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ORIGINAL ARTICLE

Risk governance, banks affiliated to business groups, and foreign ownership

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Abstract

The aim of the present work is to study the effect of risk governance on the profitability of a sample of listed banks in Mexico during the period 2007–2015. The evidence presented here shows that functions of risk governance have an impact of only slight significance on the profitability of banks, which suggests that the dispositions and recommendations for risk governance are only fulfilled in a limited way. One possible explanation for this finding is related to patterns of ownership structure, due to the presence of banks linked to business groups, that give risk management a secondary role while other objectives are given greater emphasis. However, in foreign-owned banks also there were no patterns very different from the previous ones. The results suggest that the effective size of the risk committee and the independence of the chair of this committee are the only relevant risk governance mechanisms in commercial banks established in Mexico.

Keywords Risk governance · Bank profitability · Business groups · Emerging markets

JEL Classification C23 · G21 · G34 · O54

Introduction

Studies of the international financial crisis have redirected research into the corporate governance of banks, and brought it to the analysis of risk management, differentiating it more and more from the study of non-financial firms. Risk management in the governance structure of banks, or risk governance, "is responsible for identifying, measuring, monitoring, controlling or mitigating, and reporting on risk exposures" (Basel Committee on Banking Supervision 2010, 18). The function of

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risk governance is fundamental because it helps banks to reduce the risk of suffering great losses (Ellul and Yerramilli 2013).

Strong and independent risk governance has become ever more important in line with the diversification of bank activities, moving from traditional practices (based on receiving deposits and making loans) to information-based activities, such as trading in financial markets and income generation through fees. The diversification of banking practices has increased exposure to different types of risk, whether financial, operational, or environmental, creating a complex mixture of these (Van Greunin and Brajovic-Bratanovic 2009). For example, financial risks such as those involving credit, liquidity and the interest rate, are related to each other in different ways, depending on the degree of stability of the economic environment (Diamond and Dybvig 1983; Drehmann et al. 2010; Baldan et al. 2012). To date, empirical research has focused mostly on studying the impact of risk governance on the performance of banks at times of crisis, in order to see whether particular risk management practices may be effective in reducing the various types of risk in difficult economic environments (Aebi et al. 2012; Ellul and Yerramilli 2013; Battaglia and Gallo 2015). However, the impact of risk governance in different contexts and distinct circumstances, and not just in a crisis, is still to be determined. In particular, there are a number of questions about emerging economies, where the banks tend to belong to business groups and are the main sources of finance for productive activities (Claessens and Yurtoglu 2013). This is precisely the case of the Mexican banking system, where there are contrasting schemes of corporate governance, as, in addition to banks linked to business groups, there are also independent national banks and foreign banks from developed economies.

In the case of Mexico, during the international financial crisis, as distinct from what happened in other countries, no commercial banks came close to bankruptcy, and of the 45 banks that made up the system at the time, only two of them reported important losses. However, in recent years, problems related with risk governance have been seen in some important banks: (1) An investigation that concluded in 2011 revealed that money laundering operations involving 7 thousand million dollars had been conducted through the Mexican division of HSBC. The bank was fined over 29 million dollars by the bank regulating body in Mexico (*la Comisión Nacional Bancaria y de Valores*, CNBV) for failures by the bank in its controls to prevent and detect this kind of illegal activity. The bank's US division was also fined, and had to pay much more than in Mexico.[1] (2) In 2014, Banamex (currently Citibanamex, a subsidiary of Citigroup), another of the biggest banks in the Mexican system, suffered the loss of 400 million dollars owing to loans it made to a fraudulent company called Oceanografía, which had used false information to get the loan. The bank was fined close to 2 million dollars by the CNBV because it did not have in place the necessary controls to avoid such a problem.[2] In respect of this case, the president of the CNBV declared publicly that one of the main concerns of the Mexican financial authorities is a failure to comply with aspects of the corporate

[1] See the press reports by Contreras and Espinosa (2012) and Treanor and Rushe (2012).

[2] See the press report by Estañol (2015).

[risk] governance of banks.[3] These examples show that certain deficiencies in the practice of risk governance have a negative effect on the profitability of the banks, in addition to the unfavorable impacts they may have on the rest of society as the result of an inefficient allocation of credit. By contrast, do general measures of risk governance have a favorable effect on the profitability of banks in a system with the characteristics shown by the banking sector in Mexico?

The aim of the present work is to study the impact of risk governance on the profitability of a sample of listed banks in Mexico, during the period 2007–2015. The work presented here makes two main contributions: First, to the best of our knowledge, this is the first study to combine an analysis of risk governance with the presence of banks related to business groups and foreign banks. Secondly, it is also the first study to address the effects of risk governance in a country of Latin America, a region of nations with similar patterns of corporate governance. Further, the present work has an advantage over other studies in so far as it refers to the literature on bank profitability. Based on this field of research, it is proposed to study the effects of corporate governance in a function where the lagged dependent variable is included as an independent variable, which implies estimating a dynamic panel data model. In general, researches into the impacts of corporate governance on the profitability of banks have omitted the dynamic character of the function of bank profitability, which can prejudice the reliability of the results obtained. As part of our analysis, the present work uses a dynamic panel data model, which also has advantages for solving possible problems of endogeneity, which are still a recurring concern in studies of corporate (or risk) governance.

The work presented here provides evidence that in the listed banks operating in Mexico, the functions of risk governance have an impact of very little significance on the profitability of the banks, which suggests that the dispositions and recommendations on risk management are fulfilled only to a limited extent. From the results obtained, the effective size of the risk committee and the independence of the chair of the risk committee are the only relevant risk governance mechanisms in commercial banks established in Mexico, and these mechanisms have a differentiated impact depending to the type of bank. Generally, the lack of significance of the risk governance variables still holds whether they are modeled as endogenous or exogenous in dynamic models. This finding also does not essentially change even in a static model. One possible explanation for these results has to do with the structure of ownership, as in banks linked to business groups the majority shareholders may take decisions to benefit the operation of the group as a whole, leaving risk management in a secondary role. In such a situation, the risk committees do not have enough independent members and the risk managers do not have real powers in the bank's important decisions. In short, the functions of risk governance will not have a real impact on the level of risk of the bank, or on its profitability. With regard to foreign-owned banks, they seem to have adjusted to this situation, as they do not show results that are very different from those of banks linked to business groups.

[3] See the press report by González and Román (2014).

This situation may have negative repercussions on the banks in any future economic shocks.

Section 2 provides a brief explanation of some contrasting elements in the current corporate governance of commercial banks in Mexico. Section 3 contains a review of the literature on the relation between bank profitability and risk governance, linking it to a number of research projects that emphasize the role played by the ownership structure in the degree of risk assumed by the banks. Section 4 provides an explanation of the database. Section 5 explains the models to be estimated. Section 6 sets out the econometric results. Section 7 gives the conclusions.

Corporate governance of the banks in Mexico today

Commercial banking in Mexico was nationalized from 1982 to 1991, and in 1991–1992 it was reprivatized. A large number of the reprivatized banks had solvency problems starting with the macroeconomic crisis faced by the country in the mid-1990s, which led to most of them being rescued by the federal government which capitalized them and then sold them off. During the period 2000–2002, the five biggest banks in the market were sold to foreign banks.[4]

Meanwhile, in the 25 years that have passed since the reprivatization of the banks, dozens of small scale banks have entered the market, most of them with national capital. Some of these have grown and merged with other banks, reaching a larger scale. Of the banks created since reprivatization,[5] fifteen belong to some nationally owned business group whose main activities are not in the financial sector.

In recent years, national and foreign banks have been operating in Mexico following contrasting patterns of corporate governance. As with the big non-financial companies, Mexican banks, whether independent or linked to business groups, show highly concentrated ownership, mainly in families. This type of concentrated ownership is reflected in the control and operation of these banks, as the presence and the decisions of the majority shareholders predominate on the boards of directors and in top management. Whereas the foreign-owned banks follow schemes of control and operation based on the decisions of executives detached from ownership of the bank. This type of corporate governance is expressed in boards of directors composed of managers from the country of the bank's head office abroad and Mexican executives.[6] These managers control the banks following guidelines decided in their various head offices.

[4] They became BBVA-Bancomer, Citibanamex, HSBC, Santander and Scotiabank.

[5] The one exception is Banorte, founded in the period prior to reprivatization.

[6] With the exception of Citibanamex, a subsidiary of Citibank, whose board of directors consists mainly of Mexican business people invited to join it.

Risk governance and profitability

The importance of corporate governance in the banking sector has been recognized by the Basel Committee on Banking Supervision, which has focused its recommendations on risk management. Particularly since the recent international financial crisis, it has published recommendations on this topic, and advises that "A bank should have a risk management function with sufficient authority, stature, independence, resources and access to the board." An important part of risk management is based on forming a risk committee "responsible for advising the board on the bank's overall current and future risk tolerance and strategy, and for overseeing senior management's implementation of that strategy." It also emphasizes the importance of a figure called the chief risk officer (CRO) who should be a manager dedicated exclusively to the management and oversight of risks to the bank, with direct access to the board of directors and the risk committee (Basel Committee on Banking Supervision 2010, p. 3, 12, 18). More recent recommendations by the Basel Committee have elaborated on the role and the characteristics of the risk committee, emphasizing that "the [risk] committee's work should include oversight of the strategies for capital and liquidity management as well as for all relevant risks of the bank, such as credit, market, operational and reputational risks, to ensure they are consistent with the stated risk appetite." It particularly stresses the independence of the risk committee, stating two conditions: that (i) it should include a majority of members who are independent, and ii) it should have a chair who is an independent director and not the chair of the board or of any other committee (Basel Committee on Banking Supervision 2015, p. 17).

The recommendations of the Basel Committee are based on the premise that banks with independent and solid risk management functions will be less exposed to risk, and that this will make a positive contribution to their profitability through the avoidance of certain operations that might bring losses. This hypothesis has been explored directly by some researchers, including Aebi et al. (2012), Ellul and Yerramilli (2013), Battaglia and Gallo (2015), and Nahar et al. (2016). The first two publications referred to examine the effects of risk management on the profitability of US banks during the 2007–2008 financial crisis. Aebi et al. (2012) found that banks with a better risk governance structure were more profitable during the financial crisis. They point out, in particular, the better performance of those banks where the CRO reported directly to the board of directors. They also reported that the standard variables of corporate governance did not turn out to be significant during the same period of crisis, maybe as a result of the fact that the boards of the banks had sought to maximize shareholder wealth before the crisis at the cost of increasing risks, which affected them later as the crisis developed. This finding coincides with those of Fahlenbrach and Stulz (2011) and Beltratti and Stulz (2012). Ellul and Yerramilli (2013) built a risk management index on the basis of which they studied a number of bank holding companies, and found that those that had a solid and independent risk management in operation before the crisis showed a lower degree of risk, a lower proportion of non-performing loans, and a better operating performance during the years of the

crisis. This finding is replicated to a large extent for the period 1995–2010 on the basis of lagged values in the risk management index. On the other hand, Battaglia and Gallo (2015) studied the relation between risk management and performance for a number of Chinese and Indian listed banks in the period 2007–2011. These researchers found that banks with a bigger risk committee also had greater profitability, although those with a smaller risk committee had a higher market valuation. Nahar et al. (2016) studied listed banks in Bangladesh for the period 2006–2012 and found that risk disclosure, the presence of a risk management unit and the number of risk committees are positively associated with the variables of profitability and valuation for the banks.

However, other researchers have found that the findings reached by some studies may vary in different contexts as the result of certain differences in other aspects of corporate governance, as ownership structure. The first studies to stand out are those of banks with high ownership concentration where obtaining substantial cash flow rights gives the owners power and incentives that are associated with greater bank risk-taking (Shleifer and Vishny 1986; Saunders et al. 1990; Levine 2004; Laeven and Levine 2009; Saghi-Zedek and Tarazi 2015), especially at times of economic uncertainty (Chen and Lin 2016). This behavior is only modified when the large shareholders have invested a significant amount of their wealth in the bank, which makes them more cautious (Spong and Sullivan 2007; Calomiris and Carlson 2016). Also, Laeven and Levine (2009) point out that the relation between risk and regulation is contingent upon each bank's ownership structure. For example, stricter rules on the level of capitalization of the banks are related to a greater exposure to risk when the bank has a shareholder with enough power of control.

As mentioned above in Sect. 2, in Mexico, banks affiliated to business groups are very important. It is recognized that where ownership is concentrated in families, various conflicts of interest arise in the businesses, and these become more acute when the company is part of a business group (Shleifer and Vishny 1997; Morck and Yeung 2003). In banks with this type of corporate structure, majority shareholders can take decisions that benefit themselves but harm the minority shareholders and the profitability of the bank itself (Chavarín 2016), making the level of exposure to risk a secondary consideration. In such a case, the dispositions and recommendations on risk governance may be assumed in a way that does not compromise the interests concerned in the overall running of the business group, so the function of risk management has no real impact on the level of risk of the bank, or on its profitability. This can happen if, for example, the banks appoint risk managers without giving them real powers, just to satisfy banking regulatory bodies (Ellul and Yerramilli 2013); or else if the risk committees were to meet only rarely and were not formed of truly independent members with enough financial knowledge (Hau and Thum 2009; Aebi et al. 2012). On the basis of these arguments, a first hypothesis in this work is that:

Hypothesis 1 Risk governance functions do not have a significant impact on the performance of banks linked to business groups.

However, there are also foreign banks in the sample studied. Even though a bank may have a particular risk and profitability profile in its own country, its branches in other countries can behave differently. All kinds of information on the role of foreign ownership of banks have been found, but there is a vein in the literature providing evidence to show that foreign banks perform less well than domestic banks when they are operating in a developed economy (De Young and Nolle 1996; Berger et al. 2000a; Lesink et al. 2008), although the opposite applies when foreign banks are working in emerging economies (Demirgüç-Kunt and Huizinga 2000; Claessens et al. 2001; Yeyati and Micco 2007; Chen and Liao 2011; Rokhim and Susanto 2013). This evidence is supported by several cases reported where foreign-owned banks have a lower risk profile than other banks (Laeven 1999; Crystal et al. 2002; Hasan and Xie 2013; Lassoued et al. 2016). The better performance of foreign-owned banks in emerging economies is attributed to their having easier access to capital markets, a greater capacity for diversifying risks, access to better technology, and a greater capacity for serving certain specialized customers (Berger et al. 2005). However, there are also reasons for the better performance of foreign-owned banks that can be explained in terms of corporate governance. It is claimed that foreign banks from developed economies have good standards of corporate governance in the areas of auditing, accounting and disclosure, credit risk underwriting, and supervision (Crystal et al. 2002) and that they contribute to raising the levels of corporate governance in the countries where they operate (Hasan and Xie 2013; Tunay and Yüksel 2017). Also, certain elements of corporate governance that the foreign-owned banks might have, contribute to reducing their risk profile (Chen and Lin 2016). It is to be expected that as a complement to the good structures of corporate governance, there would also be good risk management functions (Crystal et al. 2002), generating prudent levels of risk-taking and having a positive impact on the profitability of these banks. From these arguments, a second hypothesis is derived:

Hypothesis 2 Risk governance functions have positive and significant effects on the profitability of foreign-owned banks.

Database

The size of the sample to be used was determined by the availability of information on corporate governance, both for standard variables and for those of risk governance. The sample was of 24 banks listed on the Mexican Stock Exchange (*Bolsa Mexicana de Valores*) that provided information of this kind for any year in the period 2007–2015, though some of them did not provide information for each of the years studied as they removed themselves from the Stock Exchange list or left the Mexican banking system. The sample of 24 banks includes 11 banks forming part of a business group, 9 foreign banks, and 4 nationally owned banks that do not belong to any group. We obtained a sample comprising of 150 observations (banks affiliated to groups: 65, foreign banks: 65, and other nationally owned banks: 20). It is important to point out that the conclusions reached in the present work are only

valid for this sample of banks, although the sample does represent 92% of the total assets of the system in the year 2015.

Variables of risk governance

The variables of risk governance were established on the basis of information published in the annual reports that banks issuing shares or debt provide to the Mexican Stock Exchange. These variables are mostly concerned with the structure of risk committees, as the annual reports tend to mention only the existence and the membership of the committee. All the listed banks declared that they had such a committee for the period studied, but they do not mention the real frequency of their meetings or other details of their operations. They also fail to give consistent information on the existence and functions of a CRO. On the basis of hand-collected information, the following variables were established:

1. Size of the risk committee—This is the natural logarithm of the total number of members of the risk committee. This variable measures the total size of the risk committee.
2. Proportion of members with voting rights in the risk committee—This is the proportion of members of the risk committee with the right to vote on the committee. In the banks established in Mexico, it is common for the risk committees to include members who can only give their opinion, and do not have the right to vote on decisions taken by the committee. This variable measures the effective size of the risk committee.
3. Relation of the size of the risk committee to the size of the board of directors—This is a dummy variable that assumes a value of 1 when the number of members of the risk committee is greater than the number of members with a place on the board of directors; in any other case, the variable assumes the value of 0. This variable measures the relative size of the risk committee.
4. Proportion of independent members of the risk committee—This is the proportion of members of the risk committee who are independent directors on the board of directors. This variable measures independence of the risk committee.
5. Independence of the chair of the risk committee—This is a dummy variable that assumes a value of 1 when the chair of the risk committee is an independent member of the board of directors; in any other case, the variable assumes the value of 0. This variable also measures independence of the risk committee.
6. Proportion of members of the risk committee that belong to the board of directors—This is the proportion of members of the risk committee who are members on the board of directors, whether they are independent or not. This variable measures the interrelation between the risk committee and the board of directors.
7. Presence of a chief risk officer—This is a dummy variable that assumes a value of 1 when there is an explicit reference to the presence of a CRO (or equivalent) in the public information created by the bank; in any other case, the variable assumes the value of 0. This variable measures disclosure about CRO.

Because of the importance referred to above about ownership structure and its relationship with bank risk-taking and profitability, the following variables were added:

8. *Group affiliation*—This is a dummy variable that assumes a value of 1 if the bank is part of a Mexican business group; in any other case, the variable assumes the value of 0.
9. *Foreign ownership*—This is a dummy variable that assumes a value of 1 if the bank is mainly foreign-owned; in any other case, the variable assumes the value of 0.

In order to rule out the possibility that the effects of risk governance on profitability might be attributed to unobserved differences in the standard variables of corporate governance, a corporate governance index was designed on the basis of questionnaires for measuring whether the banks follow the guidelines of corporate governance set out in the Code of Best Corporate Practices (*Código de Mejores Prácticas Corporativas*), which itself follows the principles suggested by the OECD. In the case of standard corporate governance characteristics, there is detailed information having to do with the functions of the shareholders meeting, the board of directors, the function of auditing, the functions of evaluation and compensation, and the functions of financing and planning. To construct the index of standard corporate governance characteristics, 121 questions on the questionnaire were considered for the period 2007–2009, and 137 questions for the period 2010–2015.[7] The same strategy for controlling the effects of corporate governance was applied by Aebi et al. (2012) and Ellul and Yerramilli (2013), who included the G-Index (Gompers et al. 2003) as a control variable. In the case of the present work, our index covers over 120 characteristics of corporate governance, including the size of the board of directors and the percentage of independent members among them. The main topics in this index can be found in Appendix A.

Table 1 shows the pairwise correlations between the governance variables described in this section. These correlations help to identify the risk governance variables to be included in each regression. For example, the total number of members of the risk committee will only be included in the same regression with the independence of the president of the risk committee or the presence of a CRO, as it presents very high and significant correlations with the other variables. In several of the regressions, it will be possible to include a variable linked to the size of the risk committee and a variable linked to the independence of the committee (see Table 6). The index of standard corporate governance variables does not have correlation problems with risk governance variables.

[7] To construct the index, a point was assigned for each answer from the questionnaire that showed accomplishment of some recommendation in the Code. The index was standardized between 0 and 1 by dividing the total number of positive answers by the total number of questions on the list. To the extent that the index approaches the value of 1, it means that the bank is fulfilling the majority of the recommendations in the Code.

Table 1 Pairwise correlation matrix of the corporate governance variables

Variable	Log (Number of members in the RC)	Members with voting rights in the RC	RC greater than BD	Independent directors in the RC	Chair of RC is independent	Board directors in the RC	Disclosure of CRO	CG index	Group affiliation	Foreign ownership
Log (number of members in the RC)	1.000									
Members with voting rights in the RC	− 0.6595 (0.0000)	1.000								
RC greater than BD	0.6494 (0.0000)	− 0.4007 (0.0000)	1.000							
Independent directors in the RC	− 0.5052 (0.0000)	0.3735 (0.0000)	− 0.2823 (0.0005)	1.000						
Chair of RC is independent	0.1679 (0.0400)	− 0.0188 (0.8198)	0.1689 (0.0388)	0.4056 (0.0000)	1.000					
Board directors in the RC	− 0.7613 (0.0000)	0.5485 (0.0000)	− 0.5292 (0.0000)	0.5559 (0.0000)	− 0.0922 (0.2617)	1.000				
Disclosure of CRO	− 0.0477 (0.5623)	0.0754 (0.3592)	− 0.0000 (0.9038)	0.0081 (0.9218)	0.1155 (0.1594)	− 0.0853 (0.2994)	1.000			
CG index	− 0.0305 (0.7114)	− 0.0771 (0.3485)	− 0.0690 (0.4016)	− 0.0058 (0.9436)	− 0.1627 (0.0467)	0.1480 (0.0707)	− 0.4154 (0.0000)	1.000		
Group affiliation	0.0370 (0.6533)	− 0.0016 (0.9849)	− 0.1131 (0.1682)	− 0.1393 (0.0892)	− 0.3295 (0.0000)	− 0.0685 (0.4048)	− 0.2378 (0.0034)	− 0.0561 (0. 4771)	1.000	
Foreign ownership	− 0.0144 (0.8613)	0.0928 (0.2587)	0.2234 (0.0060)	0.0252 (0.7597)	0.1211 (0.1400)	0.0517 (0.5299)	0.3812 (0.0000)	− 0.3014 (0.0001)	− 0.6156 (0.0000)	1.000

RC Risk Committee, *BD* Board of Directors, *CRO* Chief Risk Officer, *CG* Corporate Governance

Dependent and control variables

Details of the other variables were obtained from the information portfolio of the CNBV. The dependent variables included in the analysis are (i) the return on average equity (ROAE), and (ii) the return on average assets (ROAA). It is important to point out that in the case of banks in Mexico, it is not possible to include measures of valuation like Tobin's q because almost none of them (barely two or three depending on the year studied) issues shares in the stock exchange; most of them take part in the exchange through the emission of debt.

In theory, as international writings on the determinants of bank profitability suggest, the following factors need to be controlled in a function of profitability (e.g., Staikouras and Wood 2004; Athanasoglou et al. 2008; Flamini et al. 2009; Bolt et al. 2012; Dietrich and Wanzenried 2014; Tan 2016): size, capital adequacy, liquidity, credit risk, total exposure to risk, activity mix, and expense management. Here, we describe the variable used for each factor[8]:

(1) *Size*—Was measured according to the natural logarithm of the number of branches of each bank. Originally the idea was to use the natural logarithm of total assets,[9] but this number presented high pairwise correlations with the variables for capital adequacy (correlation: − 0.4131, $p = 0.0000$) and that of expenses management (− 0.3380, $p = 0.0000$). Table 3 shows that the correlations are considerably reduced with the change of variable.

(2) *Capital adequacy*.—The ratio of capital to total assets was considered. This variable measures the capacity of the banks to run their business in an integrated way, including their capacity for granting loans.

(3) *Liquidity*—The ratio of deposits to loans was included. It was originally proposed to use the inverse ratio, of loans to deposits,[10] but this variable presented high pairwise correlations with the variables for capital adequacy (0.6449, $p = 0.0000$) and total exposure to risk (0.5165, $p = 0.0000$). Table 3 shows that the correlations are considerably reduced with the change of variable. In such a case, we would expect the new variable chosen to carry a sign contrary to the variable commonly used. Both ratios measure the capacity of the banks to transform deposits into loans, and to provide funding for the growth of their assets.

(4) *Credit risk*—We used the ratio of provision for loan losses to total loans. This variable measures the capacity of the banks to absorb losses, as the provisions compensate for the deteriorated value of certain loans, and of interest payments not made.

[8] For several of the factors mentioned, information from Van Greunin and Brajovic-Bratanovic (2009) was included.

[9] The natural logarithm of the number of branches and the natural logarithm of total assets present a pairwise correlation of 0.6259, $p = 0.0000$.

[10] The ratio of deposits to loans and the ratio of loans to deposits have a pairwise correlation of − 0.5534, $p = 0.0000$.

(5) *Total exposure to risk*—We included the ratio of total risk-weighted assets-to-total assets. This variable makes it possible to control the differences in risk for different banks, as the variable measuring the credit risk only reflects the application of decisions on loans taken in the past.
6) *Expenses management*—The ratio of operating expenses to total assets was included. This variable measures the non-financial expenses of the banks, including the payment of wages, materials, information systems, and the payment of rents, mainly.
(7) *Activity mix*—We included the ratio of non-interest revenue to total revenue. This is income that does not come from charging interest and is basically the net worth of commissions, tariffs, and other payments.

Table 2 gives the descriptive statistics of the variables included in the econometric analysis. For purposes of comparison with the risk committee, the size of the board of directors was also included. Although the size of the risk committee has been turned into logarithms, at the end of Table 2, the reader can also find the average size of this body in absolute values. In the sample used in this work, the risk committee had an average size of 10.63 members, a much higher figure than the 3.81 reported for banks in the USA by Aebi et al. (2012), and the 3.96 reported for a sample of banks in China and India by Battaglia and Gallo (2015). According to these authors, "strong" risk governance implies having a small number of people on the risk committee, with as many as possible of them independent members, and a large number of meetings being held by the committee, but in banks working in Mexico, at least the first of these requirements is not being met. Just considering the number of people on the committees with a right to vote, the figure is high compared to that in other countries, with an average of 7.79 members per risk committee in Mexico. In fact, for banks operating in Mexico, the average size of the risk committees is almost equal than the average size of the board of directors (10.66), but there are cases of risk committees with up to 24 members. On the other hand, the average size of the boards of directors in Mexico is smaller than the size of boards reported in USA banks (12.89), in China and India (13.20) and for the 100 biggest banks in the world (14.6), according to Aebi et al. (2012), Battaglia and Gallo (2015) and Trayler (2007), respectively. It might be expected that banks affiliated to business groups would have larger risk committees than the risk committees in foreign-owned banks, but it is not so, as the average size of the committee is almost exactly the same in both types of bank, and also, in foreign-owned banks the risk committees are more frequently bigger than the board of directors. However, the foreign-owned banks appear to have two advantages over banks affiliated to business groups: (a) the chair of the risk committee is far more frequently found to be independent, (b) the disclosure rate of the CRO is also very much higher. In both types of bank, the percentage of members of the risk committee who are independent is low.

Finally, Table 3 shows the pairwise correlations between the dependent variable ROAE and the bank control variables, including also group affiliation and foreign

Table 2 Descriptive statistics

Variable	Full sample				Banks affiliated to business groups		Foreign banks	
	Mean	SD	Minimum	Maximum	Mean	SD	Mean	SD
ROAE	0.1254	0.1507	− 0.6739	0.6550	0.0924	0.1757	0.1090	0.1132
ROAA	0.0159	0.0544	− 0.3371	0.2323	0.0007	0.0608	0.0124	0.0305
Log (number of branches)	4.6200	2.5124	0.0000	7.6980	4.4041	2.1248	4.8256	3.2340
Log (assets)	11.2727	1.7270	6.5986	14.1747	10.9912	1.4694	12.0303	1.9392
Capital-to-total assets	0.1294	0.0959	0.0257	0.5663	0.1165	0.0893	0.1267	0.0669
Deposits-to-loans	1.5374	2.2540	0.0000	18.6099	1.1790	0.3076	2.0588	3.4620
Total risk-weighted assets-to-total assets	0.6713	0.2696	0.1142	1.5668	0.6353	0.2184	0.7525	0.2861
Provision for loan losses-to-total loans	0.0394	0.0310	0.0000	0.1656	0.0531	0.0394	0.0344	0.0244
Operating expenses-to-total assets	0.0628	0.0795	0.0030	0.3782	0.0642	0.0881	0.0346	0.0168
Non-interest revenue-to-total revenue	0.3557	0.5768	− 4.1690	3.0559	0.3770	0.3227	0.2680	0.8060
Log (Number of members in the Risk Committee)	2.2155	0.5875	0.6931	3.1780	2.2403	0.5811	2.2058	0.6129
Members with voting rights in the Risk Committee	0.7333	0.2315	0.2667	1.0000	0.7329	0.2304	0.7581	0.2324
Risk Committee greater than Board of Directors	0.4800	0.5012	0.0000	1.0000	0.4153	0.4966	0.6093	0.4917
Independent directors in the Risk Committee	0.1596	0.1371	0.0000	0.5000	0.1379	0.1407	0.1636	0.1301
Chair of Risk Committee is independent	0.4000	0.4915	0.0000	1.0000	0.2153	0.4142	0.4687	0.5029
Board directors in the Risk Committee	0.5157	0.2408	0.1250	1.0000	0.4969	0.2384	0.5301	0.2556
Disclosure of Chief Risk Officer	0.6776	0.4729	0.0000	1.0000	0.5384	0.5023	0.8750	0.3333
Corporate governance index	0.8370	0.0978	0.5298	0.9830	0.8313	0.1097	0.8020	0.0928
Group affiliation	0.4244	0.4956	0.0000	1.0000	1.0000	0.0000	0.0571	0.2337
Foreign ownership	0.4069	0.4917	0.0000	1.0000	0.0547	0.2291	1.0000	0.0000
Number of members in the Risk Committee	10.6333	5.2333	2.0000	24.0000	10.7230	4.6284	10.7187	5.8022
Number of directors in the Board of Directors	10.6600	3.0692	5.0000	17.0000	11.5230	3.3312	9.7968	2.6378

Table 3 Pairwise correlation matrix of the bank variables

Variable	ROAE	Log (Number of branches)	Capital-to-total assets	Deposits-to-loans	Total risk-weighted assets-to-total assets	Provision for loan losses-to-total loans	Operating expenses-to-total assets	Non-interest revenue-to-total revenue	Group affiliation	Foreign ownership
ROAE	1.000									
Log (Number of branches)	0.1594	1.000								
	(0.0368)									
Capital-to-total assets	0.1022	0.0984	1.000							
	(0.1830)	(0.1989)								
Deposits-to-loans	− 0.1528	− 0.2687	− 0.1382	1.000						
	(0.0460)	(0.0004)	(0.0715)							
Total risk-weighted assets-to-total assets	0.0371	0.1331	0.6890	− 0.1910	1.000					
	(0.6288)	(0.0817)	(0.0000)	(0.0123)						
Provision for loan losses-to-total loans	− 0.1080	0.3203	0.2335	− 0.1602	0.3247	1.000				
	(0.1584)	(0.0000)	(0.0021)	(0.0364)	(0.0000)					
Operating expenses-to-total assets	0.1526	0.2964	0.5202	− 0.0801	0.2589	0.3289	1.000			
	(0.0456)	(0.0001)	(0.0000)	(0.2975)	(0.0006)	(0.0000)				
Non-interest revenue-to-total revenue	− 0.1194	0.0318	− 0.1269	0.1476	− 0.2822	− 0.0262	0.0747	1.000		
	(0.1187)	(0.6789)	(0.0971)	(0.0541)	(0.0002)	(0.7334)	(0.3300)			
Group affiliation	− 0.1883	− 0.0740	− 0.1155	− 0.1376	− 0.1150	0.3783	0.0147	0.0318	1.000	
	(0.0134)	(0.3346)	(0.1314)	(0.0726)	(0.1330)	(0.0000)	(0.8482)	(0.6790)		
Foreign ownership	− 0.0901	0.0680	− 0.0229	0.1908	0.2502	− 0.1356	− 0.2948	− 0.1264	− 0.6156	1.000
	(0.2398)	(0.3754)	(0.7656)	(0.0124)	(0.0009)	(0.0762)	(0.0001)	(0.0985)	(0.0000)	

ownership.[11] These correlations are important because they make it possible to identify variables that might cause problems of multicollinearity within the models. In our case, some of these possible problems were solved by using out of the ordinary measurements, as explained when defining the variables for size and liquidity. However, two high and significant correlations relating to capital adequacy still remained: (a) one with total exposure to risk, and (b) one with expenses management. Because of the high correlation of these variables, it was necessary to avoid their appearance in the same regression than capital adequacy.

To save space, the correlations between bank variables and corporate governance variables are not reported. Generally, the correlations are low and not significant between the two groups of variables, with the exception of the following cases: (i) in the bigger banks there is a higher percentage of members of the risk committee who are directors on the board (0.4086, $p=0.0000$); (ii) in the bigger banks there is a higher percentage of members of the risk committee who are independent directors on the board (0.5685, $p=0.0000$); (iii) the risk committees of banks with a higher rate of expenses management have a smaller number of members (− 0.4021, $p=0.0000$); (iv) banks with a higher rate of expenses management report having a CRO less frequently (− 0.4578, $p=0.0000$); (v) the more profitable banks report a greater rate of accomplishment of standard corporate governance practices (0.2961, $p=0.0000$); and (vi) in the bigger banks, the number of members of the board of directors is greater (0.3246, $p=0.0001$).

Estimation models

Because of the form of the database, the options for estimations represent versions of panel data models. On the basis of the literature on bank profitability, it is proposed that the effects of corporate governance be measured in a function that includes as an independent variable the lagged dependent variable, which implies a dynamic panel data model (Athanasoglou et al. 2008; Flamini et al. 2009; Dietrich and Wanzenried 2014; Tan 2016). In theoretical terms, the lag in the dependent variable means that the function of profitability is not necessarily in a long run equilibrium. In this type of specification, the coefficient of the lagged profitability shows a condition of persistence in profitability, which itself reflects possible impediments to market competition, informational opacity, or sensitivity to economic shocks (Berger et al. 2000b; Goddard et al. 2004). Generally, studies on the impacts of corporate governance on the profitability of banks ignore the dynamic nature of the function of bank profitability. In addition, techniques of estimation for models of this type make it possible to treat certain banking variables as endogenous variables, as documented in the literature on the subject and explained below.

Firstly, the following dynamic panel data model is proposed:

[11] To save space, the other dependent variable, ROAA, was not included in Table 3, but the correlations between it and the other variables are very close to those shown for the case of ROAE. The correlation between ROAA and ROAE is of 0.8402, $p=0.0000$.

$$profitability_{i,t} = \pi_0 profitability_{i,t-1} + \boldsymbol{r'}_{i,t}\boldsymbol{\delta} + \boldsymbol{x'}_{i,t}\boldsymbol{\beta} + \boldsymbol{w'}_{i,t}\boldsymbol{\gamma} + \alpha_i + \varepsilon_{i,t}, \quad (1)$$

where α_i is the panel-level effects, $\boldsymbol{r'}_{i,t}$ is the vector of risk governance variables: R_1, R_2,…R_k, $\boldsymbol{x'}_{i,t}$ is the vector of exogenous control variables: X_1, X_2,…, X_l, $\boldsymbol{w'}_{i,t}$ is the vector of endogenous control variables: W_1, W_2,…W_m, $\varepsilon_{i,t}$ is the error.

It is important to point out that as part of the control variables, the behavior of capital in the function of profitability is endogenous, as an increase in profits allows an increase in the capital ratio, especially as those banks that expect to show a better performance communicate this information to the public by increasing their capital (e.g., Berger 1995; Tanna et al. 2011; Salim et al. 2016). With regard to credit risk, it can be modeled as a predetermined variable, as the regulatory bodies of the banks establish certain specific standards for the level of provisions for loan losses. According to these standards, every bank chooses its own level of provisions (Athanasoglou et al. 2008). These two variables are represented in the Eq. (1) by the vector $\boldsymbol{w'}_{i,t}$. In a set of regressions, risk governance variables included in the vector $\boldsymbol{r'}_{i,t}$ are also considered endogenous.

The index that covers the standard aspects of corporate governance was included in the control variables of the vector $\boldsymbol{x'}_{i,t}$. In another set of regressions, control variables are included lagged one-period as another way to minimize unintentional feedback from any potential endogenous variable, which means to transform $\boldsymbol{x'}_{it}$ and $\boldsymbol{w'}_{it}$ into $\boldsymbol{x'}_{i,t-1}$ and $\boldsymbol{w'}_{i,t-1}$. For the variables included in each regression, the correlations between variables shown in Table 3 were used.

To estimate Eq. (1), the Arellano–Bover/Blundell–Bond estimator, also called system GMM, was used. This estimator has some advantages over the Arellano–Bond estimator: to be specific, greater precision and better properties for finite samples, though it does have the inconvenience of using a considerably greater number of instruments. In particular, Arellano and Bover (1995) and Blundell and Bond (1998) propose the use of an instrumental variables estimator based on additional conditions of the type: $E\left(\Delta profitability_{i,t-1}\varepsilon_{it}\right) = 0$, as they are considered in a regression in levels. Similar additional moment conditions are formulated for the endogenous variables (ratio of capital and, in some regressions, the respective risk governance variable) and the predetermined variable (ratio of provision for loan losses). In this methodology, a matrix of **Z** instruments is formed in which each instrumenting variable produces one column for each time period and lag available to that time period.

A great advantage of using the GMM type of estimators is that they have the additional benefit of solving problems of endogeneity that have always been a concern in studies of corporate governance. As explained by Wintoki et al. (2012), applying methodology of this kind means dealing directly with problems of unobservable heterogeneity and simultaneity, and the relation between current corporate (or risk) governance characteristics and past firm performance. The same authors point out that other methodologies produce results with serious problems of endogeneity. Estimation through use of the system GMM has

been already applied to studying the effects of risk governance (though only as a robustness test) by Ellul and Yerramilli (2013). Also, as mentioned above, this methodology allows endogenous and predetermined variables to be modeled.

The growth we have mentioned in the number of instruments is a problem, as the database is not large. Therefore the following strategy was followed: In the first place, an estimation was made with the smallest possible number of instruments, establishing 1 as the number of lags to be used as instruments in all the variables. Even so, regressions with 50 instruments were obtained.

In the second place, the previous regressions were re-estimated using the procedure of a reduction in the number of instruments proposed by Roodman (2009). In specific terms, the procedure of reducing the number of instruments implies "collapsing" the matrix of **Z** instruments, creating moment conditions of the type: $\sum_{i,t} profitability_{i,t-s}\hat{e}^{*}_{it} = 0$, where $\hat{e}^{*}_{it}$ are the transformed errors by differencing process (Roodman 2009, p. 107).[12] This collapsing process implies that only one instrument will be used for each variable and lag. According to the same author, in small samples, this procedure of reducing the number of instruments can prevent an excess of instruments from overfitting the instrumented variables and biasing the results towards those of ordinary least squares. It should be further noted that, as with the standard estimator, the consistency of results depends on two conditions being satisfied: (a) that the error term does not present serial correlation, and (b) that the set of instruments used is valid. As will be explained in Sect. 6, the regressions made with a standard estimator do not satisfy the second condition, while those conducted using Roodman's reduction in the number of instruments do.

In the third place, for all regressions, a correction for small samples was applied that includes *t* values for standard errors and the *F* test for each regression.

Also, to contrast the results of the previous methodology, and thinking there might still be some concern about the results obtained from a small sample, a static panel estimation with fixed-effects was made, where the variables of governance and the control variables were included one-period lagged, following Ellul and Yerramilli (2013).

$$profitability_{i,t} = \alpha_i + \delta_0 risk\ governance_{i,t-1} + \boldsymbol{x}'_{i,t-1}\boldsymbol{\beta} + \varepsilon_{i,t}, \tag{2}$$

where α_i is the fixed-effects, $\boldsymbol{x}'_{i,t-1}$ is the vector of control variables: X_1, X_2,…, X_k, and $\varepsilon_{i,t}$ is the idiosyncratic error.

Further, to test the possible existence of a differentiated risk governance impact between banks linked to business groups and foreign banks, the best option would be to split the sample into types of bank and repeat the econometric analysis (based on Eq. 1) in each of the sub-groups. Unfortunately, the size of the sample does not allow this. The alternative strategy adopted was to use a static model. A model of this kind has the advantage of being able to include a larger number of explicative variables without creating an excessive number of instruments, as happens with

[12] Given a model $y = \mathbf{x}'\beta + \varepsilon$, where $E(\varepsilon|\mathbf{z}) = 0$, the empirical residuals, or errors, are $\hat{E} = \left(\hat{e}_{1,\ldots,}\hat{e}_N\right)$.

models of the system GMM type. In fact, models of this kind, not using instrumental variables, also do not need to deal with the additional problem of failing to comply with the tests for over-identifying restrictions when new variables are added. Also, interactions between the variables for risk governance and group affiliation (or foreign ownership) may be included. To be specific, a random-effects model for panel data is used, where time-invariant regressors such as group affiliation or foreign ownership may be added. The random-effects model is expressed as follows:

$$profitability_{i,t} = \alpha_i + \lambda_0 group\ affiliation_i + \lambda_1 (group\ affiliation_i{}^{*}\ risk\ governance_{i,t}) + \boldsymbol{x}'_{i,t}\boldsymbol{\beta} + year\ dummies + \varepsilon_{i,t} \quad (3)$$

Or alternatively:

$$profitability_{i,t} = \alpha_i + \lambda_0 foreign\ ownership_i + \lambda_1 (foreign\ ownership_i{}^{*}\ risk\ governance_{i,t}) + \boldsymbol{x}'_{i,t}\boldsymbol{\beta} + year\ dummies + \varepsilon_{i,t} \quad (4)$$

It should be noted that in each regression of this type, the test of exclusion restrictions proves the Ho that $\lambda_0 = 0, \lambda_1 = 0$, which expresses the fact that there is no statistical difference stemming from the direct impact of the group affiliation (or foreign ownership) variable and its indirect effect from its interaction with the corresponding risk governance variable. The Ho should be rejected to prove that there is a distinct impact of risk governance as the result of belonging to a business group (or foreign) bank.

Results

In the first place, it was necessary to check whether the variables for capital adequacy and credit risk really could be modeled as endogenous and predetermined, as stated in Eq. (1). On this subject, authors such as Athanasoglou et al. (2008) have suggested comparing the results of tests for over-identifying restrictions, applied to the same model, first including the two variables as exogenous and then taking them as endogenous and predetermined.[13] We also used the modified version of the Durbin–Wu–Hausmann test proposed by Schaffer (2010) for panel data models, to help determine the possible endogeneity of the variables mentioned.[14] On the basis of all the evidence examined, treating these variables as set out in Eq. (1) was found to be the best way to proceed.

[13] In the first case, when both variables are taken to be exogenous, the p-values of the tests are above 0.90 and approaching 1.00 (results not reported). According to Bowsher (2002), values as high as this are implausible and are more likely to show a weakness in the results of the test. By contrast, when capital adequacy is incorporated as endogenous and credit risk takes a predetermined form, the results of the test for over-identifying restrictions give p-values that do make it possible to determine that the whole set of instruments used is valid.

[14] It should be noted that no conclusive evidence was found that would allow rejection of the idea that credit risk might be considered exogenous, so the regressions shown in Table 4 were repeated modeling the variable in this way, but the results (not reported) are no different essentially from those obtained when the variable was modeled as predetermined.

Secondly, a set of regressions was estimated including, in succession, individually, each variable of risk governance accompanied by the bank control variables and that of the index of standard corporate governance characteristics. Using the standard system GMM estimator, regressions were obtained (results not reported) with 50 instruments and p-values close to zero for the Sargan test and of 1.00 for the Hansen test. These values for the tests for over-identifying restrictions are the result of the excessive number of instruments and show the need to improve the estimation technique.

Thirdly, the previous regressions were re-estimated, but modifying the system GMM estimator through the Roodman's procedure for the reduction of instruments, as explained in Sect. 5. These regressions are shown in Table 4. The main finding was that the risk governance variables do not have significance, except for (i) the proportion of the members of the risk committee with the right to vote (column 2), which is a variable indicating the effective size of the risk committee; and (ii) the independence of the chair of the risk committee (column 5), which is a variable indicating if the chair of this committee is an independent member of the board of directors. However, both variables are only significant at the ten percent level. In the first case, it should be remembered that this variable measures the size of the risk committee without including those invited members who do not have the right to vote on decisions taken by the committee. The fact that the variable that measures the size of the whole committee is not significant (column 1) shows that the practice of inviting members with no right to vote onto the risk committees has no relevant impact on the profitability of the banks. This combination of results (columns 1 and 2) must have to do with the fact that strong risk governance involves having smaller risk committees; it also suggests that the effective size of the risk committee becomes more significant as it gets smaller. In the second case, the independence of the chair of the risk committee is also a desirable feature of solid risk governance. Another finding to note in this set of regressions is that the index of standard corporate governance characteristics has positive signs, but is not significant, which shows that the combination of traditional and risk governance variables does not have significant influence on the profitability of the banks. With respect to the bank control variables, the lagged profitability and the variable of liquidity are significant, with the expected signs. The remaining variables are not significant but have the expected signs: size shows up positive, capital is positive, credit risk is negative, and activity mix is positive. Regressions were made including a variable to measure the time trend, but this did not turn out to be significant so it was not added to the final results. Similarly, all the regressions were repeated with the following variations (results not reported): (i) adding the variable of total exposure to risk, and (ii) adding the variable for expenses management. In all cases, the main findings were unchanged.

Fourthly, the previous set of regressions was re-estimated considering the respective risk governance variable as endogenous, without modifying the other variables. These regressions were made mostly for purposes of comparison, as it is very difficult for risk governance variables to be modified by banks in response to changes in

profitability. In this case, none of the risk governance variables proved to be significant, although in some cases the index of traditional governance factors was (results not reported). Findings for the other variables are very like those shown in Table 4.

In the fifth place, regressions were made using Eq. (1), but including the control variables with one lag, as another way of minimizing possible endogeneity. The results are shown in Table 5. As in the case shown in Table 4, the only significant variables are the proportion of the members of the risk committee with the right to vote (column 2), and the independence of the chair of the risk committee (column 5). However, in these regressions, the index of traditional corporate governance characteristics presents unexpected signs, as do some of the bank control variables. Further, lagged profitability ceases to be significant. Estimations were also made with all the variables (including the respective risk governance variable) with one lag, but in this case, no risk governance variable proved to be significant, and in various cases, these variables presented signs that were distinct from those that had been expected (results not reported).

In the sixth place, Eq. (1) was estimated through a further set of regressions that included different combinations of one variable for independence and another for the size of the risk committee, as shown in Table 6 (columns 1–5). These regressions also included the combination of disclosure of the CRO and some variable for the independence or size of the risk committee (only those that obtained greater significance are included, in columns 6–8). Other combinations were not included due to the high correlations among those variables. In these regressions, Roodman's procedure for reducing the number of instruments was also employed. As in the former set of results, the variables of risk governance were not significant, again with the exceptions of the proportion of members with voting rights in the risk committee (columns 3 and 7) and the independence of the chair of the risk committee (columns 1, 5, and 8). By contrast, the index of standard corporate governance characteristics does not have a relevant effect in this case. The bank control variables show the same pattern of results as those set out in Table 4 (to save space, control variables are not shown in Table 6). The results suggest that the dispositions and recommendations on risk governance do not have a deep impact on the bank's level of risk, or on its profitability. Revising the descriptive statistics, it can be seen that in only 40% of the observations in the database is the president of the risk committee an independent member of the board of directors. Also, there is only an average of 16% of independent directors on the risk committees. On the basis of information published by the banks, in only 66% of the observations was it possible to clearly establish the presence of a CRO.

In the seventh place, we compared the previous results with those from a static model similar to those used in other studies where impacts of risk governance have been assessed, and where control variables are included one-period lagged. To do so, Eq. (2) was estimated. The results are presented in Table 7. As can be seen, even with this methodology, the risk governance variables do not turn out to be significant. In all the regressions where there is a risk governance variable in combination with the general index of traditional corporate governance factors (columns 1–7), the latter is significant but with a sign that is the opposite of the expected. By

Table 4 System GMM regressions with Roodman's procedure for reducing the number of instruments, considering exogenous risk governance variables

Variable	Dependent variable: ROAE							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ROAE t – 1	0.3323*	0.3670*	0.3391**	0.3662**	0.3708**	0.3516**	0.3307**	0.2825**
	(0.162)	(0.179)	(0.159)	(0.171)	(0.172)	(0.163)	(0.156)	(0.133)
Log (Number of branches) t	0.0073	0.0116	0.0082	0.0099	0.0081	0.0102	0.0094	0.0146
	(0.033)	(0.035)	(0.035)	(0.037)	(0.036)	(0.034)	(0.034)	(0.019)
Capital-to-assets t	0.4839	0.3128	0.4170	0.3663	0.4149	0.3800	0.4662	0.7235
	(0.454)	(0.454)	(0.429)	(0.492)	(0.479)	(0.430)	(0.428)	(0.976)
Deposits-to-loans t	− 0.0067***	− 0.0074***	− 0.0075***	− 0.0073***	− 0.0072***	− 0.0072***	− 0.0070***	− 0.0048
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
Provision for loan losses-to-total loans t	− 0.1099	− 0.1141	− 0.1480	− 0.1802	− 0.2059	− 0.1324	− 0.0971	0.0753
	(0.548)	(0.534)	(0.510)	(0.557)	(0.575)	(0.542)	(0.555)	(0.906)
Non-interest revenue-to-total revenue t	0.0055	0.0071	0.0069	0.0071	0.0045	0.0066	0.0061	0.0237**
	(0.014)	(0.014)	(0.014)	(0.016)	(0.014)	(0.015)	(0.015)	(0.009)
Log (Number of members in the Risk Committee) t	**0.0081**							
	(0.021)							
Members with voting rights in the Risk Committee t		**0.0774***						
		(0.042)						
Risk Committee greater than Board of Directors t			**− 0.0131**					
			(0.015)					
Independent directors in the Risk Committee t				**0.0857**				
				(0.058)				
Chair of Risk Committee is independent t					**0.0257***			
					(0.014)			
Board directors in the Risk Committee t						**0.0240**		
						(0.041)		
Disclosure of Chief Risk Officer t							**− 0.0097**	
							(0.016)	

Table 4 (continued)

Variable	Dependent variable: ROAE							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Corporate governance index t	0.1438 (0.100)	0.1312 (0.098)	0.1395 (0.101)	0.1353 (0.099)	0.1506 (0.095)	0.1482 (0.093)	0.1449 (0.098)	0.3070 (0.232)
Constant	− 0.1312 (0.184)	− 0.1649 (0.181)	− 0.0987 (0.181)	− 0.1208 (0.176)	− 0.1258 (0.176)	− 0.1328 (0.165)	− 0.1160 (0.173)	− 0.3215 (0.260)
Number of instruments	12	12	12	12	12	12	12	11
F Prob > F	28.83 0.000	42.83 0.000	50.02 0.000	31.31 0.000	35.07 0.000	30.22 0.000	35.24 0.000	9.85 0.000
Arellano-Bond test (Order 1) z Prob > z	− 2.49 0.013	− 2.48 0.013	− 2.54 0.011	− 2.43 0.015	− 2.51 0.012	− 2.55 0.011	− 2.53 0.011	− 1.77 0.077
Arellano-Bond test (Order 2) z Prob > z	− 0.35 0.727	− 0.22 0.826	− 0.49 0.627	− 0.29 0.770	− 0.24 0.809	− 0.31 0.756	− 0.35 0.727	0.26 0.794
Sargan test χ^2 Prob > χ^2	4.16 0.244	6.59 0.106	4.53 0.210	4.09 0.252	4.50 0.212	4.04 0.257	4.49 0.213	7.69 0.053
Hansen test χ^2 Prob > χ^2	2.65 0.448	5.13 0.126	3.15 0.369	3.22 0.359	3.41 0.333	2.82 0.421	2.73 0.435	2.82 0.420

Robust standard errors are reported in parentheses

*Significant at 10%; **significant at 5%; ***significant at 1%

contrast, when no risk variable is included, the index returns to the expected sign, but it is not significant (column 8). Likewise, various control variables come out with a different sign to the one expected.

In the eighth place, estimates were made using Eqs. (3) and (4) to prove the possible existence of a differentiated impact of risk governance between banks linked to business groups and foreign banks. The results shown in Table 8 include a regression for each variable of risk governance and its interaction with the variable for group affiliation (control variables and year dummies are not shown in Table 8). Including interactions of this type makes it possible to run a test of exclusion restrictions and thus show whether there is a statistical difference stemming from the direct impact of the group affiliation variable, and the indirect impact it has through its interaction with the corresponding risk governance variable. There is evidence of a differentiated impact of the banks linked to business groups only in the effective size (proportion of members with voting rights in the risk committee—column 2). These results are contrasted with the equivalent regressions where risk governance variables were included individually, in addition to their respective interaction with the foreign ownership variable. The results in Table 9 show a differentiated impact of foreign-owned banks only in the independence of the chair of the risk committee (column 5) (control variables and year dummies are not shown in Table 9). The results of the differentiated effects of the variables for business group affiliation and foreign ownership show us that the risk governance variables found to be significant for the whole sample (Tables 4, 5) are due to the influence of the type of bank. The significance of the proportion of members with voting rights on the risk committee is caused by banks affiliated to business groups, while the significance of the independence of the chair of the risk committee is caused by foreign banks. An additional remarkable point is that no differentiated effects were observed with the index of traditional corporate governance characteristics (Table 8, column 8; and Table 9, column 8). This means that in the traditional characteristics for corporate governance, there are no differences according to the type of bank. Taken together, the results in Tables 4, 5, 6, 7, 8, and 9 suggest that the mechanisms of risk governance have an impact of slight significance on the profitability of the banks established in Mexico. This appears to agree with the presence of banks linked to business groups, but in foreign-owned banks also there were no patterns very different from the previous ones.

Finally, the following tests of robustness were made: (a) All the regressions shown in Tables 4, 5, and 6 were repeated using ROAA as a dependent variable (results not reported) and no pattern was found to be different to those obtained from ROAE. (b) The regressions shown in Table 4 were re-estimated without including the observations from 2008 and 2009, years when the international financial crisis manifested itself most forcefully in Mexico (results not reported). It is to be noted that the variable for the proportion of members with voting rights in the risk committee was even more significant (at the five percent level). It cannot be said that there is a generalized pattern of influential risk governance mechanisms in the commercial banks operating in Mexico.

Table 5 System GMM regressions with Roodman's procedure for reducing the number of instruments, using one-period lagged control variables

Variable	Dependent variable: ROAE							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ROAE t – 1	0.2375 (0.1946)	0.2808 (0.2184)	0.2384 (0.1891)	0.2708 (0.2009)	0.2704 (0.2068)	0.2379 (0.2037)	0.2363 (0.1882)	0.2321 (0.1316)
Log (Number of branches) t – 1	0.0145 (0.0213)	0.0154 (0.0203)	0.0112 (0.0214)	0.0138 (0.0232)	0.0097 (0.0207)	0.0139 (0.0213)	0.0137 (0.0223)	0.0136 (0.0161)
Capital-to-assets *t* – 1	0.2392 (0.2149)	0.0618 (0.2563)	0.1976 (0.2307)	0.0906 (0.1888)	0.1929 (0.2128)	0.1913 (0.2096)	0.2267 (0.2119)	0.3830 (0.3183)
Deposits-to-loans t – 1	0.0002 (0.0016)	0.0001 (0.0020)	0.0000 (0.0017)	− 0.0002 (0.0018)	0.0003 (0.0019)	− 0.0001 (0.0019)	− 0.0000 (0.0018)	0.0005 (0.0019)
Provision for loan losses-to-total loans t – 1	0.4518 (0.8002)	0.3340 (0.7007)	0.3839 (0.7977)	0.5102 (0.7289)	0.5456 (0.8046)	0.4277 (0.7790)	0.4295 (0.7690)	− 0.5517 (0.7278)
Non-interest revenue-to-total revenue t – 1	− 0.0024 (0.0130)	− 0.0026 (0.0147)	− 0.0015 (0.0138)	− 0.0018 (0.0135)	− 0.0029 (0.0133)	− 0.0018 (0.0133)	− 0.0022 (0.0131)	− 0.0096 (0.0092)
Log (Number of members in the Risk Committee) t	**0.0115** **(0.0273)**							
Members with voting rights in the Risk Committee t		**0.0739*** **(0.0367)**						
Risk Committee greater than Board of Directors t			**− 0.0117** **(0.0157)**					
Independent directors in the Risk Committee t				**0.1121** **(0.0669)**				
Chair of Risk Committee is independent t					**0.0288**** **(0.0108)**			
Board directors in the Risk Committee t						**0.0122** **(0.0580)**		
Disclosure of Chief Risk Officer t							**− 0.0040** **(0.0207)**	

Table 5 (continued)

Variable	Dependent variable: ROAE							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Corporate governance index $t-1$	− 0.1667 (0.1744)	− 0.1650 (0.1704)	− 0.1782 (0.1685)	− 0.1947 (0.1693)	− 0.1804 (0.1763)	− 0.1651 (0.1788)	− 0.1667 (0.1753)	0.2731 (0.1621)
Constant	0.0978 (0.1826)	0.0837 (0.1808)	0.1621 (0.1686)	0.1430 (0.1787)	0.1432 (0.1818)	0.1257 (0.1971)	0.1330 (0.1832)	− 0.2130 (0.1391)
Number of instruments	12	12	12	12	12	12	12	11
F Prob > F	5.88 0.000	6.98 0.000	6.02 0.000	7.01 0.000	5.92 0.000	6.00 0.000	5.35 0.001	7.28 0.000
Arellano-Bond test (Order 1) z Prob > z	− 2.63 0.009	− 2.69 0.007	− 2.72 0.007	− 2.61 0.009	− 2.62 0.009	− 2.69 0.007	− 2.70 0.007	− 2.61 0.009
Arellano-Bond test (Order 2) z Prob > z	− 0.99 0.323	− 0.61 0.542	− 1.09 0.274	− 0.75 0.453	− 0.75 0.451	− 0.96 0.340	− 1.00 0.319	− 1.02 0.306
Sargan test χ^2 Prob > χ^2	5.94 0.115	8.76 0.033	7.06 0.070	6.89 0.076	7.02 0.071	6.56 0.087	6.35 0.096	6.43 0.092
Hansen test χ^2 Prob > χ^2	2.86 0.413	4.40 0.221	3.63 0.304	2.76 0.430	3.55 0.315	3.17 0.367	2.90 0.408	3.47 0.325

Robust standard errors are reported in parentheses

*Significant at 10%; **significant at 5%; ***significant at 1%

Table 6 System GMM regressions with Roodman's procedure for reducing the number of instruments, including combinations of risk governance variables

Variable	Dependent variable: ROAE							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log (Number of members in the Risk Committee) t	0.0119 (0.0202)							
Members with voting rights in the Risk Committee t		0.0730 (0.0500)	**0.0699*** **(0.0421)**				**0.0739*** **(0.0417)**	
Risk Committee greater than Board of Directors t				− 0.0073 (0.0166)	− 0.0107 (0.0142)			
Independent directors in the Risk Committee t		0.0201 (0.0716)		0.0751 (0.0638)		0.0809 (0.0592)		
Chair of Risk Committee is independent t	**0.0272*** **(0.0157)**		0.0181 (0.0119)		**0.0247*** **(0.0139)**			**0.0255*** **(0.0148)**
Disclosure of Chief Risk Officer t						− 0.0086 (0.0165)	− 0.000 (0.0187)	− 0.0093 (0.0165)
Number of instruments	13	13	13	13	13	13	13	13
F Prob > F	28.53 0.000	48.35 0.000	47.89 0.000	52.81 0.000	54.64 0.000	29.05 0.000	43.17 0.000	32.80 0.000
Arellano-Bond test (Order 1) z Prob > z	− 2.48 0.013	− 2.49 0.013	− 2.47 0.014	− 2.45 0.014	− 2.49 0.013	− 2.43 0.015	− 2.49 0.013	− 2.49 0.013
Arellano-Bond test (Order 2) z Prob > z	− 0.25 0.805	− 0.21 0.835	− 0.14 0.885	− 0.38 0.701	− 0.36 0.718	− 0.31 0.760	− 0.23 0.820	− 0.26 0.796
Sargan test χ^2 Prob > χ^2	4.49 0.213	6.52 0.089	6.53 0.089	4.31 0.230	4.72 0.193	4.39 0.222	6.71 0.082	4.81 0.186
Hansen test χ^2 Prob > χ^2	3.26 0.353	5.83 0.120	6.16 0.104	3.35 0.341	3.76 0.288	3.33 0.343	6.05 0.110	3.45 0.328

Robust standard errors are reported in parentheses

*Significant at 10%; **significant at 5%; ***significant at 1%

Conclusions

The evidence presented here shows that, for the sample of listed banks working in Mexico, the functions of risk governance have an impact of slight significance on the profitability of the banks, which suggests that the dispositions and recommendations on risk governance are fulfilled to a limited degree and mainly to satisfy the organization in charge of supervising the banks. According to the results obtained, the effective size of the risk committee and the independence of the chair of this committee are the only relevant risk governance mechanisms in commercial banks established in Mexico, and these mechanisms have a differentiated impact depending to the type of bank. The first case means that the practice of inviting members with no right to vote onto the risk committees has no relevant impact on the profitability of the banks, whereas the members of these committees who can vote do have a positive effect. This result must have to do with the fact that strong risk governance involves having smaller risk committees. The second case shows that it is indeed good for the risk committees to be chaired by an independent member. The results suggest that risk governance mechanisms could become more significant to the extent that they were able to fulfill the following requirements: (i) the effective size of the risk committees is reduced, and (ii) the proportion of risk committees with an independent chair is increased.

A possible explanation for the lack of significance about risk governance has to do with the ownership structure, as in the banks linked to business groups the majority shareholders can take decisions that benefit the operation of the group, leaving risk management in second place. In this situation, the risk committees will not have a sufficiently large number of truly independent members with the necessary knowledge of finance, and the risk managers will not have real powers in the important decisions of the bank. In such a case, the functions of risk governance would not have a real impact on the risk level of the bank, or on its profitability. However, according to the results obtained, in foreign-owned banks also there were no patterns very different from the previous ones. In fact, the two examples mentioned in Sect. 1 about serious failings in the risk governance of two of the biggest banks in the system, concern subsidiaries of foreign-owned banks from English speaking countries. One factor that might possibly influence these results concerns the adaptation of the banks to the prevailing institutional surroundings. This is a complex subject requiring research in the future.

Considering the slight relevance observed of risk governance in the listed banks operating in Mexico, it is surprising that these did not face serious problems during the international financial crisis of a decade ago. Studies of banks in Mexico have shown that little time had passed by then since the process of cleansing faced by the banks after the Mexican banking crisis in the second half of the 1990s, and their levels of capitalization were high (Castañeda 2014). However, as the years pass, the irrelevance of risk governance may well have negative repercussions on banks facing economic shocks in the future.

Table 7 Fixed-effects regressions using one-period lagged independent variables

Variable	Dependent variable: ROAE							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log (Number of branches) $t-1$	0.0383 (0.0257)	0.0320 (0.0255)	0.0396 (0.0254)	0.0385 (0.0257)	0.0411 (0.0259)	0.0367 (0.0242)	0.0403 (0.0256)	0.0362* (0.0215)
Capital-to-assets $t-1$	− 0.0933 (0.1548)	− 0.1134 (0.1668)	− 0.0972 (0.1546)	− 0.0945 (0.1536)	− 0.0868 (0.1560)	− 0.1103 (0.1627)	− 0.1094 (0.1541)	− 0.3828* (0.2228)
Deposits-to-loans $t-1$	− 0.0042*** (0.0008)	− 0.0044*** (0.0006)	− 0.0044*** (0.0006)	− 0.0044*** (0.0006)	− 0.0044*** (0.0006)	− 0.0044*** (0.0006)	− 0.0044*** (0.0006)	− 0.0027*** (0.0006)
Provision for loan losses-to-total loans $t-1$	− 0.3330 (0.7163)	− 0.2945 (0.6780)	− 0.3280 (0.6990)	− 0.3421 (0.7475)	− 0.3290 (0.6979)	− 0.3124 (0.6831)	− 0.3327 (0.7021)	− 0.5477 (0.6376)
Non-interest revenue-to-total revenue $t-1$	− 0.0046 (0.0115)	− 0.0052 (0.0115)	− 0.0046 (0.0114)	− 0.0044 (0.0115)	− 0.0038 (0.0116)	− 0.00477 (0.0115)	− 0.0046 (0.0116)	0.0291* (0.0171)
Log (Number of members in the Risk Committee) $t-1$	**0.0051** **(0.0167)**							
Members with voting rights in the Risk Committee $t-1$		**0.0202** **(0.0208)**						
Risk Committee greater than Board of Directors $t-1$			**0.0052** **(0.0115)**					
Independent directors in the Risk Committee $t-1$				**− 0.0241** **(0.0741)**				
Chair of Risk Committee is independent $t-1$					**− 0.0120** **(0.0096)**			
Board directors in the Risk Committee $t-1$						**0.0090** **(0.0273)**		
Disclosure of Chief Risk Officer $t-1$							**− 0.0095** **(0.0242)**	
Corporate governance index $t-1$	− 0.1835** (0.0774)	− 0.1930** (0.0844)	− 0.1871** (0.0835)	− 0.1815** (0.0839)	− 0.1867** (0.0836)	− 0.1981** (0.0776)	− 0.1818** (0.0845)	0.0558 (0.1144)

Table 7 (continued)

Variable	Dependent variable: ROAE							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
F	98.39	143.19	114.13	94.12	108.99	122.76	131.48	324.51
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R^2 within	0.1062	0.1104	0.1064	0.1066	0.1104	0.1060	0.1077	0.1913
R^2 between	0.0811	0.0694	0.0835	0.0783	0.0836	0.0799	0.0861	0.0015
R^2 overall	0.0417	0.0363	0.0429	0.0422	0.0473	0.0426	0.0458	0.0006

Robust standard errors are reported in parentheses

*Significant at 10%; **significant at 5%; ***significant at 1%

Table 8 Random-effects regressions for testing exclusion restrictions (testing group affiliation)

Variable	Dependent variable: ROAE							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Corporate governance index t	− 0.0917 (0.0709)	− 0.0616 (0.0638)	− 0.1123 (0.0709)	− 0.1357** (0.0626)	− 0.0935 (0.0688)	− 0.0968 (0.0685)	− 0.0674 (0.0725)	0.3362* (0.1773)
Log (Number of members in the Risk Committee) t	− 0.0045 (0.0165)							
Members with voting rights in the Risk Committee t		0.0447** (0.0176)						
Risk Committee greater than Board of Directors t			− 0.0301** (0.0145)					
Independent directors in the Risk Committee t				0.1080* (0.0650)				
Chair of Risk Committee is independent t					0.0202 (0.0136)			
Board directors in the Risk Committee t						0.0302 (0.0306)		
Disclosure of Chief Risk Officer t							− 0.0053 (0.0212)	
Group affiliation t	− 0.0249 (0.0616)	0.1267*** (0.0390)	0.0118 (0.0273)	0.0471 (0.0318)	0.0463 (0.0296)	0.0569 (0.0371)	0.0216 (0.0231)	0.0041 (0.2890)
Group affiliation * Log (Number of members in the Risk Committee)	0.0254 (0.0227)							
Group affiliation * Members with voting rights in the Risk Committee		− 0.1342*** (0.0444)						
Group affiliation * Risk Committee greater than Board of Directors			0.0345* (0.0206)					
Group affiliation * Independent directors in the Risk Committee				− 0.1397 (0.0913)				

Table 8 (continued)

Variable	Dependent variable: ROAE							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Group affiliation * Chair of Risk Committee is independent					− 0.0342 (0.0222)			
Group affiliation * Board directors in the Risk Committee						− 0.0592 (0.0483)		
Group affiliation * Disclosure of CRO							0.0133 (0.0336)	
Group affiliation * Corporate governance index								0.0037 (0.3343)
Wald χ^2	287.00	449.71	299.56	580.77	823.02	321.76	1068.57	970.80
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R^2 within	0.1950	0.2007	0.2049	0.2092	0.2059	0.1838	0.1669	0.0190
R^2 between	0.5403	0.6549	0.5607	0.6286	0.5238	0.6603	0.6732	0.5291
R^2 overall	0.4116	0.5072	0.4304	0.4978	0.4072	0.5148	0.5284	0.3380
Test of exclusion restrictions	2.88	**11.26**	3.40	2.70	3.73	2.36	1.65	0.07
χ^2	0.2367	**0.0036**	0.1829	0.2594	0.1549	0.3077	0.4379	0.9663
Prob > χ^2								

Robust standard errors are reported in parentheses

*Significant at 10%; **significant at 5%; ***significant at 1%

Table 9 Random-effects regressions for testing exclusion restrictions (testing foreign ownership)

Variable	Dependent variable: ROAE							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Corporate governance index t	− 0.1040 (0.0795)	− 0.1087* (0.0608)	− 0.0746 (0.0761)	− 0.1262* (0.0686)	− 0.1462** (0.0659)	− 0.1420** (0.0719)	− 0.1354* (0.0706)	0.5055* (0.2723)
Log (Number of members in the Risk Committee) t	− 0.0094 (0.0135)							
Members with voting rights in the Risk Committee t		− 0.0034 (0.0372)						
Risk Committee greater than Board of Directors t			− 0.0122 (0.0214)					
Independent directors in the Risk Committee t				0.0157 (0.0669)				
Chair of Risk Committee is independent t					− 0.0110 (0.0153)			
Board directors in the Risk Committee t						0.0221 (0.0345)		
Disclosure of Chief Risk Officer t							0.0014 (0.0178)	
Foreign ownership t	− 0.1310** (0.0651)	− 0.0732 (0.0502)	− 0.0318 (0.0345)	− 0.0599* (0.0361)	− 0.0704* (0.0386)	− 0.0126 (0.0408)	− 0.0313 (0.0381)	0.3793 (0.2739)
Foreign ownership * Log (Number of members in the Risk Committee)	0.0380 (0.0244)							
Foreign ownership * Members with voting rights in the Risk Committee		0.0399 (0.0481)						
Foreign ownership * Risk Committee greater than Board of Directors			0.0233 (0.0318)					
Foreign ownership * Independent directors in the Risk Committee				0.0901 (0.0752)				

Table 9 (continued)

Variable	Dependent variable: ROAE							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Foreign ownership * Chair of Risk Committee is independent					0.0352* (0.0206)			
Foreign ownership * Board directors in the Risk Committee						− 0.0200 (0.0404)		
Foreign ownership * Disclosure of CRO							− 0.0220 (0.0166)	
Foreign ownership * Corporate governance index								− 0.4649 (0.3298)
Wald χ^2	589.67	646.59	9740.22	516.72	211.14	381.58	776.33	804.71
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R^2 within	0.1736	0.1908	0.1663	0.1896	0.1009	0.1916	0.1946	0.0607
R^2 between	0.6308	0.5796	0.6570	0.5839	0.5416	0.6120	0.5506	0.4691
R^2 overall	0.4880	0.4506	0.5074	0.4573	0.3892	0.4711	0.4440	0.3345
Test of exclusion restrictions	4.27	2.18	0.96	3.59	**5.36**	0.68	2.28	1.99
χ^2	0.1182	0.3358	0.6183	0.1659	**0.0685**	0.7118	0.3201	0.3699
Prob > χ^2								

Robust standard errors are reported in parentheses

* Significant at 10%; **significant at 5%; ***significant at 1%

Appendix A: Questionnaire of best corporate practices

The index of standard corporate governance characteristics was constructed using questionnaires of Best Corporate Practices, based on a Code of Best Corporate Practices, which follows OECD principles. These questionnaires are composed by five main sections: (i) the shareholders meeting, (ii) the board of directors, (iii) the function of auditing, (iv) the functions of evaluation and compensation, and (v) the functions of financing and planning. Questionnaires are answered by firms (banks) listed in Mexican Stock Exchange. We construct the index assigning a point for each answer from the questionnaire that showed accomplishment of some recommendation in the Code. Questionnaires for each bank can be downloaded from the Mexican Stock Exchange site:https://www.bmv.com.mx/es/empresas-listadas/informacion-digitalizada

This is a list of the main topics covered by questionnaires. Each topic (or function) may include several items. Every item was transformed into a question:

1. Information for the shareholders before each shareholders meeting.
2. Information for the shareholders about board support committees.
3. Communication mechanisms to inform shareholders.
4. Functions of the board of directors.
5. Size of the board of directors.
6. Types of directors on the board.
7. Composition of the board of directors.
8. Number of independent directors on the board.
9. Substitute members on the board of directors.
10. Information about directors.
11. Board support committees.
12. Functions of the board support committees.
13. Types of directors on the board support committees.
14. Composition of the board support committees.
15. Size of the board support committees.
16. Independent members on the board support committees.
17. Number of meetings of the board of directors.
18. Information for the directors before each board meeting.
19. Requirements to convene a board meeting.
20. Responsibilities of the members of the board.
21. Conflicts of interest inside the board of directors.
22. Mechanisms of evaluation of the members of the board.
23. Functions of the auditing committee.
24. Mechanisms of internal control and its assessment.
25. Interaction between the auditing committee and the board of directors.
26. Selection of the external auditing.
27. Operations with related parties.
28. Functions of evaluation and compensation.
29. Functions of financing and planning.
30. Interaction between the financing and planning committee and the board of directors.

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