# Board Composition, Monitoring and Credit Risk: Evidence from the UK Banking Industry

By

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**Abstract:**

*This paper examines the effects of board composition and monitoring on the credit risk in the UK banking sector. The study finds CEO duality, pay and board independence to have a positive and significant effect on credit risk of the UK banks. However, board size and women on board have a negative and significant influence on credit risk. Further analysis using sub-samples divided into pre-financial crisis, during the financial crisis and post crisis reinforce the robustness of our findings. Overall, the paper sheds light on the effectiveness of the within-firm monitoring arrangement, particularly, the effects of CEO power and board independence on credit risk decisions thereby contributing to the agency theory.*

**Keywords:** Corporate Governance, Board Composition, Monitoring, Credit Risk, Banks

## 1. Introduction

The interest in the relationship between corporate governance and bank risk taking has intensified after the 2007/2008 global financial crisis among academics and practitioners (see Fortin et al. 2010; Strivastav and Hagendroff 2015). Laeven and Levine (2009); and Minton et al. (2014) note that poor governance encourages excessive risk-taking and constitutes a major contributory factor to the financial crisis in 2007/2008. More specifically, corporate boards, as an important corporate governance mechanism, have the overall responsibility to provide oversight over firm executive management and to monitor managerial decisions to maximise firm value (Strivastav and Hagendroff 2015). It is argued that board composition and stronger board oversight over management decisions and strategies will not only lead to better performance but also improve risk management and risk-taking behaviour in the banking sector (Strivastav and Hagendroff 2015). Studies such as Lewellyn and Muller-Kahle (2012), and Muller-Kahle and Lewellyn (2011) document that board characteristics impact on board decision-making processes with far-reaching consequences for risk management decisions. The compensation culture in financial institutions is an example of how weak within-firm governance led to excessive risk-taking behaviour culminating in the recent financial crisis.

This argument is consistent with the agency theory that drives conflict of interests when ownership and control of the firm are separated, with managers serving their own interests rather than the interests of shareholders (Jensen and Meckling 1976).

Despite recent research attention on the relationship between boards and firm outcomes, Finkelstein et al. (2009) and McNulty et al. (2013) note that the associations between corporate boards and managerial risk taking have provided mixed and unclear results. Kirkpatrick (2009) echoes similar views and notes that the academic research on the impact of corporate boards on bank risk-taking is strikingly sparse and not well understood with most of the research concentrated on non-financial firms. To our knowledge, only two studies, that is, Dong et al. (2017); and Berger et al. (2014) come closer to this study and utilise more than one board composition variable to investigate the effects of the board on bank risk-taking. However, our paper differs from the studies of Dong et al. (2017); and Berger et al. (2014) for one important reason. Whereas our paper is based on one-tier system of boards under Anglo-Saxon model, the studies of Dong et al. (2017); and Berger et al. (2014) are based on a two-tier system of boards under the Continental European model. It is pertinent to point out that there is a clear difference between a two-tier system and one-tier system of boards with implications for bank risk taking. For example, under one-tier system, there is a clear distinction between inside directors who run the bank, and outside directors sitting on the supervisory board (Adam and Ferreira, 2007) and outside directors tend to have less information about the firm's activities. Therefore, increasing board independence under one-tier system exacerbates information asymmetry between the CEO and non-executive directors thereby curtailing their interference into management decisions. Conversely, under the two-tier system, the supervisory board's interests are aligned with those of the shareholders, hence monitoring appears more intensive, suggesting, on balance, less risk taking may occur in a two tier board system (Berger et al.,

2014). The above has direct and different implications for risk taking in respect of the two systems of boards and it is imperative we investigate the effects of board composition and monitoring on bank risk taking under one-tier system of boards which prior studies have ignored.

In this study, we attempt to fill this gap by examining the effects of board composition and monitoring mechanisms, namely, board size, female representation, board independence, CEO duality, and CEO pay on credit risk in the UK banks over the period 2000-2014. Our research question is: to what extent do board composition and monitoring mechanisms account for credit risk in a one-tier system of boards? We do so by employing three statistical models under the panel dataset estimation, namely, pooled ordinary least squares (OLS), fixed effects (FE) and random effects (RE). We then check the robustness our results with the two-step Arellano and Bover (1995); Blundell and Bond (1998) dynamic panel-data system estimator to address the endogeneity problem which are often connected with corporate governance variables (Hermalin and Weisback 1998; Wintoki et al. 2012).

The study finds that board composition and monitoring arrangements matter for bank credit risk. Specifically, we document that CEO duality, CEO pay and board independence appear to have a positive and significant effect on credit risk of the UK banks. However, board size and the percentage of women on a board have a negative and significant influence on credit risk. Further analysis using sub-samples divided into pre-financial crisis, during the financial crisis and post-financial crisis reinforce the robustness of our findings. This study contributes to the corporate governance literature in the following way. First, the study adds to the sparse literature on the effects of board composition and within-firm monitoring arrangements on bank risking-taking behaviour. Thus, we extend the recent and few studies on the effects of

board composition to further our understanding of the role of corporate boards in risk taking behaviour in the UK banking sector. The extension of the study by Berger et al. (2014) in the context of Germany is particularly important given that, unlike the Continental European model, management and boards under the Anglo-Saxon tradition have a fiduciary duty to pursue the interests of shareholders (Allen 2005). Moreover, whereas the residual nature of shareholders' claims under the Anglo-Saxon system may exacerbate risk-taking as it is ex ante beneficial for shareholders (Merton 1977), the presence of active external market for corporate control[1] may nullify or ameliorate the consequence of residual claims. This argument leads to conflicting predictions or ambiguity regarding the role of the board. Thus, the results of this study will deepen our understanding of the role of corporate boards and inform the debate about improving governance arrangement in the banking sector. Second, we shed light on the effectiveness of the within-firm monitoring arrangement, particularly, the effects of CEO power and board independence on credit risk management decisions thereby contributing to the agency theory.

The rest of the paper is organised as follows: The next section presents the literature review on the relationship between boards and a firm's risk taking and sets out the hypotheses of the study. Section 3 outlines the data source and method used in this study. Section 4 presents and discusses the results of the study. The final section provides a summary and conclusions.

[1] Here, the takeover process is seen as a discipline mechanism on firms, allowing control to be transferred from inefficient to efficient management teams and encouraging convergence of interest between the corporate managers and shareholders (Franks and Mayers, 1990).

## 2. Literature Review

### *2.1 Board and Risk-taking*

Prior literature indicates that board characteristics are a function of the firms' agency risk (Jensen and Meckling 1976; Christy et al. 2013). This argument stems from the separation of ownership and control that leads to conflict of interest due to incomplete contracting and monitoring thereby exposing shareholders to risks (Fama and Jensen 1983; Shleifer and Vishny 1997). Corporate boards, as a corporate governance mechanism, have a responsibility to increase the firm's future cash flows and reduce the risk associated with the achievement of expected future cash flows (Christy et al. 2013). Consequently, the board's activities contain two major functions: monitoring and advising (Linck et al. 2008). Broadly speaking, the monitoring function necessitates that directors scrutinise managerial actions to reduce harmful behaviour, and excessive risk-taking of executive management (McNulty et al. 2013). The advising function of the board involves helping management to make good decisions about firm strategy and actions (Raheja 2005). In this light, Kirkpatrick (2009) concludes that the core responsibility of the board is to ensure the integrity of the corporation's systems for risk management and increased firm value.

The above argument is consistent with the agency theory position of the role of the board of directors, which suggests that corporate boards have a duty of insuring that managers pursue their responsibilities to achieve shareholder wealth maximisation (Jensen and Meckling 1976; McNulty et al. 2013). However, despite the standpoint of agency theory, a number of well-publicised examples of excessive managerial risk-taking in the financial sector have occurred in recent years thereby raising questions about the board's ability to manage risk in banks. Consequently, scholars such as McNulty et al. (2013), Lewellyn and Muller-Kahle (2012) and Berger et al. (2014) have extended the literature on board composition and its association with

risk-taking. Drawing extensively from earlier theoretical work of Holmstrom (1982) and Bolton and Dewatripont (2005), these studies document the importance of moral hazard and adverse selection in multi-agent settings. It is argued that board composition and monitoring arrangement such as board gender composition, board size, the level of power exercised by the CEO and outside director proportion of the board determine the extent of mutual monitoring (Beck et al. 2013 Berger et al. 2014). In short, prior studies indicate that board characteristics have implications for corporate outcomes. For example, Berger et al. (2014) contend that board composition in terms of differences in gender play a vital role in board decision-making process. This is because heterogeneity and diversity are indicative of different experiences each board member brings to bear on the firm's decision-making process and strategies. In a similar vein, boards characterised by a lack of diversity in its composition and the absence of independent outsiders on the board may engender groupthink (Janis 1982), leading to unbalanced decisions taken at the top with deleterious consequences for corporate outcomes. While a large amount of corporate governance literature has examined the relationship between board characteristics and firm performance (see Zahra and Pearce 1989; Minichilli et al. 2012; Minichilli et al. 2009; Lee et al. 2008), financial economists have paid relatively little attention to the relationship between board and risk-taking in the banking sector. However, there is widespread consensus among practitioners and academics that the immediate causes of the recent financial crisis were due to substantial risk exposure and risky assets used to finance mostly short-term market borrowing with little or no supervision by the board (Guerrera and Thal-Larsen 2008; Bebchuk, Cohen and Spamann 2010). This study attempts to provide insights on the role of board on credit risk of banks in the UK, which is a leading player in the global banking industry.

### *2.2 Hypotheses Development*

This section develops the hypotheses regarding the effects of board characteristics on credit risk.

From the agency perspective, CEO duality may lead to failure of internal control system as duality can affect the effectiveness of the board in the discharge of its monitoring function (Chen and Al-Najjar 2012). This is because CEO duality reduces the efficiency monitoring of the directors due to the excessive concentration of power in one person's hands. Moreover, duality gives the CEO excessive power over the decision-making process, plus scope to pursue personal interests at the expense of shareholders (Lewellyn and Muller-Kahle 2012). This point that duality may lead to the pursuit of riskier policies and outcomes because of personal interests has been supported by studies including Adams et al. (2005); and Srivastav and Hagendorff (2016). However, it is documented that when the role of the CEO is separated from the functions of the board chair, it provides a proper check and balance over risk-taking and management (Stiles and Taylor 1993).

*Hypothesis 1: CEO duality will increase credit risk in UK banks.*

**CEO Pay**

Agency theorists argue that CEO pay provides a relevant and effective tool to align managers' and shareholders' interests, thereby mitigating agency costs (Gormley et al. 2013). However, the recent financial crisis has revealed severe flaws in executive compensation, particularly CEO pay (Faulkender and Yang 2010). Some scholars have argued that excessive CEO pay contributed to the financial crisis (e.g., Hagendorff and Vallascas 2011).

The literature suggests that CEO pay may encourage risk-taking and create incentives for

highlighting short-term benefits at expense of long-term goals (Fahlenbrach and Stulz 2011). Thus, CEO pay based on performance may encourage CEO to take more risky investment choices, particularly risky loans, which tend to increase credit risk levels of the banks. As Erkens et al. (2010) note, banks with higher option-based compensation package and a large fraction of compensation in cash bonuses for their CEOs experienced larger losses during the recent financial crisis and gave more risky loans before the crisis. More specifically, Bebchuk et al. (2010) argue that CEO pay at Bear Stearns and Lehman Brothers constituted large amounts of performance-based pay prior to the financial crisis and that the total payoffs these incentives took away were bigger than the losses suffered by their firms during the crisis. Researchers such as Chen et al (2006) and Bai and Elyasiani (2013) have drawn similar conclusions and found a positive association between CEO pay and default risk. Our second hypothesis is as follows:

*H2: Higher CEO pay has positive influence on credit risk in UK banks.*

**Board Size**

The relationship between board size and board monitoring has received much attention in the corporate governance literature but the results have been mixed. On one hand, Hermalin and Weisbach (2003) argue that larger boards are less effective at their monitoring role because of higher agency costs, coordination and communication difficulties resulting delays in decision-making. For example, Dong et al. (2017) found an increase in Chinese board size to be associated with lower profit efficiency. On the other hand, Andres and Vallelado (2008), and Wang and Hsu (2013) contend that board monitoring increases with board size because larger boards tend to have individuals with different expertise on the board. The central argument regarding the relationship between larger board and credit risk is that larger boards enhance the knowledge base and help managers increase managerial ability to make better decisions in all

respects of the business, including credit risk (Hou and Moore 2010). Moreover, larger boards offer greater access to the external environment, which can help the banks to reduce uncertainties (Jia et al. 2009). Other studies by Nakano and Nguyen (2012) of Japanese firms and Switzer and Wang (2013) in the context of US banks have rendered some support for the association between larger boards and lower credit risk. We posit that larger board size improves credit risk decisions by bringing on board individuals from diverse backgrounds and different experiences, which enable a more extensive analysis and thorough decision-making process. Therefore, our third hypothesis is as follows:

*H3: Larger board size has negative influence on credit risk in UK banks.*

**Board Independence**

Prior studies on the relationship between board independence and firms' outcomes appear to be mixed. Adams and Ferreira (2007) contend that a board with a high proportion of independent directors can suffer from a lack of specific knowledge and information about the firm leading to poor analysis and decisions. A number of studies such as Phatan (2009) and Shen (2005) have found a negative impact of board independence on corporate outcomes. Byrd and Hickman (1992) contend that the monitoring role of the board is facilitated by a board which is composed of a larger proportion of outside independent directors. This is because such composition tends to represent a more effective way in monitoring and controlling managerial actions. In the context of the UK, the Corporate Governance Code (2012) requires companies to have approximately one-half of board membership to be independent outsiders. We expect the large representation of outside directors on the board will facilitate effective thereby exerting a negative influence on credit risks. Therefore, the fourth hypothesis is as follows:

*H4: Higher proportion of board independence has negative influence on credit risk in UK banks.*

**Board Gender**

A growing body of economics and finance literature contends that women directors on board would benefit the monitoring process (Upadhyay and Zeng 2014). Khan and Vieito (2013) point out that, banks with a higher percentage of women on the board are associated with enhanced monitoring process. Jamali et al. (2007) suggest that when a board has a higher number of women directors, the management-monitoring activities of the board are more effective due to the diverse nature of the group, skills and knowledge.

In the context of risk management, Vandergrift and Brown (2005) indicate that women are more risk averse than men, and the differential risk attitudes and characteristics between men and women impact on corporate financial decisions. Other studies such as Sener and Karaye (2014) noted that the differences in risk attitude towards risk matters in terms of financial and investment decisions. The differences in risk tolerance is also reflected in granting loans, where female directors are perceived to take less risky loans and tend to select more stable investments (Huang and Kisgen 2013). A meta-analysis of 150 studies on risk-taking by Byrnes et al. (1999) supports this conclusion, suggesting that in experimental settings, men exhibit a greater tendency to make risky choices. In the case of the UK banking industry, Beck et al. (2013) show that default rates for loans originated by female loan officers tend to be lower than their male counterparts. However, the findings of Beck et al. (2013) were in respect to loan officers, not board members. Two recent studies that examine gender composition on boards are those of Berger et al. (2014) and Sila et al. (2016). Whereas Sila et al. (2016) found no evidence that female boardroom representation influences equity risk, Berger et al. (2014) found evidence that female executive affect bank risk-taking. In the light of the above, we expect a negative influence of females on the board to have negative influence on credit risk and this leads to our fifth hypothesis:

*Hypothesis 5: Higher proportion of female directors on the board will exert negative influence on credit risk in UK banks.*

## 3. Data Source and Methodology

### *3.1 Data Source*

Our sample consists of 79 UK banks with 783 observations derived from the Bankscope for the period of 2000-2014. The credit risk indicators and various financial ratios are also derived from the Bankscope database. The board characteristics data were hand collected and calculated from the annual reports of each bank.

### *3.2 Measurement of Variables*

The measurements of independent and dependent variables are summarised in Table 1.

(Insert Table 1 about here)

**Independent Variables**

CEO duality is a dummy variable, which takes a value of 1 if the CEO and chairman are the same person and equals 0 otherwise. CEO Pay is measured by total CEO remuneration. Board size is the total number of members on the board. Board independence is measured by the percentage of non-executive directors on the board. Board gender is measured using a dummy variable, which takes a value of 1 if there is at least one woman on the board and equals 0 otherwise.

**Dependent Variables**

This study adopts two proxies, namely, non-performing loans ratio (NPLR) and loan loss provision (LLPR) to measure credit risk in line with the previous studies such as Shehzad et al.

(2010) and Liang et al. (2013), who argue that these variables are essential measures of credit quality.

***Non-Performing Loans Ratio (NPLR)***

The non-performing loans ratio (NPLR) is considered a significant variable to measure the effectiveness of credit risk with respect to the banks' lending practice (Liang et al. 2013). This ratio is defined as the amount of non-performing loans scaled by total loans (Shehzad et al. 2010). A higher level of low-quality loans is more likely to have a higher credit risk. Conversely, a lower level of low-quality loans is expected to lead to lower credit risk. Therefore, NPLR has a positive correlation with banks' credit risk.

***Loan Loss Provisions Ratio (LLPR)***

The loan loss provision ratio (LLPR) reflects the anticipated further losses, which a bank suffers in the event of default (Anandarajan et al. 2005), and is measured by total loan loss provisions to total gross loans (Nguyen and Boateng, 2015). LLPR as alternative measure for risk-taking has been employed in the previous studies such as Nguyen and Boateng (2015). LLPR is a proxy for the probability of default.

**Control Variables**

Based on the existing literature, this study controls a number of banks' unique characteristics, including bank profitability, bank size, bank efficiency and leverage ratio which might affect banks' credit risk.

***Bank Profitability***

Return on asset (ROA) represents a proxy for profitability, computed as a ratio of the net profit to the total assets of the bank. A higher return on assets (ROA) may lead to higher risk-taking. Consequently, the expectation is that higher bank profitability may be associated with higher credit risk.

***Bank Size***

Bank size is measured as a log of total assets (Andres and Vallelado 2008). In terms of risk, larger banks could be less risky due to the greater ability to diversify their activities (Demsetz and Strahan 1997). Moreover, larger banks may be associated with lower credit risk because of their ability and resources to search for better information about their customers and risk profile.

***Bank Efficiency***

Bank efficiency is defined as a ratio of expenses to revenue (Tan 2016). This measurement has been used extensively in the empirical literature (See Dietrich and Wanzenried 2011). This ratio measures a bank's ability to turn resources into revenue. In particular, considering that banks produce the same output under the same conditions, cost efficiency measures how close to the minimum cost a bank is, where this minimum cost is determined by banks with the "best practices" in the sample (Berger et al. 2009). The lower the percent is, the better financial situation a bank has and the lower is the level of risk-taking (Silva et al. 2016). Therefore, higher efficiency may be associated with higher credit risk.

***Leverage***

Leverage is measured by the equity-asset ratio. In this study, we employed both non-risk- and

risk based measures in our analyses. According to Basel III, leverage ratio is measured as equity divided by unweighted balance sheet assets[2] (BCBS, 2014). This ratio indicates the extent to which a bank has financed its assets by equity (Dermine, 2015). Bhagat et al. (2015) show that a higher leverage ratio means that a bank has a better long-term solvency position. It is considered safer for a bank to have a higher leverage ratio. Consequently, higher leverage may be associated with lower credit risk.

### *3.3 Econometric Model*

This section sets out the econometric models employed to estimate the association between board characteristics and CEO monitoring mechanisms and credit risk. Our model is:

$$C\_RISK = \beta_1 DUALITY_{it} + \beta_2 CEO\_PAY_{it} + \beta_3 Board\_SIZE_{it} + \beta_4 Board\_IND + \beta_5 GENDER + \delta CONTROLS + \varepsilon_{it} \quad (1)$$

where C_RISK is dependent variables of the two credit risk measures: the non-performing loans ratio (NPLR) and loan loss provision ratio (LLPR). DUALITY represents CEO duality; CEO_PAY is CEO pay; Board_SIZE represents board size; Board_IND represents board independence; GENDER represents board gender. CONTROLS are control variables which include: ROA, bank size, efficiency and financial leverage.

### *3.4 Estimation Methods*

We employ panel data analysis approach to examine the effects of board composition and monitoring mechanism on credit risk in UK banks. The panel data considers the unobservable

[2] In 2014, the Basel Committee introduced a complementary leverage ratio which is not risk-weighted. This is because pillar 1 risk-weighted Basel II/III capital ratio has been criticized for the following reasons: insufficient capital in a recession, complexity, open to gaming, lack of robustness, and fear of excess leverage in the economy (BCBS, 2014). The risk based measure is used as robustness check.

and constants heterogeneity, that is, the specific features of each bank. As Andres and Vallelado (2008) indicated, panel data analysis is the most efficient tool to use when the sample is a mixture of time series and cross-sectional data. To estimate the effects of the independent variables on the dependent variables and insure robustness, we use three models: a pooled OLS model, a random effects model and a fixed effects model.

### *3.5 Univariate Analysis*

Table 2 shows the descriptive statistics of the variables used in this study. The mean value of NPLR is 1.92%, while that of LLPR is 2.43%. CEO duality constitutes 15% of the sample. The mean CEO pay is 0.66 million. This figure is much lower than the average in the US commercial banks (3.43 million) from 2005 to 2010, documented by Tian and Yang (2014). The average board size in the UK banking sector is 10, which appears relatively small compared with 18 and 16 directors in the studies of Adams and Mehran (2008) and Andres and Vallelado (2008) in the US and Organisation for Economic Cooperation and Development (OECD) countries. The independent directors constitute approximately 54% of the board. This suggests that UK banks tend to follow a relatively independent board structure in which the proportion of independent directors is high. Board gender, on average, is 0.12 indicating that female directors account for 12% of total directors in the boardrooms of UK banks. This percentage is almost double the average in the Asian region (6%), reported by Dyckerhoff et al. (2012). The average ROA of the sample UK banks is 0.42%, efficiency ratio is 70.55%, and the average leverage ratio is 7.8%.

**(Insert Table 2 about here)**

Table 3 shows that none of the correlation coefficients among independent variables is higher than 0.7 (See Gujarati 1995). Therefore, multicollinearity appears to not be a problem in this study. This is confirmed by the variance inflation factors (VIF) which is within the cut-off point of 10 as recommended by Neter et al. (1989).

**(Insert Table 3 about here)**

### *3.6 Regression Results and Discussions*

The Hausman specification test is employed to test the fixed effect model and the random effect models. The null hypothesis is as follows: $H_0$: The X variables are not correlated with the errors (Random Effects). The alternative hypothesis is as follows: $H_1$: The X variables are correlated with the errors (Fixed Effects). The analysis suggests that the random effects model can be rejected in favour of the fixed effects model at a 1% critical level.

Table 4 reports our results across the three approaches, in columns 1-3 (NPLR) and columns 4-6 (LLPR), respectively. Overall, our results indicate that board independence, CEO duality and CEO pay have a positive and significant effect on credit risk while board size and female directors exert negative and significant influence on credit risk. Regarding the effect of duality, we document a positive and statistically significant relationship with NPL ratio at the 10% level under the OLS approach but the results appear stronger at 1% and 5% levels, respectively, when LLPR is employed as dependent variable under FE and RE models in columns 5 and 6. The results provided support hypothesis 1. The results appear consistent with the findings of the study by Lewellyn and Muller-Kahle (2012) that CEO duality diminishes the efficiency monitoring of the directors because of the excessive concentration of power in the hands of one person. The results may be explained by the fact that duality weakens effective board

monitoring over credit management decisions and provides the CEO with excessive power over the decision-making process, and greater scope to pursue riskier outcomes that satisfy personal interests at the expense of shareholders.

Another interesting finding is that CEO pay has a positive and significant relationship with NPLR at the 1% level under the OLS approach but appears strong and positive at the 1% level 10% level when credit risk is proxied by LLPR. Our results show that CEO pay exerts a positive relationship with credit risk in columns 1, 4, 5 and 6, thereby supporting hypothesis 2. The results appear consistent with the studies of DeYoung et al. (2013), who found that higher CEO pay encourages CEOs to make more risky decisions. The underlying explanations appear to be in line with the CEO entrenchment hypothesis as documented by Elvasiani and Zhang (2015), in which they found that entrenched CEOs tends to attain more latitude in shaping corporate strategy, extracting larger compensation and perquisites for themselves. Therefore, entrenched CEOs may engage in excessive risk-taking behaviours because of the potential reward, hence the potential or likelihood for an increased credit risk level.

Board size has a negative and significant relationship on NPLR at the 1%, 5% and 10% levels in columns 1, 2 and 3 but has a negative but insignificant in columns 4, 5, and 6 under LLPR. The results provide some support for Hypothesis 3. The findings that board size has a negative relationship with credit risk are in line with the study of Switzer and Wang (2013) in the context of US banks. The findings appear be in line with the argument suggested by Pathan (2009) and Wang (2012), in which they found that larger boards pursue conservative investment policies and that their decision outcomes are moderate. In other words, larger boards are more likely to take less risky credit management decisions and, as a result, decrease credit risk level.

**(Insert Table 4 about here)**

Board independence has a positive and significant relationship with credit risk in 5 of the 6 columns of Table 4. Hypothesis 4 is therefore not supported. The results appear surprising and interesting because prior evidence suggests that board independence is negatively related to firm outcomes and risk-taking (See Pathan et al. 2007; Pathan 2009). It is therefore expected that effective monitoring performed by independent boards would generate higher quality of decision-making and reduce credit risk level (Leung et al. 2014), but this appears not to be the case. Perhaps our results may be explained by the point made by Liang et al. (2013), who noted that independent directors may damage board effectiveness if they do not bring the requisite skills and experiences that might contribute to full and comprehensive decision-making process and reduce risk. Another plausible explanation may be the difficulty of independent directors to gather greater specific and relevant information needed to make such technical decisions thereby decreasing the quality of credit management monitoring.

The proportion of female presence on the board has a negative and significant relationship with credit risk management in columns 1, 4, 5 and 6. The results provide support for Hypothesis 5. The findings support the contention that women tend to be more risk averse in financial decision making (Jianakoplos and Bernasek 1998). The fact that women appear less overconfident in financial decision than their male counterparts as discussed by Barber and Odean (2001) and Niederle and Vesterlund (2007) may lead to stronger monitoring and risk reduction. Accordingly, female directors can set the credit risk strategy of the bank in accordance with their relatively risk averse nature, thereby lowering credit risk (Khan and Vieito 2013). The results also resonate with the recent study by Berger et al. (2014) in the

German context under the Continental European model of corporate governance which indicates that female executives affect governance of the bank to some extent.

We notice some differences in respect of the impact of the CEO pay, duality and board size variables on two credit risk proxies, namely, NPLR and LLPR reported in Table 4. We attribute the differences to a number of reasons. First, LLPR measures expected loss provision on loans in existing portfolios whereas NPLR represents the actual ratio of non-performing loans. One plausible reason for the differences in our results may be due to the fact that NPLR plays a vital role in the assessment of loan quality, and tends to have a strong impact on the lending strategy compared to LLPR which is just used to control the anticipated losses (Anandarajan et al. 2005). Another reason may be that, regarding LLPR, managers rely on accounting metrics and have substantial discretion in making their estimates of the expected portfolio losses. As LLPR cannot be estimated with certainty and are based on discretion, bank managers have incentives to manipulate LLPR to reduce earnings volatility, to convey a signal of lower risk to shareholders and enhance managers' compensation. Therefore the positive and significant relationship between duality, CEO pay and LLPR suggests the presence of earnings management among the sample firms. This may enable the CEO is also a chair to smooth earnings to boost her compensation. The differences in the results of the variables may be due to managerial power implying that the banking institutions in our study deviate from efficient LLPR estimation to enhance compensation and send signal to shareholders and investors. However, board size appears to have a negative and insignificant effect on LLPR suggesting that managerial power appears to nullify the effects of board size in earnings management manipulation.

Regarding the control variables, our regression results indicate that ROA and efficiency have a positive influence on credit risk consistent with previous studies such as Zedek and Tarazi (2015) and Silva et al. (2016). However, the findings also suggest a negative and significant relationship between leverage and credit risk while bank size appears to be negative but insignificant.

### *3.7 Robustness Test*

To check for the robustness of our results in Table 4, this study employs two additional specifications to rule out alternative explanations. First, this study calculates the change in CEO pay over the period from 2000 to 2014 to measure the change in the CEO pay in relation to credit risk decisions. If CEO compensation is designed to induce bank CEOs to invest in risky projects, we would expect to see higher CEO pay in the following fiscal year (Hagendorff and Vallascas 2011). Second, we calculate the change of board gender each year in our sample and thus examine whether a change in the number of women directors affect credit risk in line with the study of Sila et al (2016). The results obtained appear similar to that in Table 4 confirming the robustness of our results.

This study also specifies alternative dependent variable. NPLR is recalculated as the percentage of total assets instead of total loan used by Liang et al (2013). Regarding control variables, this study utilises return on equity (ROE), computed as a ratio of the net profit to equity (Hasan et al. 2012) is used in place of ROA. Post-financial crisis literature emphasises the importance of the quality of loan portfolio and credit risk management on ROE (Dietrich and Wanzenried 2011). We also employ risk based leverage measure in addition to the non-risk based used in our analysis reported in Table 4. The risk based leverage ratio measures the extent to which a bank has sufficient capital relative to the risk of its business activities (Kamal, 2016; Mustika

et al. 2015). The leverage ratio is calculated as the total capital divided by risk weighted assets (BCBS, 2014). Appendix 1 reports the results which appear similar to the findings documented in Table 4.

### *3.8. Addressing Endogeneity Issue*

A key concern for any analysis on board effect should consider that board variables are endogenous (Adams et al., 2010; Liang et al., 2013). The regression of board composition, monitoring on credit risk that underlies the "board effect" argument is a classic example of a regression that is likely to suffer from endogeneity problems such as omitted variables, reverse causality and measurement error (Adams et al., 2010). To address the problem of endogeneity, we employ two-step System GMM (Arellano and Bover, 1995; Blundell and Bond, 1998). To assess the validity of our findings, we conducted the second-order autocorrelation test *AR* (2). The *AR* (2) tests the null hypothesis of no second-order autocorrelation in residuals (Roodman, 2009). We find that *AR* (2) for all the models reported in Table 5 to be insignificant, implying that the residuals in the equations are not serially correlated. The system estimator regression results are reported in Table 5. The results indicate that the System GMM results appear to be similar to results reported in Table 4.

**(Insert Table 5 about here)**

To assess the impact of the 2008 financial crisis on our results, we divided the sample into pre-crisis, during crisis and post-crisis. Specifically, we examined whether banks adjusted their board characteristics and the impact on credit risk during the financial crisis. Consequently, this study groups the sample into three groups as follows: the crisis period (2007-2009), pre-crisis period (before 2007) and post-crisis period (after 2009). The results of Table 6 show there

are no significant changes in response to changes in credit risk before, during and after the crisis.

**(Insert Table 6 about here)**

## 4. Conclusions and Implications

The recent financial crisis has clearly highlighted that corporate governance systems, particularly corporate boards as an internal governance mechanism, matter for bank risk-taking decisions. However, the relationship between boards and credit risk remains under-researched and not well understood. In this paper, we analysed the effects of board composition and monitoring on the credit risk in the UK banking sector. The study finds that CEO duality, pay and board independence exert a positive and significant effect on credit risk of the UK banks. However, board size and women on a board have a negative and significant influence on credit risk. Further analysis using sub-samples divided into pre-financial crisis, during the financial crisis and post crisis reinforce the robustness of our findings. Overall, we find evidence that board characteristics play important roles on credit risk. Contrary to our expectations, we find independent directors exert positive influence on credit risk decisions. The finding that board size has a negative and significant influence lends support to the argument that larger boards enhance the knowledge base, offer greater access to the external environment and helps managers increase managerial ability to make better decisions in all aspects of the business including credit risk (Hou and Moore 2010).

The study has a number of implications for policy and practice. The findings that duality and CEO pay influence credit risk suggest CEO power and compensation are key drivers for bank's credit risk decisions. The implication here is that the bank contracting environment drives risk-

taking in banks and hence risk-taking behaviour of executive management can best be approached through contracting arrangement rather than legislation limiting the pay of senior managers as advocated by politicians and policy makers. Another important implication of the results of this study is that, bank CEOs have greater influence on board decisions regarding credit risk policies suggesting that the design of control and supervisory mechanisms for financial institutions should be further strengthened given the far-reaching consequences and severity of the impact of bank risk taking on a country's economy. More specifically, our results raise an important issue of whether legislative measures should be put in place to give a quota to females on board composition given that female members on the board exert a negative and significant influence on bank risk-taking. We suggest that global initiatives appear warranted to increase female representation on the board along the lines of some continental European countries, such as Belgium, France, Italy, Norway and the Netherlands where relevant legislations have been passed to offer 30 percent of board positions to females.

Despite the significant contribution of this study, more studies appear warranted. We suggest that future studies should investigate board composition, demographic diversity and monitoring on bank risk-taking using cross-country data. Another important issue which warrants further investigation is the differences in the results of the effects of managerial power variables such as duality and CEO pay on credit risk using LLPR and LPLR proxies.

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**Table 1: Definitions of Variables**

| Variables | Measurement | Exp. Sign |
|---|---|---|
| **Credit Risk Variables:** | | |
| Non-performing loan ratio (NPLR) | Non-performing loans scaled by total loans. | |
| Loan loss provision ratio (LLPR) | Loan loss provision scaled by gross loans | |
| **Board Variables:** | | |
| CEO duality (DUALITY) | A dummy variable which takes a value of 1 if the CEO and chairman are the same person, 0 = otherwise | + |
| CEO_PAY | Total amounts of remuneration of CEO. | + |
| Board_SIZE | Total number of members on the board | _ |
| Board_IND | The percentage of non-executive directors on the board | _ |
| Board Gender (GENDER) | A dummy variable takes a value of 1 if there is at least one woman on the board, 0 = otherwise | _ |
| **Control Variables:** | | |
| Profitability (ROA) | Net income scaled by total assets | |
| SIZE | Log of total assets | |
| Efficiency | Expenses scaled by revenue | |
| Leverage | Equity divided by unweighted balance sheet assets | |

**Table 2: Descriptive Statistics**

| Variables | Mean | SD | Min | Max |
|---|---|---|---|---|
| NPLR | 1.92 | 4.25 | 0.01 | 42.41 |
| LLPR | 2.43 | 6.50 | 0.01 | 37.80 |
| DUALITY | 0.15 | 0.36 | 0.00 | 1.00 |
| CEO_PAY | 0.66 | 0.85 | 0.10 | 3.93 |
| Board_SIZE | 9.82 | 2.90 | 4.00 | 22.00 |
| Board_IND | 0.54 | 1.99 | 2.00 | 16.00 |
| GENDER | 0.12 | 0.43 | 0.00 | 1.00 |
| ROA | 0.42 | 0.77 | -2.57 | 3.81 |
| Bank_Size | 5.74 | 1.98 | 3.32 | 16.03 |
| Efficiency | 70.55 | 13.98 | 32.26 | 99.78 |
| Leverage | 7.80 | 9.02 | 1.67 | 97.89 |

Note: This table reports summary statistics on key variables. The sample is unbalanced panel covering 783 bank-years observations over the period of 2000-2014. C_RISK is dependent variables of the two credit risk measures: the non-performing loans ratio (NPLR) and loan loss provision ratio (LLPR). DUALITY represents CEO duality; CEO_PAY is CEO pay; Board_SIZE represents board size; Board_IND represents board independence; GENDER represents board gender. CONTROLS are control variables which include: ROA, bank size, efficiency and leverage

**Table 3: Correlation Matrix**

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.NPLR | 1.00 | | | | | | | | | | | 1.09 |
| 2. LLPR | 0.10 | 1.00 | | | | | | | | | | 1.14 |
| 3.DUALITY | 0.04 | 0.15 | 1.00 | | | | | | | | | 1.53 |
| 4.CEO_PAY | 0.11 | 0.13 | -0.25 | 1.00 | | | | | | | | 1.86 |
| 5.Board_SIZE | -0.01 | -0.16 | -0.30 | 0.55 | 1.00 | | | | | | | 4.48 |
| 6.Board_IND | 0.08 | 0.15 | -0.35 | 0.55 | 0.53 | 1.00 | | | | | | 4.40 |
| 7.GENDER | -0.02 | -0.16 | -0.54 | 0.23 | 0.29 | 0.35 | 1.00 | | | | | 1.57 |
| 8.ROA | -0.01 | -0.03 | 0.09 | 0.10 | -0.03 | -0.10 | -0.16 | 1.00 | | | | 2.06 |
| 9.Bank size | -0.01 | -0.02 | -0.13 | 0.19 | -0.03 | 0.07 | 0.05 | -0.07 | 1.00 | | | 1.20 |
| 10.Efficiency | -0.08 | -0.23 | 0.03 | 0.09 | 0.05 | 0.08 | 0.13 | -0.17 | 0.05 | 1.00 | | 1.42 |
| 11Leverage | -0.10 | -0.07 | 0.10 | -0.12 | -0.19 | -0.15 | -0.04 | 0.05 | -0.08 | 0.08 | 1.00 | 1.13 |

Note: C_RISK is dependent variables of the two credit risk measures: the non-performing loans ratio (NPLR) and loan loss provision ratio (LLPR). DUALITY represents CEO duality; CEO_PAY is CEO pay; Board_SIZE represents board size; Board_IND represents board independence; GENDER represents board gender. CONTROLS are control variables which include: ROA, bank size, efficiency and leverage.

**Table 4: Regression Results**

| | NPLR | | | LLPR | | |
|---|---|---|---|---|---|---|
| | OLS (1) | FE(2) | RE(3) | OLS(4) | FE (5) | RE (6) |
| ***Board Variables:*** | | | | | | |
| DUALITY | 0.91 | 0.07 | 0.04 | 0.46 | 1.55 | 1.28 |
| | (1.79)* | (0.16) | (0.10) | (0.61) | (2.58)*** | (2.16)** |
| CEO_PAY | 0.09 | 0.03 | 0.03 | 0.06 | 1.12 | 0.11 |
| | (4.01)*** | (1.02) | (1.46) | (1.85)* | (3.40)*** | (3.29)*** |
| Board_SIZE | -0.52 | -0.21 | -0.26 | -0.13 | -0.16 | -0.19 |
| | (-4.96)*** | (-1.76)* | (-2.48)** | (-0.85) | (-0.95) | (-1.22) |
| Board_IND | 0.66 | 0.60 | 0.60 | 0.03 | 0.82 | 0.75 |
| | (4.51)*** | (4.31)*** | (4.45)*** | (0.12) | (4.16)*** | (3.94)*** |
| GENDER | -1.12 | -0.24 | -0.34 | -2.03 | -1.32 | -1.44 |
| | (-2.67)*** | (-0.68) | (-0.98) | (-3.23)*** | (-2.67)*** | (-2.95)*** |
| ***Control Variables:*** | | | | | | |
| ROA | 0.01 | 1.14 | 0.98 | 0.45 | 0.57 | 0.56 |
| | (0.01) | (5.93)*** | (5.26) *** | (1.52) | (2.10) ** | (2.11) ** |
| Bank_Size | -0.11 | -0.01 | -0.02 | -0.10 | -0.28 | -0.13 |
| | (-1.62) | (-0.13) | (-0.19) | (-0.92) | (-1.71) | (-0.94) |
| Efficiency | 0.02 | 0.01 | 0.01 | 0.12 | 0.03 | 0.04 |
| | (1.95) * | (0.29) | (0.52) | (7.38) *** | (1.93) * | (2.82) *** |
| Leverage | -0.05 | -0.03 | -0.03 | -0.01 | -0.01 | -0.01 |
| | (-2.74)*** | (-1.85)* | (-2.00)** | (-0.49) | (-0.03) | (-0.17) |
| Adj R-Square | 0.06 | | | 0.10 | | |
| Wald test | 6.33 | 8.03 | 65.50 | 10.58 | 8.43 | 71.38 |
| | (0.00)*** | (0.00)*** | (0.00)*** | (0.00)*** | (0.00)*** | (0.00)*** |
| Hausman (p-value) | | 19.42 | | | 57.13 | |
| | | (0.00)*** | | | (0.00)*** | |
| Observations | 783 | 783 | 783 | 783 | 783 | 783 |

Note: C_RISK is dependent variables of the two credit risk measures: the non-performing loans ratio (NPLR) and loan loss provision ratio (LLPR). DUALITY represents CEO duality; CEO_PAY is CEO pay; Board_SIZE represents board size; Board_IND represents board independence; GENDER represents board gender. CONTROLS are control variables which include: ROA, bank size, efficiency and leverage, t-statistics (in parentheses), number of observations (N), R-square, adjusted R-square, F/Wald statistics (p-value), and Hausman test. *p<0.1; **p<0.05; ***p<0.01

**Table 5: Board Characteristics and Credit Risk: System GMM**

| | NPLR | LLPR |
|---|---|---|
| NPLR (Lag 1) | 0.58 | |
| | (1.90)*** | |
| LLPR (Lag 1) | | 0.66 |
| | | (2.41)*** |
| DUALITY | 0.46 | 0.23 |
| | (3.18)*** | (1.60) |
| CEO_PAY | 0.03 | 0.01 |
| | (7.68)*** | (2.34)** |
| Board_SIZE | -0.42 | -0.32 |
| | (-25.56)*** | (-11.45)*** |
| Board_IND | 0.67 | 0.60 |
| | (30.32)*** | (16.93)*** |
| GENDER | -0.28 | -1.37 |
| | (-3.57)*** | (-18.01)*** |
| **Control Variables:** | | |
| ROA | 0.05 | 0.21 |
| | (2.72)*** | (3.40) *** |
| Bank_Size | -0.08 | -0.06 |
| | (-7.04)*** | (-4.31)*** |
| Efficiency | 0.01 | 0.02 |
| | (2.60)*** | (15.58) *** |
| Leverage | -0.01 | -0.02 |
| | (-1.65)* | (-2.60)*** |
| AR (1) | 0.115 | 0.132 |
| AR (2) | 0.860 | 0.143 |
| Sargan test | 63.78 | 67.32 |
| Observations | 783 | 783 |

Note: The table presents the results of the two-step system GMM estimate of regressing NPLR and LLP on board characteristics variables with bias corrected robust standard errors. F test statistics is the test of model statistical significance. The p values of AR (1); AR (2) and Sargan test of over-identifying restrictions are also reported. Figures in parenthesis are t-statistics: C_RISK is dependent variables of the two credit risk measures: the non-performing loans ratio (NPLR) and loan loss provision ratio (LLPR). DUALITY represents CEO duality; CEO_PAY is CEO pay; Board_SIZE represents board size; Board_IND represents board independence; GENDER represents board gender. CONTROLS are control variables which include: ROA, bank size, efficiency and leverage *p<0.1; **p<0.05; ***p<0.01

**Table 6: Board Characteristics and Credit Risk in Different Stage of Financial Crisis**

| | NPLR | | | LLPR | | |
|---|---|---|---|---|---|---|
| | Pre-crisis | During crisis | Post-crisis | Pre-crisis | During crisis | Post-crisis |
| **Board Variables** | | | | | | |
| DUALITY | 1.38 | 0.48 | 0.33 | 0.22 | 1.13 | 0.69 |
| | (8.44)*** | (4.31)*** | (0.43) | (3.16)*** | (0.80) | (0.86) |
| CEO_PAY | 0.05 | 0.02 | 0.11 | 0.15 | 0.01 | 0.07 |
| | (25.33)*** | (10.44)*** | (40.05)*** | (53.51)*** | (0.52) | (14.78)*** |
| Board_SIZE | -0.23 | -0.31 | -0.24 | -0.75 | -0.80 | -0.43 |
| | (-12.84)*** | (-27.43)*** | (-24.37)** | (47.31)*** | (-18.97)*** | (-18.61)*** |
| Board_IND | 0.08 | 0.54 | 0.53 | 0.33 | 1.42 | 0.73 |
| | (4.03)*** | (23.63)*** | (43.01)*** | (13.95)*** | (24.15)*** | (15.47)*** |
| GENDER | -0.97 | -1.05 | -0.01 | -0.77 | -1.24 | -0.12 |
| | (-15.10)*** | (-18.49)*** | (-0.07) | (-19.14)*** | (-8.21)*** | (-0.32) |
| **Control Variables** | | | | | | |
| ROA | 0.60 | 0.68 | 0.45 | 0.85 | 0.09 | 0.49 |
| | (11.62)*** | (34.42) *** | (16.46) *** | (12.72)*** | (0.89) | (13.26) *** |
| Bank_Size | -0.67 | -0.34 | -0.07 | -0.65 | -0.30 | -0.69 |
| | (-14.89)*** | (-36.02)*** | (-10.03)*** | (-26.59)*** | (-10.78)*** | (-26.00)*** |
| Efficiency | 0.02 | 0.03 | 0.02 | 0.02 | 0.02 | 0.04 |
| | (7.62) *** | (22.87)*** | (20.79)*** | (21.04) *** | (5.74) *** | (21.55) *** |
| Leverage | -0.11 | -0.01 | -0.01 | -0.04 | -0.06 | -0.01 |
| | (-17.65)*** | (-4.10)*** | (-1.97)** | (-4.39)*** | (-5.30)*** | (-2.79)*** |
| Observations | 283 | 174 | 326 | 283 | 174 | 326 |

Note: The table presents the results of the two-step system GMM estimate of regressing NPLR and LLP on board characteristics variables with bias corrected robust standard errors. F test statistics is the test of model statistical significance. Sargan test is the test of over-identifying restrictions. Figures in parenthesis are t-statisticsC_RISK is dependent variables of the two credit risk measures: the non-performing loans ratio (NPLR) and loan loss provision ratio (LLPR). DUALITY represents CEO duality; CEO_PAY is CEO pay; Board_SIZE represents board size; Board_IND represents board independence; GENDER represents board gender. CONTROLS are control variables which include: ROA, bank size, efficiency and leverage *p<0.1; **p<0.05; ***p<0.01

Appendix 1: Robust Test – UK Banks' Board Composition and Monitoring on Credit Risk

| | **NPLR** | | | **LLPR** | | |
|---|---|---|---|---|---|---|
| | **OLS (1)** | **FE(2)** | **RE(3)** | **OLS(4)** | **FE (5)** | **RE (6)** |
| *Board Variables:* | | | | | | |
| DUALITY | 0.91 | 0.07 | 0.16 | 0.50 | 1.51 | 1.25 |
| | (1.80)* | (0.16) | (0.39) | (0.66) | (2.52)** | (2.10)** |
| CEO_PAY | 0.10 | 0.02 | 0.03 | 0.07 | 0.12 | 1.11 |
| | (4.17)*** | (0.85) | (1.37) | (2.05) ** | (3.47)*** | (3.39)*** |
| Board_SIZE | -0.52 | -0.23 | -0.28 | -0.15 | -0.14 | -0.17 |
| | (-4.92)*** | (-1.95)* | (-2.62)*** | (-0.94) | (-0.86) | (-1.11) |
| Board_IND | 0.65 | 0.63 | 0.62 | 0.01 | 0.81 | 0.75 |
| | (4.43)*** | (4.50)*** | (4.62)*** | (0.02) | (4.18)*** | (3.94)*** |
| GENDER | -1.14 | -0.28 | -0.36 | -2.03 | -1.29 | -1.41 |
| | (-2.73)*** | (-0.79) | (-1.04) | (-3.25)*** | (-2.61)*** | (-2.90)*** |
| *Control Variables:* | | | | | | |
| ROA | 0.03 | 0.14 | 0.12 | 0.12 | 0.13 | 1.13 |
| | (0.79) | (4.56) *** | (4.13) *** | (2.40)** | (3.11) *** | (3.12) *** |
| Bank_Size | -0.13 | -0.01 | -0.03 | -0.13 | -0.25 | -0.10 |
| | (-1.75)* | (-0.09) | (-0.33) | (-1.25) | (-1.51) | (-0.71) |
| Efficiency | 0.02 | 0.01 | 0.01 | 0.13 | 0.04 | 0.06 |
| | (1.47) | (0.44) | (0.20) | (7.58) *** | (2.63) *** | (3.49) *** |
| Leverage | -0.04 | -0.02 | -0.02 | -0.02 | -0.01 | -0.01 |
| | (-2.63)*** | (-1.15) | (-1.34) | (-0.89) | (-0.34) | (-0.52) |
| Adj R-Square | 0.06 | | | 0.10 | | |
| Wald test | 6.33 | 6.35 | 54.37 | 10.58 | 9.07 | 77.19 |
| | (0.00)*** | (0.00)*** | (0.00)*** | (0.00)*** | (0.00)*** | (0.00)*** |
| Hausman (p-value) | | 14.01 | | | 56.26 | |
| | | (0.00)*** | | | (0.00)*** | |
| N | 783 | 783 | 783 | 783 | 783 | 783 |

Note: C_RISK is dependent variables of the two credit risk measures: the non-performing loans ratio (NPLR) and loan loss provision ratio (LLPR). DUALITY represents CEO duality; CEO_PAY is CEO pay; Board_SIZE represents board size; Board_IND represents board independence; GENDER represents board gender. CONTROLS are control variables which include: ROA, bank size, efficiency and leverage, t-statistics (in parentheses), number of observations (N), adjusted R-square, Wald statistics (p-value), and Hausman test. *p<0.1; **p<0.05; ***p<0