deposits		3.6528		5.1640
		(2.3841)		(13.2422)
Group*Operating expenses-to-assets		-0.4269		-0.2192
		(0.3168)		(0.6924)
Group*Market share		0.3926**		2.3299***
		(0.1817)		(0.8082)
Constant	0.0730*	0.0061	0.2914	0.0117
	(0.0386)	(0.0393)	(0.1847)	(0.2102)
Number of observations	39	39	39	39
F	2.73	7.64	4.57	9.29
Prob > F	0.0296	0.0000	0.0019	0.0000
R^2	0.2813	0.7165	0.2850	0.6851
Test of exclusion restrictions				
F		7.25		5.15
Prob > F		0.0001		0.0012
Value of group affiliation considering interactions as:[b] Group*($X_j - \bar{X}_j$)		**-0.0351*****		**-0.1088***
		(0.0125)		(0.0614)

[a] The sample used in these regressions excludes Banco Walmart de México and Banco Fácil.

[b] $\bar{X}_j$ is the sample mean of variable X_j

Robust standard errors are reported in parentheses.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

Table 5
Random-effects regressions considering all banks

	Dependent variable					
Variable	*ROAA*			*ROAE*		
Log (Number of branches)	0.0104**	0.0111**	0.0135*	0.0144	0.0136	0.0222
	(0.0050)	(0.0051)	(0.0076)	(0.0142)	(0.0149)	(0.0193)
Log (Regulatory capital)	-0.0254	0.0232*	0.0271**	-0.0697*	0.0083	0.0038
	(0.0192)	(0.0123)	(0.0127)	(0.0404)	(0.0409)	(0.0400)
Loans-to-deposits	0.0092	-0.0397***	-0.0435***	0.0537	-0.0479	-0.0600
	(0.0206)	(0.0147)	(0.0136)	(0.0704)	(0.0644)	(0.0467)
Provision for loan losses-to-loans	0.1967***	0.1556***	0.1610***	0.2675*	0.2091	0.2577**
	(0.0370)	(0.0434)	(0.0456)	(0.1530)	(0.1657)	(0.1174)
Risk weighted assets-to-assets	0.0530***	0.0691***	0.0731***	0.0298	0.0577	0.0718
	(0.0186)	(0.0198)	(0.0248)	(0.0453)	(0.0492)	(0.0573)
Operating expenses-to-assets	-0.7220***	-0.7591***	-0.7896***	-0.9096***	-0.9708***	-0.8752***
	(0.1287)	(0.1342)	(0.1268)	(0.2209)	(0.2464)	(0.3084)
Non-interest revenue-to-revenue	0.0004	-0.0005	0.0025	0.0338**	0.0318**	0.0218
	(0.0052)	(0.0037)	(0.0036)	(0.0150)	(0.0145)	(0.0186)
Market share	-0.4371**	-0.3503**	-0.3953*	-0.0819	0.0914	-0.2348
	(0.1748)	(0.1699)	(0.2343)	(0.5110)	(0.5470)	(0.6994)
Group affiliation	**-0.0508****	0.2340***	0.3154***	**-0.1174****	0.3429*	0.5107***
	(0.0235)	(0.0585)	(0.0731)	(0.0586)	(0.1777)	(0.1904)
Group*Log (Num. of branches)			-0.0101			-0.0172
			(0.0098)			(0.0270)
Group*Log (Regulatory capital)		-0.0890***	-0.1139***		-0.1437***	-0.1904***
		(0.0195)	(0.0226)		(0.0512)	(0.0662)
Group*Loans-to-deposits			2.4952			15.9935**
			(2.9150)			(7.5401)
Group* Provision for loan losses-to-loans			-0.0132			-0.3610
			(0.1052)			(0.3635)
Group* Risk weighted assets-to-assets			-0.0242			-0.0652
			(0.0340)			(0.1118)
Group*Operating expenses-to-assets			0.2385			-0.6104
			(0.2046)			(0.9647)
Group* Non-interest revenue-to-revenue			0.0000			-0.0106
			(0.0071)			(0.0366)
Group*Market share			0.2149			0.2957
			(0.2794)			(0.9317)
Constant	0.0824	-0.0858**	-0.1052**	0.2973**	0.0320	0.0168
	(0.0673)	(0.0386)	(0.0422)	(0.1382)	(0.1359)	(0.1309)
Number of observations	174	174	174	174	174	174
Number of groups	41	41	41	41	41	41
Wald chi^2	357.80	596.38	2255.85	293.26	444.72	1127.87
Prob > chi^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R^2 within	0.7259	0.8095	0.8199	0.3696	0.4167	0.5028
R^2 between	0.5539	0.5986	0.5989	0.5028	0.5413	0.4910
R^2 total	0.5830	0.6371	0.6488	0.4510	0.4907	0.4728
Test of exclusion restrictions						
chi^2		21.15	68.79		12.97	52.51
Prob > chi^2		0.0000	0.0000		0.0015	0.0000
Value of group affiliation considering		**-0.0574****	**-0.0391**		**-0.1278****	**-0.0238**
interactions as:[a] Group*($X_j - \bar{X}_j$)		(0.0234)	(0.0243)		(0.0572)	(0.0549)

Random-effects regressions were calculated using full sample (panel data) for period 2007-2011.

[a] $\bar{X}_j$ is the sample mean of variable X_j

Cluster- robust standard errors are reported in parentheses.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

Table 6
Fixed-effects regressions considering all banks

Variable	*Dependent variable*			
	ROAA		*ROAE*	
Log (Number of branches)	0.0090	0.0094	0.0063	0.0263
	(0.0102)	(0.0146)	(0.0419)	(0.0453)
Log (Regulatory capital)	0.0195*	0.0210*	0.0002	0.0049
	(0.0111)	(0.0119)	(0.0377)	(0.0333)
Loans-to-deposits	-0.0657***	-0.0707**	-0.0998	-0.0961
	(0.0227)	(0.0285)	(0.1017)	(0.1016)
Provision for loan losses-to-loans	0.1586***	0.1660***	0.2263	0.2395**
	(0.0415)	(0.0413)	(0.1486)	(0.1130)
Risk weighted assets-to-assets	0.0687***	0.0682***	0.0589	0.0584
	(0.0200)	(0.0240)	(0.0434)	(0.0470)
Operating expenses-to-assets	-0.7656***	-0.7883***	-0.8999***	-0.7379*
	(0.1376)	(0.1408)	(0.3242)	(0.3674)
Non-interest revenue-to-revenue	-0.0007	0.0023	0.0349**	0.0276
	(0.0039)	(0.0038)	(0.0153)	(0.0204)
Market share	-0.1459	0.1773**	2.3140**	2.4213**
	(0.1679)	(0.1374)	(1.0002)	(0.9213)
Group*Log (Num. of branches)		-0.0009		-0.0270
		(0.0162)		(0.0548)
Group*Log (Regulatory capital)	-0.0880***	-0.1126***	-0.1353**	-0.1983***
	(0.0191)	(0.0192)	(0.0604)	(0.0625)
Group*Loans-to-deposits		4.8051*		25.1128***
		(2.5261)		(5.0157)
Group* Provision for loan losses-to-loans		0.0515		-0.1052
		(0.1597)		(0.3545)
Group* Risk weighted assets-to-assets		-0.0140		0.0499
		(0.0360)		(0.1460)
Group*Operating expenses-to-assets		0.2307		-1.3071
		(0.2399)		(1.2287)
Group* Non-interest revenue-to-revenue		-0.0001		-0.0329
		(0.0093)		(0.0445)
Group*Market share		-0.3991		-1.7094
		(0.3817)		(2.1091)
Constant	0.0047	0.0092	0.1322	0.1083
	(0.0500)	(0.0481)	(0.1393)	(0.1124)
Number of observations	174	174	174	174
Number of groups	41	41	41	41
F	71.89	122.01	79.28	165.57
Prob > F	0.0000	0.0000	0.0000	0.0000
R^2 within	0.8120	0.8246	0.4263	0.5288
R^2 between	0.2944	0.2379	0.3007	0.2367
R^2 total	0.3062	0.2595	0.2657	0.2092
Test of exclusion restrictions				
F		7.67		10.18
Prob > F		0.0000		0.0000

Fixed-effects regressions were calculated using full sample (panel data) for period 2007-2011.
Cluster-robust standard errors are reported in parentheses.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

Table 7
Hausman-Taylor regressions

Variable	*Dependent variable*			
	ROAA		*ROAE*	
	All banks	Without 2 banks[a]	All banks	Without 2 banks[a]
Log (Number of branches)	0.0063	-0.0019	0.0064	0.0025
	(0.0045)	(0.0044)	(0.0126)	(0.0134)
Log (Regulatory capital)[b]	-0.0312***	-0.0571***	-0.0794***	-0.1392***
	(0.0075)	(0.0080)	(0.0240)	(0.0284)
Loans-to-deposits	-0.0237	-0.0261	-0.0077	0.0227
	(0.0648)	(0.0524)	(0.2019)	(0.1827)
Provision for loan losses-to-loans[b]	0.2037***	0.1677***	0.2902***	0.3049***
	(0.0329)	(0.0294)	(0.1054)	(0.1060)
Risk weighted assets-to-assets	0.0510***	0.0181	0.0282	-0.0163
	(0.0158)	(0.0137)	(0.0497)	(0.0485)
Operating expenses-to-assets	-0.7259***	-0.2548***	-0.8618***	-0.0563
	(0.0473)	(0.0861)	(0.1477)	(0.3034)
Non-interest revenue-to-revenue	0.0001	0.0059	0.0354***	0.0283
	(0.0040)	(0.0052)	(0.0127)	
Market share	-0.2887	-0.0688	0.3061	0.3042
	(0.2572)	(0.2265)	(0.6810)	(0.6466)
Group affiliation	**-0.0500***	**-0.0454***	**-0.1129**	**-0.1250***
	(0.0299)	(0.0272)	(0.0737)	(0.0690)
Constant	0.1121***	0.2064***	0.3394***	0.5343***
	(0.0379)	(0.0370)	(0.1109)	(0.1203)
Number of observations	174	166	174	166
Number of groups	41	39	41	39
Wald chi^2	409.66	190.58	104.55	67.68
Prob > chi^2	0.0000	0.0000	0.0000	0.0000

[a] The sample used in this regression excludes Banco Walmart de México and Banco Fácil.
[b] This variable is considered time varying endogenous.
Standard errors are reported in parentheses.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.