Effect of board quality on the financial performance of conventional and Islamic banks: Comparative study on the international evidence

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Research

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Abstract

This article provides the first logical analysis that detailed the process of comparative analysis between the correlation of board determinants' quality and the financial performance of conventional and Islamic banks. However, in previous research, we have never encountered rewarding studies that compared these impacts. In our study, we distinguished between the impact of the board of directors on the financial performance in conventional and Islamic banks. Settings of the financial performance and board of directors of the conventional and Islamic banks are collected from 30 countries located in four continents: America, Europe, Asia, and Africa. Two equal samples were collected that each of them is composed of 112 banks. By using the cylindrical panel method, data were used to explore the impact of the board of directors on the financial performance between both types of banks over the period 2010-2018, giving us 1008 bank-year observations in each sub-sample. On the whole, empirical results have shown that in conventional banks the board of directors has negatively affected the financial performance, while the impact of the board on the financial performance of Islamic banks is ambiguous. Nevertheless, the degree of the positive impact on financial performance is more significant in Islamic banks.

1. Introduction

Several theories have been developed to provide the financial and accounting literature with description of the board composition (Booth et al., 2002; Kiel and Nicholson, 2003; Anderson et al., 2004; De-Andres et al., 2005; Cheng and Courtenay, 2006; Chen and Lin, 2014), whether about its effectiveness, as a mechanism of governance, within the framework of shareholder theory, stakeholder theory, and resources' dependence theory, or its impact on bank performance. However, few studies have focused on the impact of the board composition on improving the FP and creating profits. The board is the most important internal mechanism of governance (Brown et al., 2011). Its primary roles are to set goals, plan long and medium-term strategies, plan for the future operational management of the banks, oversee their implementation, and make strategic decisions (Zahra and Pearce, 1989). A bank board monitors the effectiveness of the internal and external risk oversight system, as well as the performance of executives (Aguilera et al., 2011).

Most research focused on board effectiveness on firms' samples. However, few studies have addressed the effect of board effectiveness on the quality of bank governance (Adams and Mehran, 2012). In banking institutions, it is essential to improve the operational efficiency of a governance mechanism at the level of its operating environment. The board role is not limited to supervision, but also encompasses the planning of development strategies and the mobilization of the resources needed to achieve the banks' objectives. Its role extends to preserving performance. Thus, the lack of qualifications in the board composition and general management are undoubtedly the major causes of the bankruptcy of several banks around the world. More specifically, according to Datar (2004) and Onali and Torluccio (2016), BOD plays a fundamental role in determining the structure of banks' ownership and the level of their FP. Also, this mechanism is responsible for developing control procedures to manage the various risk situations to which the bank could be exposed.

The effectiveness of the banks' internal governance as a whole depends on the detailed effectiveness of its elements, notably the number of directors on the board, the percentage of external directors, the ownership of internal directors, the structure of as well as the number of meetings held (Hermalin and Weisbach, 2003; Nam and Lum, 2004). With more details on the criteria for the ideal choice of board members, Chapra (2007) identified three important points to respect for the appointment of the IBs' board members: The directors of a high degree of moral integrity and professional competence, the board members are well trained to the Sharia rules, and the board members must ensure sufficient transparency in the disclosure of information relating to the IBs' activities.

Limits of previous research have allowed us the opportunity to explore new perspectives by proposing a more advanced synthetic view. Our work could expand the issues explored in their research, so further enrichment is needed. This is why we have opened reflection on possible questions on this topic and the related issues to be explored. They mainly concern the deepening of the theoretical research paradigm and the development of new procedures, auditing, control and governance techniques and the enrichment of the banks' evaluation chain.

Our explanatory research aims, firstly, to study the relationship between a set of FP measures and sum variables of board quality in order to interpret the signs of correlation. Secondly, the purpose of this research is to show the extent of the BOD on the profitability, the efficiency, the liquidity, and the solvency of each banks' type in order to choose the most effective and efficient governance approach which is the most valid for all financial institutions of all types. In other words, this study attempts to compare the degree of the impact of the board on IBs' FP of with the relative impact of its conventional competitors in order to answer the following question: in what type of banks, the impact of board on performance is more meaningful?

We synthesized the contributions of our research into two points. The first contribution is that our results can be a valuable source of knowledge for investors, policymakers, funders, economic agents and regulators, especially in the financial services sector and in the development of financial objectives and planning of strategic plans for boards' control. The second contribution is that we were given the vital role of the board on the FP of large conventional and Islamic banks, future research can address the implications of board quality for monetary policy in some developed, emerging and developing countries.

The remainder of the paper is organized as follows. Section 2 reviews previous research on this topic and the hypotheses of the study. Section 3 describes the methodology which is employed, the data sources, variables, and the models' specifications. Empirical results are presented in Sect. 4. Finally, Sect. 5 contains concluding remarks.

2. Literature Review

2.1. Board Determinants

The BOD is at the center of a banks' governance system. Since the board is the most influential governance mechanism, in this section we looked at the impact of the board quality on the performance of conventional and Islamic banks. We examined whether the characteristics of the BOD affected the banks' FP in a period of financial stability. Our objective is to compare the correlation between the board of Islamic and conventional banks on FP's indicators.

2.1.1. Board size

Large boards could include more representative directors in terms of quantity and quality. Multiple choice gives more opportunities for senior managers to choose directors with more experience and specialized expertise (Williams and Armstrong, 2005; Kent and Stewart, 2008; Ntim et al., 2012). The board size improves governance reporting and is expected to impact the director's quality oversight (Ntim et al., 2012). As already noted, some studies have found that companies with large boards have a positive influence on FP, especially companies with complex and large businesses operating in multiple segments (Coles et al., 2008). Besides, small boards lead to the creation of conflicting relationships, either by aligning the interests of executives with those of shareholders or by aligning the interests of executives and directors. This minimizes agency costs between members of a small board.

In the same vein, Dalton et al. (1999) discovered a positive and significant relationship between the board size and the banks' FP. The significant effect added by the Big boards is due to the presence of agency problems, to the conflicts of interest, to the communication challenges, to the coordination failures, to the transmission of accounting problems, to the transfer of financial information and the decision-making. In addition, Adams and Mehran (2012) carried out a study that aims to analyze the relationship between the BOD determinants and the FP based on a sample of 35 US banks listed throughout the period 1986–1999. In conclusion, they stated that the board size is positively correlated with FP. Similarly, Adams and Mehran (2003) completed a study aimed at verifying the impact of board size on banks' performance. They found that when the banks' board size is large, banks have high levels of performance, implying that they are necessarily associated with higher risks than banks with small boards. As a result, if the board size is small, members can easily misappropriate their own interests through manipulations, and directors are influenced by their superiors.

In the case of the Middle East, other academics stipulate that the small board easily suffers the influence of the leaders more than the large one, because it has a variety of experiences belonging to the different administrators (Gary and Gleason, 1999). Along the same lines, Naushad and Malik (2015) tested the impact of board size on FP in 24 banks covering the GCC region over the period 2012–2013. The results revealed that small-sized boards are significantly capable of monitoring the management of banks in the CCG region.

In Asia, by performing a panel study on a sample of Chinese and Indian banks listed during the Subprime financial crisis, Battaglia and Gallo (2015) investigated the association between some governance mechanisms, risk management and the banks' performance in China and India during the period 2007–2011. They noted that banks with a large BOD are governed by a positive and significant impact on the FP indicators. Also, Yung (2009) analyzed the impact of banking governance arrangements in Hong Kong on bank performance. He monitored the governance quality by the size and the composition of the board. He concluded that banks with large boards and low loan levels between related parties tend to perform better. To protect the shareholders' rights and to ensure that managers cannot defend their interests to the detriment of shareholders, a correlation between loans and related parties has been established as a parameter for valuing the governance system efficiency. The higher the level of loans granted, the more the bank exports a bad reputation to the banking market. This consequence can damage the degree of effectiveness of its existing governance system. As a result, this affects its FP because banks facilitate the efficient allocation of resources. This finding reflects the importance of governance in improving banks' FP.

Other studies have invested in determining the optimal board size; they have found that there is a non-linear effect between board size and bank performance (Andres and Vallelado, 2008). As for Booth et al. (2002), their empirical results have shown that banks with large boards perform better than their counterparts with reduced boards. They suggested that the average size of banks' boards is 16 directors. This current research argued that a small directors' number is easily influenced by the CEO. Moreover, Belkhir (2009) conducted a study to determine the preferable number of BOD, so that the bank can deliver the expected return. He showed that when the board size extends to about 19 members, performance increases. At the limit of this threshold, increasing the board size results in performance growth. Beyond 19 members, the performance decreases. While there is some debate about whether banks should be large or small, some other studies have suggested that institutions with more complex operations should have more members in their BOD (particularly banks). They verified that the board size has a positive effect on FP (Coles et al., 2008; and Bassem, 2009) and that large boards are less restrictive in taking bank risks (Pathan, 2009). In addition, Wasiuzzaman and Gunasegavan (2013) conducted a comparative study between the performance of Islamic and conventional banks operating in Malaysia during the period 2005–2009. They found that the assets' profitability, the board size, and the CBs' size are higher than those of the IBs.

After a rich literature exposure concerned the relationship between FP and board size, we expected that a large board could ameliorate the parameters of profitability, efficiency, liquidity, and solvency of the banks' board. For this reason, we have proposed a theoretical suggestion that confirms that the board size has a strictly positive impact on the banks' FP:

Hypothesis 1

The board size has a positive effect on the FP of conventional and Islamic banks.

2.1.2. Rooting of the board chairman: automatic renewal of the mandate

In this topic, previous research has attempted to demonstrate the effectiveness of the board and its impact on the CBs' performance. However, in IBs the subject of rooting is not yet widely treated. This may be due to the weakness of the board impact or because of its limited power as a mechanism of governance in this banks' type. Theoretically, rooting means the occupation of the same post by a manager after the end of their first fixed-term contract. It manifests itself in two methodical forms leading to the same results. Either through the duality of the CEO and that of the board chairman by the same person. Either the same person in which designation as a board chairman will exceed his first contract or he automatically renewing his mandate without verifying the conditions of his independence.

Nevertheless, Naushad and Malik (2015) examined the effect of the CEO duality on FP of 24 banks selected from the GCC zone for two years 2012 and 2013. The results revealed that the CEO, who also serves as the board chairman, is likely to improve the banks' FP. Owners of blocks have a positive and significant

effect on the banks' performance. Indeed, Al-Hawary (2011) studied the association between some mechanisms of banking governance measured by the ownership concentration, the majority shareholding, the capital adequacy ratio, the board size, the presence of external directors and the duality between the CEO and the board chairman on the performance of Jordanian banks during the period 2002–2009. Results showed that duality and external directors have a positive and statistically significant effect on Tobin's Q. Nevertheless, capital adequacy, board size, ownership concentration, and majority shareholding had no statistically significant effect on Tobin's Q. In this way, he deduced that banks in Jordan need to arrange a good quality of governance to positively and effectively influence banking performance.

Based on the majority of research highlighted in this theme, we have predicted the presence of a positive correlation between the CEO rooting and the banks' FP.

Hypothesis 2

There is a positive relationship between the rooting of the board chairman and the FP of conventional and Islamic banks.

2.1.3. Board Independence

The independence of directors is considered to be the most important measure of board effectiveness. Are considered as independent directors all members who do not have any affiliation with the bank, except for their membership in the board as directors (Brown et al., 2011). A non-executive board member only has a business relationship with the bank direct or who is qualified by his/her integrity and expertise to protect the interests of all stakeholders (Young, 2000). This director type should not be a current employee, a former employee of the bank, or a member close to the top of the hierarchy and has no significant business relationship with the bank (Pathan, 2009). Previous research supposed dependent all directors having a previous executive function, familiar with the bank manager or have other business links with the bank (Aebi et al., 2012). According to Cotter et al. (1997), the board is assumed to be independent when the number of independent directors within it exceeds 50% of the total members.

Some studies have found that the presence of independent directors among board members is not associated with any effect on FP. To test this observation Yermack (1996); Bhagat and Black (2002) and Hermalin and Weisbach (2003) have pointed out the absence of a significant relationship between the qualified composition of the board, which has been measured by the directors' independence degree, and the FP. They argued that the lack of a significant correlation between board composition and FP is evident. This relationship is generally consistent with the relative economic situation and taken into consideration during a financial crisis. Other studies have associated market measures to detect the independent directors' impact on the FP. They found no significance between the composition of the board and the FP (Hermalin and Weisbach, 1991; Bhagat and Black, 2002). For this reason, Gebba and Aboelmaged (2016) indicated that a typical board should contain a heterogeneous mix of executive and non-executive directors. The revised Malaysian Corporate Governance Code (CGCM, 2007) also provided that all publicly traded companies should have a BOD, which should have a balance between executive and non-executive directors to avoid decisions dominated by one group or by some board members (Kallamu, 2016).

However, several researchers have adopted another discordant explanatory approach which stipulates that external directors are not able to understand the complexity of the banks' activities. As a result, they considered outside directors to be agents with insufficient expertise to carry out their stakeholder control missions, to detect the opportunistic behavior of the managers and to monitor the overruns against the sense of increased performance. Besides, within this opposite argument, some researchers have found that the presence of foreign directors on the board has a negative and significant effect on banks' future FP (Adnan et al., 2011). In the same topic, Coleman and Biekpe (2006) examined the effect of the board composition on the financial decisions of 47 companies listed on the Nairobi Stock Exchange over the period 1995–2004. They found that larger firms were more in debt. However, short-term debt is negatively correlated with board independence. This explains why this type of directors is very likely to make consecutive and massive debt decisions to exploit them for purposes prejudicial to the bank interest, which confirms the presence of opportunistic behaviors. Moreover, Busta (2007) confirmed the existence of a negative association between the current performance of non-executives and the performance of some European banks. Even more, Minton, et al. (2010) investigated the correlation between risk-taking, the performance of US banks and the board directors' independence in financial crises. The results indicated that board independence is positively related to risk-taking and bank performance before the crisis, but it has shown a poor impact on banks' performance during the crisis.

Independent directors with conflicting interests lead to poor governance practices, as the situation is favorable for the appearance of interest between the BOD and managers (Hermalin and Weisbach, 1991) leading to a decline in performance (Yermack, 1996; Bhagat, and Black, 1999; Ghazali, 2010). They observed a negative relationship between the proportion of independent directors on the BOD and the performance per share. In the same research path, Erkens et al. (2012) studied the association between banks' corporate governance and FP in 30 countries Subprime crisis of 2007–2008. They found that board independence and ownership concentration are associated with poor rates of profitability during the crisis. They argue that the independent boards raised a lot of equity during the crisis, banks with a high concentration of property took more risks before the crisis, the risks translate into significant losses for shareholders during the crisis, the wealth of existing shareholders was transferred to the creditors thereafter. Similarly, Adam (2012) showed that banks with more independent members on their boards performed poorly. Also, Minton et al. (2010) and Hoque and Muradoglu (2015) found that the financial expertise of the independent directors of commercial banks is negatively related to the variations of their values. They went through financial troubles which led to a decrease in the banks' performance. Moreover, Mollah and Zaman (2015) analyzed the effect of the governance effectiveness on performance in conventional and Islamic banks during the period 2005–2011. They found that in IBs, the size and independence of the board significantly and negatively influence their FP. Besides, they noted that the duality and the internal recruitment of the CEO have a negative and significant impact on the IBs' FP. Empirically; they have proven that the Sharia Committee contributes positively and significantly to the IBs' FP during a supervision mission. This impact becomes negligible when it is an advisory role.

In the Asian context, referring to more in-depth research, Kallamu (2016) studied the moderating role of independent directors in the interaction between the ownership structure and the FP of Malaysian banks between 2007 and 2011. He noted that the existence of independent directors among board members adversely affects FP. In Malaysian banks, the majority of owned directors have mixed and confused their interests with the interests of other shareholders. On the contrary, the presence of independent directors on the BOD constitutes a positive and significant moderating effect on the relationship between the directors' ownership and the FP. This reflects that independent directors positively moderate the relationship between directors' ownership and improved the FP of the institution, as there will be an alignment between directors' and shareholders' interests. In conclusion, he stated that the independent directors exercise a guiding force on the banks' FP.

Therefore, based on the previous selective studies, we formulated our third research hypothesis in the following form:

Hypothesis 3

There is a negative relationship between the proportion of the board's independent directors and the FP of conventional and Islamic banks.

2.1.4. Number of meetings held by the board of directors

Based on the literature review, several studies have identified the importance of the frequency of board meetings as a mechanism able to influence the governance quality in different contexts (Sánchez, 2010; Choi and Lai, 2014; Thu et al., 2016) or also as a control parameter of the FP (EL-Maude et al., 2018). The effect added by this governance mechanism has led us to distinguish two groups of previous studies. Although many studies discussed the effect of the meetings' number held by the CBs' board are numerous, the studies discussing the effect of the board meetings' number on FP in Islamic banking are almost non-existent.

In contrast, an intermediate stream has established a coordination among governance mechanisms to determine whether the quality of one mechanism affects or enhances the quality of the other. These researchers found no correlation. In a recent study, Thu et al. (2016) have indicated that the performance of commercial banks in Vietnam does not depend on the board meetings' frequency. Besides, the FP of Vietnamese banks does not have a clear correlation with the level of board independence. However, few studies focus on the relationship between the board meetings' number and the IBs' FP that are almost non-existent.

However, some studies have found that there is a negative association between the governance quality and the meetings' number held by the BOD. In this sense, Sánchez (2010) analyzed the impact of some governance determinants on the governance quality in Spain banks over the period 2004-2006. He studied the influence of board characteristics, including board size, independence, and diversity of mechanisms on the governance quality. He found that board activity is limited by a small number of annual meetings.

Furthermore, Choi and Lai (2014) analyzed the effect of bank governance on the FP of Asian banks during the period (2007–2012) by using multiple linear regression analyses. The system of bank governance has been assessed by three characteristics, a variable reflects the governance quality, a variable measures the board size, and a variable symbolizes the frequency of board meetings. The findings indicated that there is a negative and statistically significant relationship between capital adequacy and the board size.

We have drawn from the foregoing the following hypothesis:

Hypothesis 4

There is a negative relationship between the frequency of board meetings and the FP of conventional and Islamic banks.

2.2. Control variables may have an impact on the financial performance of conventional and Islamic banks

To find the desired answer to overcome the problem of choice, we have proposed that it is important to stabilize the maximum of variables in a mobile economic environment. For this reason, we took some additional factors defined as complementary variables of governance as independent variables. In our work, we selected four control variables to better explain performance measures. These variables are bank type, bank age, bank size, and inflation.

2.2.1. Bank type

Few studies in the literature have highlighted the importance of the typological distinction between financial institutions in the governance theory. Comparative studies establishing a causal link between the governance mechanisms' quality and the banks' FP are almost non-existent. The differentiation between the categories, groups or types of banks depends on the purpose of the study and the details of the discussed topic. In this sense, Macey and O'Hara (2003) argued that the consideration of the peculiarities of any type of banks requires a thorough review of the attention given to specific governance and a renewal of sequencing efforts and mechanisms, because bank officials play a crucial role in the economy, especially for depositors.

Some previous studies have distinguished between Islamic and conventional banks. As an explanation of our perception, the study of Charles et al. (2015) articulated this point of view. They carried out a comparative study between Islamic and conventional banking indices using different risk measures and analyzing the performance of the two indices from various risk-adjusted performance measures during the period of the global financial crisis (2007–2008). They noted that Islamic clues seem to be riskier than indices of their conventional counterparts. Taking into account that this study was carried out in a period

of a financial crisis that could skew the risk assessment and despite the fact that both types of banks are exposed to the same extreme events, Charles et al. (2015) have also emphasized that CBs performed better than their Islamic counterparts over the period 1996–2013.

Indeed, deep research on the correlation between banking classes and banking performance has focused on other typological divisions. In other studies, some researchers in finance have advanced a different investigation of this concept in a reading assimilated to other contexts, or they have established a conceptual presentation keeping the same context, but they have changed simply the theme. The initiators of this stream discussed the distinction between banks based on the separation between the typology "Origin of Institutional Ownership" and the typology "Regional Integration of Banks". In this line of research, Kim and Rasiah (2010) compared the governance impact on the performance of two types of banking ownership in Malaysia before, during, and after the Asian financial crisis. To see the relationship between governance and performance, the researchers distinguished between the private domestic banks against foreign-invested banks. They have shown that there is generally a positive and significant correlation between banking governance and FP of Malaysian banks. Also, before the crisis, foreign-owned banks had better governance quality than private domestic banks and they earned more compared to their competitors in the Malaysian market. However, after the crisis, the findings showed the opposite, private domestic banks recorded better governance quality and a higher profits level.

Other researchers have preferred the establishment of dissimilar reference classes. In this case, the distinction is made between private and public banks or between listed and unlisted banks. At this point, Cornett et al. (2009) tested the difference between the impact of privatization and state participation on the performance of commercial banks in 16 countries from the Far East between 1989 and 2004. The study examined how the type of banks' shareholding can affect its performance during the period when the region had the Asian financial crisis of 1997. They argued that the performance of public and private banks sharply deteriorated over the trial period. In countries where government participation in the banking sector is very important, banks have shown lower performance. Nevertheless, public banks have generated a lower level of profitability and efficiency than private banks. Besides, they found that private banks were more profitable, had more capital base, and had lower credit risk compared to their counterparts before and during the Asian crisis. Faced with this situation, four years after the financial crisis, Cornett et al. (2009) detected that the reduction in the cash flow, the capital base, and the loans' quality granted by public banks was remarkable and higher than private banks. After the crisis, public banks cut off with private banks through cash flow, core capital, and non-performing loans. As a result, public banks recovered their performance to levels similar to those of private banks during the post-crisis period.

Although there is no official standard or uniform segmentation, we have selected a specific distinction based on a purely practical classification. The border between these various types of institutions is relatively small based on a separation between the core business and the services offered by each category of banks. It is a distinction between commercial banks, business banks, and universal banks.

From the previous literature about this variable, we formulated the hypothesis as follows:

Hypothesis 5

The banks' type has a positive impact on the FP of conventional and Islamic banks.

2.2.2. Bank age

Since the Islamic banking system is very recent, its conventional counterparts are concretely advancing in a practical way. The majority of IBs are more recent than the CBs, although Islamic finance appeared before the launch of the conventional banking model in the world. IBs have to go through a number of challenges to develop their products in order to achieve significant performance in the banking market in competition with their conventional counterparts (Samad et al., 2005; Chong and Liu, 2009). In addition, the operating roots of CBs have gained greater experience in the mechanics of the financial markets and a greater share in the financial sector (Samad, 2004a).

Over the years, the Islamic financial model has expanded and has been on a gradual upward trend. Success has spread throughout the world and not only in the Muslim world. Currently, IBs are located in Asia, America, Europe, the Middle East, and Africa. Countries accepting the practice of Islamic finance in its territories are in a number of fifty-seven countries. Besides, Bilal and Abbas (2015) reported that Bahrain and Malaysia are in the process of becoming regional hubs for Islamic financial service providers (Samad et al., 2005).

Otherwise, international banks around the world consider the growth of Sharia-compliant Islamic banking products an opportunity for profit (Siddiqui, 2008). The Islamic financial system has changed over time from a simple system limited to the deposit at the creation of new hedging and investment derivatives. Driven by an increasingly sophisticated and dynamic demand, IBs are becoming more pragmatic and their practices are gradually coming closer to those of traditional finance, which is why they have entered other new markets, such as insurance and mutual funds (Olivier and Krassimira, 2008).

In addition, Shamsheer et al. (2008) compared the efficiency of costs and profits of a CBs' sample and another of IBs between 1990 and 2005. Each group is divided into two classes of banks, old and new in 21 countries. They argue that the newer banks had better cost efficiency and a profit efficiency similar to that of the old banks. This could be because the new banks have learned from the experiences of the old banks. Furthermore, the attempts of the new banks aimed at offering the customers of the old CBs higher interest rates than the rates offered by the old ones of the same group and to discuss with the customers of the IBs of the same class the percentages of higher profits. Even more, Alharthi (2016) found the same results in the MENA region; the new Islamic and conventional banks work better than the older banks.

Similarly, Jemric and Vujcic (2002) analyzed the effectiveness of a CBs' sample in Croatia between 1995 and 2000. The results revealed that the new Croatian banks are more efficient than the old ones. The problem of old banks was mainly due to the non-performing portfolio containing either non-efficient or non-profitable products. Besides, the inefficiency of the old banks compared to the new banks' amounts to the excess of the employees' number and the assets costs fixed too high. Moreover, Kraft and Tirtiroglu (1998) revealed that the conventional Croatian banks recently established in the banking market are less

efficient than the old ones, regardless of whether they are private or state-owned; but they have offered a higher profitability than that generated by the old banks.

From the literature review already stated, we have proposed the following hypothesis: Hypothesis 6: The banks' age has a negative impact on the FP of conventional and Islamic banks.

2.2.3. Bank size

The assumption of size has been widely tested in the accounting and financial literature. In this respect, several authors have associated the variable "Bank Size" with measures of other economic themes, related either to the management result, to the market, to the FP, and the corporate governance, etc. (Molyneux and Thornton, 1992; Turel et al., 2012 and Bertay et al., 2013). Earlier studies have also shown that size is a determinant of profitability and leverage in banks (Srairi, 2009; Caglayan and Sak, 2010; Gropp and Heider, 2010). This variable is always defined by the logarithm of the total assets of a bank (Flamini et al., 2009).

Moreover, as indicated by Pahuja and Bhatia (2010) and Ntim et al. (2012), large banks disclose more information about the governance quality and the financial situation. Also, the size has generally been used to capture the ability of banks to adopt and to exploit economies of scale in their transactions and their tendency to maximize profits. The goal of profit maximization is found at some level to seek an optimal bank size. Besides, Boyd and Runkle (1993) concluded that there is a statistically significant relationship between the size and bank profitability.

Furthermore, Fadzlan and Noor (2012) tested the impact of internal and external economic factors on the profitability of Indian banks during the period 2000–2008. They revealed that in a developing economy, the bank size has a positive and significant impact on the profitability of domestic banks. Also, Shamsher et al. (2008) compared a sample of CBs with another sample of IBs based on size, age, and region of banks. The results did not show any significant difference between the average cost scores of large and small banks for each type of bank. Nevertheless, big banks have generated their revenues more efficiently. This evidence has indicated that the banks' size affects their profit efficiency, but not their cost-effectiveness. The study revealed that there are no significant differences between the cost efficiency of banks with different asset sizes and bank flows. Large IBs are slightly more efficient than large CBs in terms of costs, while large CBs are slightly more efficient in terms of profits. Results also implied that the small banks in each sector are evolving as well as the big banks, even though their asset level is the lowest. But small IBs have had slightly higher costs and revenues than smaller CBs.

Likewise, other studies have demonstrated that there is a positive and significant correlation between bank size and FP (Isik and Hassan, 2003; Bos and Kolari, 2005; Athanasoglou et al., 2008; Fahad, 2014). These authors concluded that as banks expand, so does their ability to improve profitability. Even more, Grigorian and Manole (2002) carried out a study on a set of countries that were restructuring their banking sectors. The choice is focused on the banks that have undergone major transformations throughout the 1990s. They estimated the indicators' effect on the effectiveness of commercial banks over the period 1995–1998. The sample consisted of banks from 17 countries. They discovered that large banks and well-capitalized banks are likely to generate better overall banking efficiency from their operations.

In the same current, Yung (2009) conducted a study whose main purpose was to analyze the impact of governance on the performance of 23 banks in Hong Kong during the period 2005–2007. The results also revealed that bank size is positively correlated with FP. Indeed, large banks are more exposed to investment risks than small banks. In another context, Hussein and Charif (2011) assessed the impact of bank size on the performance of commercial banks in the UAE over the period 1996–2005. They worked on data from 15 major banks and 23 small banks. As a result, they confirmed that large banks operate more efficiently than smaller banks.

By the same token, Manthos and Nikolaos (2009) analyzed the effect of macroeconomic banking determinants on the efficiency of European banks in 10 EU countries between 1994 and 2005. The determinants chosen to clarify the effects on efficiency are the bank size, the sectoral concentration and the degree of economic investment. They found that the bank size and the external investment environment act positively on the banks' efficiency. However, the concentration of the sector has a statistically negative effect on efficiency. Similarly, Saeed (2014) surveyed the impact of the bank's specific variables, sector variables and macroeconomic factors on the profitability of 73 UK commercial banks during the period 2006–2012. He confirmed that large banks with large assets, capital, deposits, loans, and equity can provide security, competitiveness and economic growth and cope with macroeconomic factors, such as interest rate and inflation rate.

In addition, Jonathan and Nghia (2005) tested a heterogeneous sample of commercial banks in the South Asian region. They found that the CBs' sizes are much higher compared to the sizes of their IBs' counterparts. They also revealed that the commercial bank size was positively and significantly correlated with bank efficiency regardless of the model studied. They unveiled that big banks were more profitable than smaller institutions while considering the profit quality of strong institutions extended. Indeed, other researchers have found consistent results. In this sense, Fanta et al. (2013) and Bertay et al. (2013) revealed that the bank size has a positive and statistically significant effect on banks' FP measures. This implies that big banks enjoy better profits than smaller banks because they held large shares of the banking markets. Moreover, this advantage is due to the economy technique of scale approved for the marketing of the services and products offered. In the same vein, other researchers have shown that the "Bank Size" positively improves profitability in favor of banks as it reduces the cost of goods and services (Pasiouras and Kosmidou, 2007; Fanta et al., 2013).

Another stream of research recorded a similar result even though the study was done in an agency context. In this topic, Bashir (1999) highlighted the impact of the Sudanese IBs size on their FP between 1983 and 1993. He argued that the bigger the IBs are the more profitable they become and vice versa. Moreover, consolidating deposits and receivables into a single entity is an effective means of facilitating the sale of range products, diversifying the services offered and reducing the degree of exposure to risks. However, large IBs are heavily indebted and systematically riskier, indicating that large IBs are economically efficient.

Also, in a study applied to a sample of CBs, Bhagat and Black (2002) revealed the priority of financial institutions to add external directors to their boards of directors following a decline in FP. This result is explained by the opacity of the financial transactions of the assets and the complication of the banking operations. The resolution of this problem requires more vigilance, precaution, and solicitude on the part of the leaders and more control, occupation, and verification exercised by the internal and external mechanisms of governance whose role is to reduce moral hazard behavior among stakeholders. Theoretically, the size of the total assets must have a positive impact on the banks' efficiency. But that does not prevent the existence of optimal size in the big banks; they always have the possibility of maximizing their commercial powers. After all, small banks with a maximum commercial threshold can not exceed large banks because of resource, capacity and competition constraints (Rashwan and Ehab, 2016). Besides, in his comparative study between conventional and Islamic banks in the MENA region, Alharthi (2016) reported that CBs with a larger size perform better than smaller commercial banks. Indeed, he stated that the benefits of the loans have improved efficiency significantly. About IBs, he also concluded that large IBs have proven more effective than smaller ones.

This is why our hypothesis took the following formulation:

Hypothesis 7

The banks' size has a positive impact on the FP of conventional and Islamic banks

2.2.4. Inflation

The annual inflation rate is the overall percentage increase in the Consumer Price Index for all goods and services. The impact of inflation on bank performance has been widely discussed in the finance literature as well as in the governance literature. Inflation is often used by many previous studies to assess the variation, evolution, and change in economic contingency factors over time (Gul et al., 2011; Ramadan, 2011; Mollah and Zaman, 2015; Rashwan and Ehab, 2016; Tugba et al., 2017). In particular, inflation is a determinant of banks' FP because of its influence on depositors' funds, which are the financial resources of banks.

Some studies in the literature have thought that IBs are not involved in transactions testing the confrontation between inflation and interest rates. Inflation has an insignificant relationship to net interest margin and general banking fees. In principle, the practice of interest is prohibited and non-interest expenses are much more limited. Other studies have concluded that the stability of IBs stems from the fact that inflation, rate of return, and other economic factors fluctuate (Karim and Ali, 1989; Turen, 1996; Cihak and Hesse, 2010). In this sense, Ramadan (2011) studied the impact of bank-specific economic variables and macroeconomic variables on the profitability of Jordanian IBs between 2000 and 2010. He stated that inflation does not have a significant effect on the profitability of assets and the profit margin of Jordanian IBs. Besides, the effect of inflation on non-interest expenses is very deep insofar as the CBs' revenues are mainly based on direct and indirect interest, fees and commissions. This results in a very influential effect on the CBs' FP. To ensure these levels of efficiency, CBs adjust their interest rates upward to change other operating income to ensure the corresponding benefits in the event of an increase in the rate of inflation. However, this causes a slowdown in the growth of non-interest expenses. Also, CBs will suffer a fall in demand for investment loans and especially consumption. This could be a signal of credit risk (Imane, 2014).

Several previous studies have found a positive association between inflation and banks' FP. The revenues' cost as a measure of IBs' profitability as well as CBs is not influenced by changes in the rate of inflation (Gul et al., 2011; Fahad, 2014). They thought that the increase in the inflation rate causes a rise in the valuation of the bank without affecting the demand for credit, therefore, inflation will not decrease commercial activities and it will have no negative effect on the banks' performance. The growth of the inflation rate is always associated with high-interest rates on loans, so banks will be more likely to maximize their income. In this sense, Gul et al. (2011) conducted a panel study in Pakistan to examine the relationship of bank-specific characteristics and macroeconomic indicators on banks' profitability over 5 years 2005–2009. Therefore, they founded that inflation has a positive impact on all measures of profitability.

Although inflation is a necessary macro-economic measure to evaluate the FP of banks, Rashwan and Ehab (2016) have designed a comparative study aimed at assessing the performance between conventional and Islamic banks in several countries through six efficiency and cost-effectiveness indicators. They collected empirical data from 12 countries during the period 2009–2014. In this framework, inflation has been used as a macroeconomic factor that can influence the efficiency of costs, revenues, and bank profits. The results discerned the existence of a non-significant impact of inflation on non-interest bank charges and the net interest margin of IBs. Otherwise, inflation significantly altered non-interest expenses and the net interest margin of CBs. This impact contributed to the slowdown of the growth of non-interest expenses and the stimulation of the net interest margin of CBs once the inflation rate rises. In terms of operating revenues, the results showed that inflation had a positive and significant effect on income in both types of banks. Nevertheless, inflation has no significant impact on the profitability of the assets and equity of Islamic and conventional banks. On the same theme, Alharthi (2016) has indicated that inflation influences the effectiveness of Islamic and conventional banks in a negative and significant way, while it has significantly improved the efficiency of two types of banks. For these reasons, we have seen that the most appropriate hypothesis is the following:

Hypothesis 8

Inflation has a positive impact on the FP of conventional and Islamic banks.

3. Empirical Method: Distinction Between The Effect Of The Board Quality On The Financial Performance Of The Islamic And Conventional Banks

The comparison of the board impacts on the FP of two banks' groups remains a restricted task to be generalized for three main reasons. First, the lack of comprehensive international data related to governance and performance at the same time prevents analysts from deepening their theoretical propositions of assumptions and their empirical interpretations. Therefore, the various difficulties are transformed into several consequences generating many problems. The causes of the birth and the evolution of the problems come back mainly to the decrease of the governance mechanism quality or the decline of the banking

performance. Then, the generalization of its results is difficult because of the proportional impact of vulnerable economic events. Finally, phenomena related to the banking governance quality and FP that have occurred on the financial market are not planned by the same techniques. Moreover, the corrective actions of their results and their consequences are not addressed with the same methods. Empirical methodology in the research sphere is a very complicated approach. It is based on the theoretical justification of the most appropriate and effective systematic methods. However, the theoretical proofs are sometimes non-existent with the topic to be discussed or they may be unavailable in reality. There are different types of paradigms and research approaches that are possible. Among them we have chosen the demonstrative approach, considering as it is the most appropriate to our current study.

3.1. Methodological aspects

The methodology applied in our exploratory study is a demonstrative comparison by resorting to modeling. The data analysis for this study focused on associations between mechanisms, relationships between shareholders, and individual behaviors to explain correlations between the different stakeholders. This helps to identify the impact factors affecting the relationships between basic FP measures and the influences due to the BOD. The research plan to be followed to answer the questions already mentioned began with the clarification of the data sources, then we quoted the variables to be modeled, finally, we exposed our object models.

3.1.1. Data collection

Two samples were taken from two reference populations. The choice of banks is limited to countries whose banking systems incorporate both Islamic and conventional banks over the period 2010–2018 regardless of the proportion of each model in each country’s banking market. These populations are made up of 2,974 conventional financial institutions and 683 Islamic financial institutions. The countries part of our study are USA, France, Singapore, Algeria, Thailand, India, Egypt, Bangladesh, Indonesia, Pakistan, Tunisia, Malaysia, Canada, Sudan, Turkey, United Kingdom, Luxembourg, Bahrain, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates, South Africa, Senegal, Nigeria, Sri Lanka, Kazakhstan, and Lebanon. However, we have excluded all specific financial institutions subject to particular regulations. The tested samples include only purely conventional or Islamic banks. Besides, due to difficulties in collecting information on FP and BOD, we excluded banks marked by some missing observations, variables or data. We also removed the multi-type mutated banks (Islamic-conventional window banks and conventional-Islamic window banks). These three conditions led us to eliminate 571 conventional financial institutions and 2862 Islamic financial institutions. Subsequently, we have reduced the banks’ number remaining for each bank type based on qualitative and quantitative filtering criteria (samples equality, activity type, similarity of origin country, bank width), each CB has its Islamic equivalence in terms of capital and size taken from the same country. This restriction reduced the size of our samples to 112 banks each. Finally, after several elimination and deletion steps, we obtained two pairs of equal samples (n1 = n2).

3.1.2. The measurement of the variables to be tested

3.1.2.1. Endogenous variables

In this sub-section, we presented FP measures. The main variable to explain was represented by four dependent variables: profitability, efficiency, liquidity, and solvency. Table 1 shows the parameters we worked on, the symbols and the relative reports.

Table 1 Description of variables to explain				
FP measurement	Rating for CB	Rating for IB	Measurement	Previous studies
Profitability ratio	Rtc	Rti	Marginal Profit / Total Revenues	Sujan et al. (2013);Atyeh et al. (2015); Ogbeide and Akanji (2017); Haddad et al. (2019b).
Liquidity ratio	Ltc	Lti	Net Loans / Total Assets	Olson and Zoubi (2008); Onakoya and Onakoya (2013); Osama et al. (2013); Haddad et al. (2020).
Efficiency ratio	Etc	Eti	Operating result / Average Total Assets	Moin (2008); Emilia and Judit (2012); Rashid and Khaleequzzaman (2015); Haddad et al. (2019a).
Solvency ratio	Stc	Sti	Total Loans / Total Deposits	Olson and Zoubi (2008); Onakoya and Onakoya (2013); Ola and Suzanna (2015); Haddad et al. (2019c).

3.1.2.2. Exogenous variables

Throughout the remaining part of this work, banks’ FP is explained by four determinants of BOD. Referring to the review of the previous literature, the predominantly independent variables have been described in Table 2 as follows:

Table 2
Description of the explanatory variables

The internal governance mechanism	Rating for CB	Rating for IB	Measurement	Previous studies
Board of directors	Board size of CB (TCONSc)	Board size of IB (TCONSi)	The number of directors in the BOD	Uwuigbe and Fakile (2012); Aebi et al. (2012); Fanta et al. (2013).
	Rooting of the board chairman or accumulation of the post of CEO and the board chairman (ENRADIRc)	Rooting of the board chairman or accumulation of the post of CEO and the board chairman (ENRADIRi)	Binary variable: 1: if the CEO also holds the post of board chairman of the bank or the board chairman exceeded the mandate 0: if not	Coleman and Biekpe (2007); Al-Hawary (2011); Hoque and Muradoglu (2015).
	Board independence: presence of external directors in the BOD (INDCONSc)	Board independence: presence of external directors in the BOD (INDCONSi)	Number of directors who are not related to any professional/ family relationship, nor the bank nor the executives, except for their roles in the board on the total number of the BOD	Rachdi and Ameur (2011); Pan (2014); Hoque and Muradoglu (2015).
	Number of meetings held by the CB's board (REUCONSc)	Number of meetings held by the IB's board (REUCONSi)	Number of meetings held by the BOD in a year.	Chen et al. (2006); Choi and Lai (2014); Thu et al. (2016).

3.1.2.3. Measurements of control variables

Table 3 displays the list of control variables supported by some previous studies that employed the same variables and their measures.

Table 3
Description of control variables

Control variable	Rating for CB	Rating for IB	Measurement	Previous studies
BankType	TYc	TYi	A qualitative variable takes three forms: 1: if the bank is a commercial bank 2: if the bank is an investment bank 3: if the bank is a universal bank	Cornett et al. (2009); Kim and Rasiah (2010); Farazi et al (2011); Charles et al. (2015).
Bank Age	AGc	AGi	Age of conventional / Islamic bank for each year	Jemric and Vujcic (2002); Jeff et al. (2010a); Filip et al. (2013); Arif et al. (2017).
Bank Size	TAc	TAi	Logarithm of book value of total assets of conventional / Islamic bank at the end of each year	Rachdi and Ameur (2011); Berger et al. (2014); Saha et al. (2015); Rashid and Jabeen (2016)
Inflation	INFc	INFi	The rate of inflation in the country of origin of the conventional / Islamic bank object of study	Gul et al. (2011); Rashwan and Ehab (2016); Nahar and Sarker (2016); Tugba et al. (2017).

3.1.3. Presentation of models to estimate

Before proceeding to the estimations, it is necessary to present the typical models to reassess several times the FP and each time the dependent variable will be changed according to the FP measures and the bank type.

Conventional models of multiple regressions are of the following form:

Model n1: Association between CBs' profitability and board quality:

$$\text{LnRtc} = \alpha_0 + \alpha_1 \text{LnTCONSc} + \alpha_2 \text{ENRADIRc} + \alpha_3 \text{LnINDCONSc} + \alpha_4 \text{LnREUCONSc} + \alpha_5 \text{TYc} + \alpha_6 \text{LnAGc} + \alpha_7 \text{LnTAc} + \alpha_8 \text{LnINFc} + \varepsilon_i \quad (1)$$

Model n2: Association between CBs' efficiency and board quality:

$$\text{Etc} = \alpha_0 + \alpha_1 \text{LnTCONSc} + \alpha_2 \text{ENRADIRc} + \alpha_3 \text{LnINDCONSc} + \alpha_4 \text{LnREUCONSc} + \alpha_5 \text{TYc} + \alpha_6 \text{LnAGc} + \alpha_7 \text{LnTAc} + \alpha_8 \text{LnINFc} + \varepsilon_i \quad (2)$$

Model n3: Association between CBs' liquidity and board quality:

$$\text{Ltc} = \alpha_0 + \alpha_1 \text{LnTCONSc} + \alpha_2 \text{ENRADIRc} + \alpha_3 \text{LnINDCONSc} + \alpha_4 \text{LnREUCONSc} + \alpha_5 \text{TYc} + \alpha_6 \text{LnAGc} + \alpha_7 \text{LnTAc} + \alpha_8 \text{LnINFc} + \varepsilon_i \quad (3)$$

Model n4: Association between CBs' solvency and board quality:

$$\text{LnStc} = \alpha_0 + \alpha_1 \text{LnTCONSc} + \alpha_2 \text{ENRADIRc} + \alpha_3 \text{LnINDCONSc} + \alpha_4 \text{LnREUCONSc} + \alpha_5 \text{TYc} + \alpha_6 \text{LnAGc} + \alpha_7 \text{LnTAc} + \alpha_8 \text{LnINFc} + \varepsilon_i \quad (4)$$

Islamic models of multiple regressions are of the following form:

Model n5: Association between IBs' profitability and board quality:

$$\text{LnRti} = \beta_0 + \beta_1 \text{LnTCONSi} + \beta_2 \text{ENRADIRi} + \beta_3 \text{LnINDCONSi} + \beta_4 \text{LnREUCONSi} + \beta_5 \text{TYi} + \beta_6 \text{LnAGi} + \beta_7 \text{LnTAi} + \beta_8 \text{LnINFi} + \varepsilon_i \quad (5)$$

Model n6: Association between IBs' efficiency and board quality:

$$\text{Eti} = \beta_0 + \beta_1 \text{LnTCONSi} + \beta_2 \text{ENRADIRi} + \beta_3 \text{LnINDCONSi} + \beta_4 \text{LnREUCONSi} + \beta_5 \text{TYi} + \beta_6 \text{LnAGi} + \beta_7 \text{LnTAi} + \beta_8 \text{LnINFi} + \varepsilon_i \quad (6)$$

Model n7: Association between IBs' liquidity and board quality:

$$\text{Lti} = \beta_0 + \beta_1 \text{LnTCONSi} + \beta_2 \text{ENRADIRi} + \beta_3 \text{LnINDCONSi} + \beta_4 \text{LnREUCONSi} + \beta_5 \text{TYi} + \beta_6 \text{LnAGi} + \beta_7 \text{LnTAi} + \beta_8 \text{LnINFi} + \varepsilon_i \quad (7)$$

Model n8: Association between IBs' solvency and board quality:

$$\text{LnSti} = \beta_0 + \beta_1 \text{LnTCONSi} + \beta_2 \text{ENRADIRi} + \beta_3 \text{LnINDCONSi} + \beta_4 \text{LnREUCONSi} + \beta_5 \text{TYi} + \beta_6 \text{LnAGi} + \beta_7 \text{LnTAi} + \beta_8 \text{LnINFi} + \varepsilon_i \quad (8)$$

3.2. Econometric validation of models

The FP of conventional and Islamic banks depends on the systematic use of explanatory variables. Interdependence between the board determinants forced us to test also the correlation between the explanatory variables one by one.

3.2.1. Error Heteroscedasticity Test

Heteroscedasticity qualifies data do not have constant variances; the objective of this test is to know if the errors' variance for each individual is constant. This situation is frequently encountered in the case of panel data. It is therefore important to know how to detect heteroscedasticity before correcting it. Heteroscedasticity does not generally bias the coefficient estimate, but it remains uncommitted because of the poor quality of the standard deviations.

To identify heteroscedasticity in linear regression, there is a range of specific tests designed mainly for this reason, among which we mention the most common name the Cook-Weisberg test, Breusch-Pagan test, White test, Modified Wald test, Goldfeld test, Gleisjer test, etc. In our study, we chose the Breusch-Pagan test and the Modified Wald test to check for this type of problem.

If the probability associated with the test is below the tolerance threshold (5%), we reject the hypothesis of heteroscedasticity (H0). Nevertheless, if the probability is greater than (5%), the null hypothesis will be retained, it is possible in this case to confirm the heteroscedasticity of the residues.

Before starting the analysis of the results, first, we referred to the agreement of choice between the applied tests. Depending on whether it is a fixed or random-effect, for models that are confirmed fixed, such as those affiliated with the efficiency and solvency of IBs (Table 5), we compared these models to the Modified Wald test. Nevertheless, in the case of models relating to the profitability, the efficiency, the liquidity and the solvency of CBs (Table 4) and the models specific to the profitability and liquidity of IBs (Table 5), the Breusch-Pagan test proves more appropriate to detect heteroscedasticity.

Table 4 illustrates the heteroscedasticity test results of CBs for random-effect models (LnRtc, Etc,Ltc, and LnStc). For this effect type, the random-effects models have highlighted the need for the Breusch-Pagan test. We speak of heteroscedasticity when the magnitude of the error risk is constant over time. The χ^2 statistics of these models showed risks associated with the rejection of the heteroscedasticity hypothesis well below the desired threshold of 5%. The probabilities of χ^2 test of banks' profitability, efficiency, liquidity and solvency models are lower than the minimum risk acceptance rate of the null hypothesis, leading to the rejection of the proposal of heteroscedasticity problems at the level of these models. Therefore, we concluded that the CBs' models are not heteroscedastic.

Table 4
Heteroscedasticity tests of the CBs' sample

Model type	Modified Wald Test	Breusch- Pagan Test	χ^2	Prob > χ^2	Heteroscedasticity
LnRtc	-	Test of Breusch- Pagan	11.69	0.0003 < 5%	Absence of the heteroscedasticity problem
Etc	-	Test of Breusch-Pagan	172.06	0.0000 < 5%	Absence of the heteroscedasticity problem
Ltc	-	Test of Breusch-Pagan	224.67	0.0000 < 5%	Absence of the heteroscedasticity problem
LnStc	-	Test of Breusch-Pagan	49.80	0.0000 < 5%	Absence of the heteroscedasticity problem

Similarly, Table 5 showed the heteroscedasticity tests' results of the IBs sample for fixed-effects models (Eti and LnSti) as well as for random-effects models (LnRti and Lti). Furthermore, the Modified Wald test gives a probability of the χ^2 lower than the predetermined threshold of 5%, the fixed-effects Eti and LnSti models recorded values of χ^2 equal to (0.0000). Therefore, we rejected the heteroscedasticity problems hypothesis, the variance of errors in these two models is not the same for all IBs.

Moreover, results of the Breusch-Pagan test revealed χ^2 statistics below 5% for the models assumed until now random, more specifically, the probabilities of the models relating to the profitability and the liquidity of IBs equal respectively to (0.0006) and (0.0000). Therefore, we have been able to reject the null hypothesis, LnRti and Lti models are not heteroscedastic and the variance of their errors is not the same for all IBs. As well as we have deduced that our data do not have a heteroscedastic structure.

Table 5
Heteroscedasticity tests of the IBs' sample

Model type	Modified Wald Test	Breusch-Pagan Test	χ^2	Prob > χ^2	Heteroscedasticity
LnRti	-	Breusch- Pagan Test	10.45	0.0006 < 5%	Absence of the heteroscedasticity problem
Eti	Modified Wald Test	-	$7.3*10^5$	0.0000 < 5%	Absence of the heteroscedasticity problem
Lti	-	Breusch- Pagan Test	194.48	0.000 < 5%0	Absence of the heteroscedasticity problem
LnSti	Modified Wald Test	-	$2.1*10^6$	0.0000 < 5%	Absence of the heteroscedasticity problem

In the case of fixed-effects models, whatever the model is heteroscedastic or not, if it does not contain individual effects, reasoning procedure requires the direct navigation to analyze the correlation. However, with a random-effect model, we must check before, if the square of the residuals can be explained by the model variables. In this case, we confirm that there is a problem of heteroscedasticity. The choice of one test or another depends on the need, the type of variables and the econometric effect of the models.

3.2.2. Residual autocorrelation test

The autocorrelation of residues test is used to detect for each individual in the sample whether the errors of a period are influenced by the errors of the previous period. The autocorrelation hypothesis of the residues is a necessary condition before the validation of the estimated results. It also facilitates the choice of the best modeling method that lends itself to our data after the classification of existing effects.

There are several autocorrelation errors' tests, among which we have chosen the Wooldridge test and the Durbin-Watson test. Each of them is employed in a well-defined econometric situation. In our research, we have insisted on the most often known: the Wooldridge test is generally the most suitable when the model is subjected to a fixed-effect, however, the Durbin-Watson test is the most applicable in the case of random-effects models because of its ability to detect particular forms of autocorrelation.

The hypotheses of the autocorrelation test are as follows:

H0: The errors are not autocorrelated.

H1: The errors are autocorrelated.

The decision rule of this test is as follows: if the risk obtained is greater than the critical value (Prob > F)<(5%), we reject the null hypothesis, in this case, the errors of the individuals (conventional or Islamic bank) are considered autocorrelated and vice versa.

The results of the autocorrelation tests for residues are shown in Tables 6 and 7 below:

Table 6
Autocorrelation tests of the CBs' sample

Model type	Wooldridge Test	Durbin Watson Test	F of Fisher	Prob > F	Autocorrelation	Decision
LnRtc	-	Durbin Watson Test	3.172	0.0841 > 5%	Absence of autocorrelation	Random-effect
Etc	-	Durbin Watson Test	16.518	0.0003 < 5%	Presence of autocorrelation	Fixed-effect
Ltc	-	Durbin Watson Test	56.355	0.0000 < 5%	Presence of autocorrelation	Fixed-effect
LnStc	-	Durbin Watson Test	0.032	0.8583 > 5%	Absence of autocorrelation	Random-effect

For the models provisionally classified with fixed-effects, the (Wooldridge, 2002) test results referring to the efficiency and the solvency of IBs (Table 7) have shown two values greater than 5%. They are illustrated with respective risks equal to (0.000) for Eti and LnStc. Since the risk of rejecting the null hypothesis is not high, therefore, it was rejected to confirm that the errors are autocorrelated. Based on these results, we concluded that their errors are autocorrelated, hence, we have rectified the class of these two models to random-effects.

After the Durbin Watson test, Fisher statistics on the profitability and the solvency models of CBs (Table 6) and the liquidity model of IBs (Table 7) generated p-values strictly greater than 5%, the risks being respectively equal to (0.0841) for LnRtc, (0.8583) for LnStc and (0.5246) for Lti. For this reason, we confirmed the absence of autocorrelation of errors, which indicates that in these models, the errors are dependent on each other. Therefore, these models have purely random-effects. Furthermore, for the specific model to the efficiency and the liquidity of CBs and the profitability of IBs recorded risks of less than 5%, equal to (0.0003) for Etc, (0.0000) for Ltc, and (0.0338) for LnRti respectively. The Durbin Watson test displayed a rate of risk null, which indicates the presence of autocorrelation between the errors. Hence, we have rectified the class of these two models to fixed-effects.

Table 7
Autocorrelation tests of the IBs' sample

Model type	Wooldridge Test	Durbin Watson Test	F of Fisher	Prob > F	Autocorrelation	Decision
LnRti	-	Durbin Watson Test	4.889	0.0338 < 5%	Presence of autocorrelation	Fixed-effect
Eti	Wooldridge Test	-	74.399	0.0000 < 5%	Presence of autocorrelation	Random-effect
Lti		Durbin Watson Test	0.412	0.5246 > 5%	Absence of autocorrelation	Random-effect
LnSti	Wooldridge Test	-	70.944	0.0000 < 5%	Presence of autocorrelation	Random-effect

Given these results, 3 final models took the form of heterogeneous panels with fixed-effects that vary from one individual to another (Etc, Ltc, and LnRti) and 5 models took the final form of heterogeneous panels with random-effects (Etc, LnStc, Eti, Lti, and LnSti). The second models' types assume that the relationships between the FP measurement of conventional or Islamic banks and the ownership structure determinants in each sample are not identical for all individuals of the same sample.

Apart from the distinguishing features and differences between the organizational structures of Islamic and conventional banks, there are financial peculiarities that separate each banking model from the other and prevent the merger and proximity of the two models (Nganga, 2013). Each CB in our first sample is governed by its own effect regardless of individual temperaments, conflicts of individual interests, internal or external environmental factors of the bank, location of governance mechanisms, regions, etc. Similarly, identifying the effects associated with IBs implies that each of them is governed by a varying effect among banks, but it is unchangeable over time.

3.2.3. Verification of multicollinearity problems

The multicollinearity test is performed to prevent the instability risk of the coefficients estimated by the OLS method. It also makes it possible to see if the matrix of the exogenous variables is regular. Any linear regression calls for the presence of collinearity and multicollinearity problems will be integrated into the same model, between the exogenous variables.

To verify the degree of correlation of the independent variables between them, when the majority of the explanatory variables did not satisfy the normality condition, we examined Spearman's correlation coefficients, the non-parametric version of Pearson (Ricco, 2015). The solution consists in eliminating the collinear variable or the block of exogenous variables containing the same types of information, affecting the quality of the regression. The correlation that deviates from the significance level of the Spearman test meaning is considered useless in the model.

Tables 8 and 9 illustrate the matrices of Spearman's correlation coefficients measuring the degree of linear connection, on the one hand, between the variables to be explained and the explanatory variables, and on the other hand, between the explanatory variables between them. Table 8 displayed the CBs' Spearman matrix, whereas Table 9 displayed the IBs' matrix. Each coefficient is between - 1 and + 1, the sign takes into account the meaning of the relationship.

There is a collinearity between two independent variables when the correlation between them is greater than 0.8 (Gujarati, 2004). The appearance of collinearity makes the signs and values of the estimated coefficients seem contradictory; in this case, their variances are unstable. Since collinearity leads to redundant estimates and misleading significance, it must be detected by performing the necessary corrections and treatments before completing the analysis of the results.

Correlation measures the intensity of the relationship between variables. The link strength between the variables is classified into three types, there is a strong, medium or weak correlation. It is also positive if the correlation coefficient is positive and negative if this coefficient is negative. From Table 8, analysis of the Spearman correlation matrix of the CBs' sample revealed that the signs of the explanatory variables on the FP vary from one model to another. As a result, the separate interpretation of each model gave us a clear idea of the individual effect of each variable.

Beginning with the CBs' profitability (LnRtc), the matrix conceded that (LnAGc) and (LnTAc) have acted positively on the CBs' profitability. This leads us to argue that the more the effects of the cited variables develop, the better the CBs' profitability will progressively improve. However, (LnTCONSc), (LnREUCONSc), and (LnINFc) are negatively affected the CBs' profitability. This led us to conclude that the greater the impacts of these variables are, the more the CBs' profitability deteriorates.

The shift to efficiency analysis (Etc) revealed that only variables related to (TYc), (LnAGc), and (LnINFc) are positively correlated with the CBs' efficiency. This has indicated that as the value of these variables grows, more CBs will become more efficient. Nevertheless, (LnTCONSc), (ENRADIRc), (LnINDCONSc), (LnREUCONSc), and (LnTAc) reflected the negative and destructive impacts of the bank efficiency.

Concerning the liquidity (Ltc), the correlation matrix arrangement found that (LnREUCONSc) and (LnAGc) are positively correlated with the CBs' availability. This summarizes that the more the tendency of these variables is evaluated, the more CBs increase their wealth. However, other variables demonstrated the opposite, an inverse impact was generated by (ENRADIRc), (TYc), (LnTAc), and (LnINFc), they generally recorded negative effects on bank performance and specifically their liquidity powers. This explains why any improvements in these variables lead to the weakening of bank liquidity.

Similarly, after an inventory of solvency (LnStc), we attributed to the conclusion that (LnREUCONSc) supported the CBs' solvency. The more this variable has protected the CBs' solvency, the more its effects are propagated within the decision-making nodes, the more they guarantee its solvency capabilities. However, (LnTCONSc), (TYc), (LnAGc), (LnTAc), and (LnINFc) harmed the sustainability of the bank solvency, therefore, the evolution of the impact associated with these variables contributes, no doubt, to the deterioration of the CBs' solvency.

Finally, the analysis of the correlation between the explanatory variables did not reveal any inter-variable correlation coefficient greater than 0.8. For this, we admitted the absence of collinearity problems in all the models reasoning the board quality's impacts on the FP parameters.

Table 8
Spearman correlation matrix of the CBs' sample

	LnRtc	Etc	Ltc	LnStc	LnTCONSc	ENRADIRc	LnINDCONSc	LnREUCONSc	TYc	LnAGc	LnTA
LnRtc	1.0000										
Etc	0.2982*	1.0000									
	0.0000										
Ltc	-0.0578 0.3344	-0.1086* 0.0742	1.0000								
LnStc	-0.0434 0.4683	-0.0862 0.1572	0.3861* 0.0000	1.0000							
LnTCONSc	-0.2904* 0.0005	-0.3677* 0.0069	-0.0305 0.5900	-0.1165* 0.0021	1.0000						
ENRADIRc	0.0536 0.3704	-0.2231* 0.0428	-0.1106* 0.0298	-0.0243 0.6672	-0.2200* 0.0001	1.0000					
LnINDCONSc	0.0113 0.8780	-0.3746* 0.0000	-0.0295 0.6652	0.0261 0.7025	0.4087* 0.0000	0.1060 0.1195	1.0000				
LnREUCONSc	-0.3737* 0.0000	-0.2919* 0.0013	0.1729* 0.0021	0.1058* 0.0066	0.0895 0.1128	-0.2472* 0.0000	-0.0974 0.1525	1.0000			
TYc	-0.0761 0.2034	0.1070* 0.0008	-0.1132* 0.0012	-0.1924* 0.0034	-0.2336* 0.0000	-0.0454 0.4221	0.0722 0.2894	-0.1770* 0.0016	1.0000		
LnAGc	0.1576* 0.0081	0.2050* 0.0007	0.1556* 0.0057	-0.1788* 0.0132	0.0425 0.4520	0.2036* 0.0003	0.0541 0.4276	0.1101* 0.0509	-0.1208* 0.0321	1.0000	
LnTAc	0.2387* 0.0014	-0.2091* 0.0005	-0.1989* 0.0025	-0.1924 0.0016	0.3212* 0.0000	0.0528 0.3507	0.3003* 0.0000	0.2056* 0.0002	-0.2402* 0.0000	0.0806 0.1537	1.0000
LnINFc	-0.2475* 0.0000	0.1656* 0.0072	-0.3022* 0.0000	-0.1667 0.0005	0.1209* 0.0348	-0.1484* 0.0094	-0.2798* 0.0000	0.0943 0.1001	-0.0404 0.4826	-0.2928* 0.0000	-0.2000 0.0000

Based on Table 9, an overview of the Spearman correlation matrix that collects with the IBs sample showed a heterogeneous mixture of the various signs, sometimes the variables' signs coincide with those detected by its conventional counterparts and sometimes they diverge. In what follows, we have listed the conclusions obtained on the effect of each variable on each FP measure.

First, the analysis of the IBs' profitability (LnRti) highlighted the presence of three variables playing an important role in the process of creating profitability; (LnINDCONSi), (TYi), and (LnAGi). However, (LnTCONSi), (LnREUCONSi), (LnTAi), and (LnINFi) revealed an opposite effect, the more the impacts of these variables grow, the more the IBs' profitability decreases.

Then, the correlation coefficients relative to the IBs' efficiency (Eti) signed a very important cumulation of the positive effects generated by some variables mainly due to (LnTCONSi), (ENRADIRi), (LnAGi), and (LnTAi). This has proven that the more the effect of its organizations extends, the more IBs improve its short-term returns and the more they guarantee its sustainable returns.

Turning to the impact of the explanatory variables on the IBs' liquidity (Lti), we pointed out that (ENRADIRi), (LnINDCONSi), and (LnTAi) played a favorable role of protecting their liquidity capacity. These mechanisms have all been factors for improving monetary dependence. On the contrary, (LnTCONSi), (LnAGi), and (LnINFi) have an adverse effect on the effectiveness of IBs' liquidity.

Finally, we looked at the dependency analysis between solvency (LnSti) and another explanatory variable, the Spearman test revealed a positive correlation between (LnINDCONSi) and IBs' solvency. In contrast, Spearman matrix testified to the presence of a considerable but suspicious cumulative effect on the part of (LnTCONSi) and (LnINFi). This led us to conclude that the more significant its effects, the more IBs will keep its solvencies.

The correlation coefficients between the independent variables of the 2nd matrix revealed that the intersection between all the variables did not generate any correlation coefficient greater than 0.8. Hence, there are no collinearity problems between the variables.

Table 9
Spearman correlation matrix of the IBs' sample

	LnRti	Eti	Lti	LnSti	LnTCONSi	ENRADIRi	LnINDCONSi	LnREUCONSi	TYi	LnAGi	LnTAi
LnRti	1.0000										
Eti	0.2356*	1.0000									
	0.0001										
Lti	0.0461	-0.0040	1.0000								
	0.4528	0.9430									
LnSti	0.0134	-0.2889*	0.4809*	1.0000							
	0.8269	0.0000	0.0000								
LnTCONSi	-0.1452*	0.3316*	-0.3234*	-0.4313*	1.0000						
	0.0574	0.0002	0.0292	0.0004							
ENRADIRi	-0.1280	0.1292*	0.1691*	0.0408	-0.0971*	1.0000					
	0.3363	0.0028	0.0026	0.4711	0.0853						
LnINDCONSi	0.2471*	-0.0863	0.3133*	0.2791*	0.1473*	-0.0987	1.0000				
	0.0058	0.2162	0.0003	0.0008	0.0342	0.1570					
LnREUCONSi	-0.2682*	-0.0431	0.0184	0.0171	0.1881*	-0.1585*	0.2203*	1.0000			
	0.0635	0.4462	0.7446	0.7627	0.0008	0.0048	0.0014				
TYi	0.2356*	0.0665	0.1769*	-0.0217	-0.1168*	0.0426	0.3381*	-0.1607*	1.0000		
	0.0005	0.2389	0.0016	0.7006	0.0383	0.4515	0.0000	0.0042			
LnAGi	0.1828*	0.3297*	-0.2425*	-0.0620	0.0759	0.1679*	-0.1635*	0.0248	-0.2066*	1.0000	
	0.0027	0.0000	0.0655	0.2741	0.1807	0.0029	0.0189	0.6627	0.0002		
LnTAi	-0.3227*	0.1179*	0.4264*	0.0526	0.2155*	0.1591*	0.1056	0.0716	-0.1476*	0.3178*	1.0000
	0.0413	0.0279	0.0000	0.3811	0.0001	0.0050	0.1300	0.2086	0.0093	0.0000	
LnINFi	-0.2621*	0.0098	-0.2851*	-0.2538*	0.1285*	-0.0459	-0.2458*	0.1232*	-0.0201	0.1029*	-0.1956*
	0.0000	0.4360	0.0000	0.0000	0.0248	0.4241	0.0005	0.0314	0.7266	0.0738	0.0007

4.

4. Interpretation Of The Comparative Results Of The Board Determinants' Impacts On The Financial Performance Measures Of Conventional And Islamic Banks

4.1. Inter-model and inter-bank analysis

Before judging the impacts of the board quality, we should estimate the separate impacts provided by the board determinants and the effects generated by the other control variables on the FP measures. To do this, we have established multiple linear models.

To correctly decide the individual significance of the variables, we referred to the Student statistics. When the estimated statistic's probability is less than one of the reference significance thresholds, we have selected the variable in question. Otherwise, the effect of the variable is considered insignificant. The list of tables from 10 to 17 summarizes the coefficients of the different explanatory variables estimated by the model of each sample.

The BOD may have a positive or negative influence on the banks' FP depending on the situations encountered. So far, we have checked the significance of the variables that explain the quality of the BOD in each model. In the next step, we established a comparative study between the same impacts of similar models, which highlights the importance of the board in their existence. Finally, we made a comparison between the pre-established signs (expected) and the signs already found.

4.1.1. Impacts of the board quality on the profitability of conventional and Islamic banks

Based on the Table below, the CBs' profitability coefficients saw two conclusions. About the variables LnTCONSc, LnINDCONSc, and LnREUCONSc, they have deteriorated the CBs' profitability, but only the impacts of LnTCONSc and LnREUCONSc are significant on the profitability at the threshold of 1%. By contrast, ENRADIRc has shown a positive but no significant effect on the CBs' profitability. Concerning to the control variables, TYc, LnAGc, and LnTAc reported positive impacts on profitability. However, only LnAGc and LnTAc recorded significant impacts at the level of 1%. Nevertheless, LnINFc negatively affected the CBs'

profitability significantly at the 1% level. As shown in Table 10, hypotheses n°1 and n°7 have been confirmed in the case of CBs. Thus, we successively rejected hypotheses n°2, n°3, n°4, n°5, n°6, and n°8.

Table 10
Regression results of board impacts on CBs' profitability

LnRtc	Coefficient	Std. Err.	Z	P> z	[95% Conf. Interval]		Decision
LnTCONSc	-0.4250975	0.1177521	-3.61	0.000***	-0.6558874	-0.1943076	H1 rejected
ENRADIRc	0.0199997	0.0573994	0.35	0.728	-0.0925011	0.1325005	H2 rejected
LnINDCONSc	-0.0362331	0.0349907	-1.04	0.300	-0.1048137	0.0323474	H3 rejected
LnREUCONSc	-0.542087	0.0646165	-8.39	0.000***	-0.668733	-0.415441	H4 accepted
TYc	0.0771252	0.0655637	1.18	0.239	-0.0513773	0.2056277	H5 rejected
LnAGc	0.3560312	0.0444134	8.02	0.000***	0.2689826	0.4430799	H6 rejected
LnTAc	0.3086841	0.11053	2.79	0.005***	0.0920493	0.5253188	H7 accepted
LnINFc	-0.2208978	0.0402224	-5.49	0.000***	-0.2997322	-0.1420635	H8 rejected
Constant	3.600837	0.3567324	10.09	0.000	2.901654	4.30002	-

The results in Table 11 have distinguished two determinants of board quality adopting signs of negative and significant impacts on profitability at the 10% threshold, these variables being LnTCONSi and LnREUCONSi, but only LnINDCONSi has recorded a positive impact on the IBs' profitability. For the control variables, TYi and LnAGi revealed positive and significant impacts at the 1% level. However, LnTAi and LnINFi have negatively affected the IBs' profitability. As LnTAi is significant at the 10% threshold, also, LnINFi is significant at the level of 1%. Consequently, we have adopted hypotheses n°1 and n°3. However, contrary to what is anticipated, according to Table 11, the hypotheses n°2, n°4, n°5, n°6, n°7, and n°8 were rejected in the case of Islamic banking model.

Table 11
Regression results of board impacts on IBs' profitability

LnRti	Coefficient	Std. Err.	Z	P> z	[95% Conf. Interval]		Decision
LnTCONSi	-0.2258192	0.1247032	-1.81	0.070*	-0.0185946	0.470233	H1 rejected
ENRADIRi	-0.0304139	0.0760295	-0.40	0.689	-0.179429	0.1186011	H2 rejected
LnINDCONSi	0.0283029	0.0490483	0.58	0.004***	0.1244357	0.06783	H3 rejected
LnREUCONSi	-0.0792698	0.0460498	-1.72	0.085*	-0.1695257	0.0109861	H4 accepted
TYi	0.2171499	0.0522316	4.16	0.000***	0.1147778	0.319522	H5 accepted
LnAGi	0.2108591	0.0596759	3.53	0.000***	0.0938965	0.3278217	H6 rejected
LnTAi	-0.4366414	0.2311491	-1.89	0.059*	-0.8896853	0.0164026	H7 rejected
LnINFi	-0.5308617	0.0509122	-10.43	0.000***	-0.6306477	-0.4310756	H8 rejected
Constant	3.201927	0.5702389	5.62	0.000	2.08428	4.319575	-

4.1.2. Impacts of the board quality on the efficiency of conventional and Islamic banks

As revealed in Table 12, the correlation between board determinants and the CBs' efficiency has shown that LnTCONSc, ENRADIRc, LnINDCONSc, and LnREUCONSc negatively affected bank efficiency at the 1% level. Concerning the additional variables, TYc, LnAGc, and LnINFc, these generated a positive sign to reinforce the CBs' efficiency at the level of 1%. Notwithstanding the three mentioned variables, LnTAc has adopted a negative effect. It has acted significantly at the 1% threshold. Based on the previous results, we confirmed the hypotheses n°1, n°2, and n°8. However, referring to the decision rules, we accepted the hypotheses n°3, n°4, n°5, n°6, and n°7 (see Table 12).

Table 12
Results of regression of board impacts on CBs' efficiency

Etc	Coefficient	Std. Err.	Z	P> z	[95% Conf. Interval]		Decision
LnTCONSc	-0.4034392	0.1541054	-2.62	0.009***	-0.7054803	-0.1013981	H1 rejected
ENRADIRc	-0.2044307	0.0665404	-3.07	0.002***	-0.3348476	-0.0740138	H2 rejected
LnINDCONSc	-0.3385383	0.0602644	-5.62	0.000***	-0.4566544	-0.2204223	H3 accepted
LnREUCONSc	-0.2001578	0.0680429	-2.94	0.003***	-0.3335194	-0.0667962	H4 accepted
TYc	0.1072601	0.0679662	1.58	0.001***	-0.0259513	0.2404714	H5 accepted
LnAGc	0.2722857	0.071187	3.82	0.000***	0.1327617	0.4118096	H6 rejected
LnTAc	-0.6239381	0.1124029	-5.55	0.000***	-0.8442438	-0.4036325	H7 rejected
LnINFc	0.3353558	0.0493592	6.79	0.000***	0.2386136	0.432098	H8 accepted
Constant	-2.00778	0.4745786	-4.23	0.000	-2.937937	-1.077623	-

However, after analyzing Table 13, in IBs we mentioned that the same variables have another combination of impacts on the bank efficiency of our sample. For the sake of precision, TYi, LnTAi, LnAGi, and LnINFi, among which only the impacts relating to LnTAi and LnAGi have recorded influential effects on efficiency and that are significant at the rate of 1%. Therefore, only hypothesis n°7 was accepted. Subsequently, we rejected respective hypotheses n°1, n°2, n°3, n°4, n°5, n°6, and n°8 specifically in the case of IBs (see Table 13).

Table 13
Results of regression of board impacts on IBs' efficiency

Eti	Coefficient	Std. Err.	Z	P> z	[95% Conf. Interval]		Decision
LnTCONSi	0.0124856	0.0024575	5.08	0.000***	0.0076691	0.0173022	H1 accepted
ENRADIRi	0.0014518	0.001415	1.03	0.001***	-0.0013214	0.0042251	H2 accepted
LnINDCONSi	-0.0010896	0.0011001	-0.99	0.322	-0.0032457	0.0010665	H3 rejected
LnREUCONSi	-0.001975	0.0013519	-1.46	0.144	-0.0046248	0.0006748	H4 rejected
TYi	0.0012718	0.0009673	1.31	0.189	-0.0006242	0.0031677	H5 rejected
LnAGi	0.0073942	0.001096	6.75	0.000***	0.005246	0.0095423	H6 rejected
LnTAi	0.0122375	0.0048068	2.55	0.011***	0.0028165	0.0216586	H7 accepted
LnINFi	0.0006461	0.0012217	0.53	0.597	-0.0017485	0.0030407	H8 rejected
Constant	-0.0599947	0.011775	-5.10	0.000	-.0830733	-.0369162	-

4.1.3. Impacts of the board quality on the liquidity of conventional and Islamic banks

According to the Table 14, the specific coefficients of the board effect on the liquidity available within CBs or produced by the operating cycle has shown that LnTCONSc and LnREUCONSc play a fundamental role in forcing the liquidity production, whereas, this effect is only partially significant with LnREUCONSc at the level of 1%. However, ENRADIRc and LnINDCONSc negatively affected availabilities but not necessarily significantly, with the exception made, the incidence received by LnINFc is significant at the level of 5%. Regarding the additional variables, TYc, LnTAc, and LnINFc showed negative effects that are not significant with LnTAc and LnINFc at the rate of 1%. Nevertheless, LnAGc has revealed a positive and significant impact at the 1% threshold on the CBs' efficiency. As expected, hypotheses n°2 and n°4 have been confirmed. Therefore, we explicitly rejected hypotheses n°1, n°3, n°5, n°6, n°7, and n°8 (see Table 14).

Table 14
Regression results of board impacts on CBs' liquidity

Ltc	Coefficient	Std. Err.	Z	P> z	[95% Conf. Interval]		Decision
LnTCONSc	0.0055105	0.0258944	0.21	0.831	-0.0452415	0.0562625	H1 rejected
ENRADIRc	-0.0346359	0.0144743	-2.39	0.017**	-0.0630051	-0.0062667	H2 rejected
LnINDCONSc	-0.0104435	0.0104218	-1.00	0.316	-0.0308699	0.0099829	H3 rejected
LnREUCONSc	0.0748228	0.0115973	6.45	0.000***	0.0520925	0.0975531	H4 rejected
TYc	-0.0114669	0.012047	-0.95	0.341	-0.0350786	0.0121448	H5 rejected
LnAGc	0.0381463	0.0104971	3.63	0.000***	0.0175724	0.0587202	H6 rejected
LnTAc	-0.0725111	0.0216542	-3.35	0.001***	-0.1149526	-0.0300696	H7 rejected
LnINFc	-0.0846695	0.0110867	-7.64	0.000***	-0.1063991	-0.0629399	H8 rejected
Constant	0.6602716	0.0862141	7.66	0.000	0.4912951	0.8292481	-

Also, Table 15 revealed that the estimated model of the IBs' liquidity reported an improvement of the board characteristics that gave coefficients with positive signs just as ENRADIRi, LnINDCONSi, and LnREUCONSi. Analysis showed positive effects on liquidity, among which only LnINDCONSi recorded a significant impact at a rate of 1% and ENRADIRi scored a significant impact at the level of 5%. Conversely, LnTCONSi acted significantly on liquidity at the level of 1%. Focusing on auxiliary variables, we noted that LnAGi and LnINFi negatively affected the IBs' liquidity at the 5% significance rate. However, TYi and LnTAi generated positive and significant impacts at the 1% threshold on the IBs' liquidity. As pre-established, based on Table 15 we validated the hypotheses n°1, n°3, n°5, n°6, and n°7, for the IBs' model. Nevertheless, contrary to what is planned, we rejected the hypotheses n°2, n°4, and n°8.

Table 15
Regression results of the board impacts on IBs' liquidity

Lti	Coefficient	Std. Err.	Z	P> z	[95% Conf. Interval]		Decision
LnTCONSi	-0.0647014	0.0266515	-2.43	0.015**	-0.1169374	-0.0124654	H1 rejected
ENRADIRi	0.0290831	0.0121164	2.40	0.016**	0.0053353	0.0528308	H2 accepted
LnINDCONSi	0.0027745	0.0144338	0.19	0.000***	-0.0255152	0.0310642	H3 rejected
LnREUCONSi	0.0095326	0.0121374	0.79	0.432	-0.0142563	0.0333215	H4 rejected
TYi	0.0127265	0.0129126	0.99	0.004***	0.0380348	0.0125819	H5 accepted
LnAGi	-0.0208915	0.0117612	-1.78	0.076*	-0.043943	0.00216	H6 accepted
LnTAi	0.2445306	0.0341898	7.15	0.000***	0.1775197	0.3115415	H7 accepted
LnINFi	-0.0200158	0.0112233	-1.78	0.075*	-0.0420131	0.0019815	H8 rejected
Constant	0.2448671	0.0955678	2.56	0.010	0.0575576	0.4321766	-

4.1.4. Impacts of the board quality on the solvency of conventional and Islamic banks

In the same line, through Table 16 we noticed that the solvency coefficients associated with the board determinants revealed that ENRADIRc, ENRADIRi, and LnREUCONSc participate in the preservation of bank solvency rates and more specifically the mechanisms whose roles are significant at the threshold 1%, especially the number of meetings held. However, LnTCONSc has raised the CBs' solvency significantly to the 1% threshold. For the secondary variables, we noticed that TYc, LnTAc, LnAGc, and LnINFc contributed to the decline in the solvency rates of banks at the significance level of 1%. Therefore, referring to Table 16, we confirmed the basic assumptions n°1, n°3, and n°6. Whereas the hypotheses n°2, n°4, n°5, n°7, and n°8 were rejected.

Table 16
Regression results of the board impacts on CBs' solvency

LnStc	Coefficient	Std. Err.	Z	P> z	[95% Conf. Interval]		Decision
LnTCONSc	-0.0839261	0.0403352	-2.08	0.037**	-0.1629815	-0.0048707	H1 rejected
ENRADIRc	0.0056781	0.0167608	0.34	0.735	-0.0271724	0.0385286	H2 rejected
LnINDCONSc	0.0119223	0.0154934	0.77	0.442	-0.0184442	.0422888	H3 rejected
LnREUCONSc	0.0542974	0.0186937	2.90	0.004***	0.0176584	0.0909364	H4 rejected
TYc	-0.1263987	0.0213637	-5.92	0.000***	-0.1682707	-0.0845267	H5 rejected
LnAGc	-0.0388244	0.0161149	-2.41	0.016**	-0.0704091	-0.0072397	H6 accepted
LnTAc	-0.0500508	0.0304722	-1.64	0.001***	-0.1097752	0.0096737	H7 rejected
LnINFc	-0.196619	0.0177722	-11.06	0.000***	-0.2314519	-0.1617862	H8 rejected
Constant	0.6580049	0.1015307	6.48	0.000	0.4590084	0.8570014	-

As shown in Table 17, through the estimation of the CBs' solvency model, we found that there are three board characteristics involved in the protection of the solvency of this bank type, like ENRADIRi, LnINDCONSi, and the REUCONSi, by which only LnINDCONSi reported a significant impact on solvency at the level of 1%. However, LnTCONSi has a favorable and significant effect on the IBs' solvency at the threshold of 1%. Symmetrically, the other additional variables reported negative effects. More particularly, we cite, TYi, LnAGi, and LnINFi, but only the effect of LnINFi on solvency is significant at the 1% threshold. However, the impact of LnTAi on the IBs' solvency is positive, but it is not remarkable. Hence, these results allowed us to validate hypotheses n°1 and n°3. Nevertheless, contrary to what is pre-established, according to Table 11, we have accepted hypotheses n°2, n°4, n°5, n°6, n°7, and n°8 in the case of IBs.

Table 17
Regression results of the board impacts on IBs' solvency

LnSti	Coefficient	Std. Err.	Z	P> z	[95% Conf. Interval]		Decision
LnTCONSi	-1.078232	0.2612626	-4.13	0.000***	-1.590297	-0.5661666	H1 rejected
ENRADIRi	0.0157862	0.0735698	0.21	0.830	-0.1284079	0.1599802	H2 rejected
LnINDCONSi	0.358276	0.0948083	3.78	0.000***	0.1724552	0.5440968	H3 accepted
LnREUCONSi	0.0942325	0.0748859	1.26	0.208	-0.0525411	0.2410061	H4 rejected
TYi	-0.0163018	0.0599326	-0.27	0.786	-0.1337676	0.1011641	H5 rejected
LnAGi	-0.0016083	0.0488283	-0.03	0.974	-0.09731	0.0940934	H6 rejected
LnTAi	0.0953078	0.151482	0.63	0.529	-0.2015914	0.3922071	H7 rejected
LnINFi	-0.2130698	0.0584814	-3.64	0.000***	-0.3276912	-0.0984484	H8 rejected
Constant	1.901046	0.6527903	2.91	0.004	0.6216002	3.180491	-

4.2. Analogical study between the significant impacts of the board quality on the financial performance measures

From the foregoing, the mono-analysis already carried out has shown an ambiguity of confirmation or assertion of the hypotheses from a single FP measure. First, not all the board determinants of the two bank types revealed significant effects on FP measures. Besides, not all board determinants of each bank type recorded the same signs. To overcome the problem of inconsistency of the non-significant impacts, we were limited to the variables that revealed significant signs. Then, the incompatibility of the signs led us to establish a state of reconciliation between the significant effects of the board determinants specific to each bank type. To better appreciate the difference in board effects on the FP of each bank type, we compared the individual effects of each board determinant on the same FP measure for each bank type. Table 18 illustrated the reconciliation results specific to CBs with their Islamic counterparts.

Table 18
Summary of the significant impacts of the board determinants on FP measurements between Conventional and Islamic banks

	CB		IB	
Model	Positive impact	Negative impact	Positive impact	Negative impact
Rt	/	LnTCONSc LnREUCONSc	/	LnTCONSi LnINDCONSi LnREUCONSi
Et	/	LnTCONSc ENRADIRc LnINDCONSc LnREUCONSc	LnTCONSi ENRADIRi	/
Lt	LnREUCONSc	ENRADIRc	ENRADIRi LnINDCONSi	LnTCONSi
St	LnREUCONSc	LnTCONSc	LnINDCONSi	LnTCONSi
Reconciliation of similar impacts	2	8	5	5

From Table 18, we noted that the exclusion of non-significant impacts and the aggregation of significant impacts clarifies and simplifies the vision. On the one hand, the approach between the impacts on FP has shown that the CBs' board quality has deteriorated their profitability, their efficiency, their liquidity, and their solvency even though the board features have improved some of their liquidity and their solvency. On the other hand, the IBs' board quality has revealed a non-decisive impact on FP. BOD has improved their efficiency, their liquidity, and their solvency, but at the same time, it has affected their profitability and some of their liquidity, and their solvency. In conclusion, the degree of significance of the negative impact on the advice of CBs is more influential on FP than the degree of significance of the positive impact on IBs.

5. Conclusion

We have noticed that our empirical results are not conclusive in the case of two models of banks, we pointed out that the board quality in the banking environment represents a two-way destiny that does not have a decisive impact on FP. By evidence, we have estimated that board size and board independence have normally contributed to improving the FP of conventional and Islamic banks. Also, we have planned that the rooting of the board chairman and the number of meetings held by the board have influenced negatively their FP. However, the reality has revealed mixed results, all depend on the FP measure. The degree of partial impact varies from one board determinant to another and from one FP variable to another for the same control variable. Besides, the results vary from one FP measure to another for the same board characteristic, depending on the study context, the accounting standards applied and the governance approach followed.

Due to previous factors, we discovered a new classification method of the heterogeneous and detailed impacts of the board quality on the FP through which we argued that the board quality has revealed a driving impact on FP in each bank type. The development of new accounting and auditing aspects aimed at steering the control of the BOD has become a necessity.

The global unification of auditing standards allows us to adjust and arrange boards of directors, while respecting the particularities of each banking model, to facilitate the supervision and monitoring of the governance systems introduced in banks independently of their types. Based on this proposal, the creation of an international institute for monitoring bank boards is possible. The initiative also opens the horizon for highlighting an international non-profit organization with the power to mandatory application of the standards of organizing the boards of directors and improving their working qualities.

Conventional or Islamic banks of large sizes are too big to fail, but also too easy not to go bankrupt. Everything is proportional, as long as there are failures in their governance systems, FP remains a relative dependent variable. The complexity of the large banks' activities go beyond the traditional role of the BOD in that the degree of risk is higher, independently of the bank type. Nevertheless, the collective competence to identify and monitor challenges, overruns, conflicts, manipulations, agency relationships, opportunistic behaviors, and banking risks is lower. This raises an important question about the feasibility and sufficiency of the traditional structure of the board.

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