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Independence in Bank Governance Structure: Empirical Evidence of Effects on Bank Risk and Performance

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Graphical abstract

Abstract

We investigate how different governance arrangements affect risk and return in banks. Using a new data set for UK banks over the period 2003-2012, we employ a simultaneous equations framework to control for the reciprocal relationship between risk and return. We show that separation of the roles of CEO and Chairman increases bank risk without causing a concurrent increase in return. We also find that oversight by a Remuneration Committee and Non-Executive Directors (NEDs) lowers the probability of bank failure, indicating that empowering an independent Chairman has different effects from empowering independent NEDs. Overall, our results underline the importance of accounting for the heterogeneity in corporate governance arrangements within banks.

Keywords: Bank, risk, performance, ownership, simultaneous equations.

JEL classification: C30, G21, G28, G32, G34

1 Introduction

The institutional systems and protocols that govern a firm have implications for its performance. This is especially so in the banking sector where the presence of explicit or implicit deposit guarantee exacerbates incentive problems. The 2007-2009 Global Financial Crisis prompted reforms of bank governance, especially in the area of independence of senior management. Hitherto there is scant evidence on how these reforms have affected bank performance. We fill this gap by analysing how the independence of bank governance structures affect risk and return in UK banks.

Agency theory argues that incentives are key drivers of the decisions taken by different agents within firms, such as the owners, senior management and other employees (Fama, 1980). This theory provides foundation to normative recommendations in which independence in the governance structure – such as through a Chairman[1] separate from the CEO, Non-Executive Directors (NEDs) separate from management, and Board Committees with oversight powers – allows shareholders and regulators to influence executive managers. An alternative view in the literature holds that the presence in the governance structure of decision-making authorities independent from one another may confuse decision making (Yang and Zhao, 2014) or cause CEOs to under-focus on risk management because others are accountable for it (Rus *et al*, 2011). In this view, there can be inefficiencies in which a factor that increases risk does not have a compensating effect on return. We contribute to this literature by

[1] We use the term "Chairman" rather than the more-inclusive "Chairperson" because "Chairman" is the term used in UK Corporate Law and the UK Corporate Governance Code.

testing these theoretical predictions and modelling the simultaneity between risk and return. This approach allows us to make inference on risk and return, provided that these two outcomes are simultaneously set by banks' senior management.

We show that combining the roles of CEO and Chairman lowers risk without affecting return, which is consistent with the hypothesis of conflictual overlap in roles but not with the implications of agency theory in this context. We also find that the presence of a Remuneration Committee and a higher proportion of NEDs on the Board each lower the probability of bank failure. The contrast between the effects of empowering an independent Chairman, which our results suggest would increase risk, and empowering independent NEDs, that our results show would decrease risk, is very important in the context of our study. Since NEDs are a form of independent oversight and Remuneration Committees are tasked to align pay structures with risk and performance, our results relating to these groups of agents appear to indicate that independence matters for bank performance, even though our results relating to the CEO and Chairman show that other factors, not explicitly addressed by agency theory, matter too. Specifically, our results suggest that empowering different actors within banks might work when the conflicting agents are very different (such as the CEO versus a diffuse group like NEDs) but that there could be greater potential for confusion of roles when they are both senior individuals (like the CEO versus the Chairman). Indeed, the fact that NEDs and a Remuneration Committee affect different outcomes from a Joint CEO-Chairman suggests that the workings of governance are complex, with the predictions of agency theory being more relevant in some aspects than in others.

Our simultaneous-equations empirical framework uses return on assets as a measure of bank return and loan impairments over gross loans as a measure of realised risk. These are used because we are concerned with risk and return at the operating level. These variables also reflect risk and return in banks' assets portfolios and are available for all banks, including those with no listed securities (mutuals and unlisted companies). As a robustness test we use the Z-Score, which captures the probability of default of individual banks (Mare et al., 2017). Other literature uses non-performing loans as a dependent variable (for example Ghosh, 2015). However, this variable is unsuitable for use in our models because it is a stock measure, whereas returns is a flow measure.

Our data is a new data set for UK banks over the period 2003-2012, chosen specifically to balance expansionary (2003-2003) and stressed (2008-2012) conditions, and containing important handcollected elements. We focus on the UK because it has well-defined corporate governance standards defining what constitutes, for instance, a CEO, Chairman, and NED (UK Financial Reporting Council, 2014) and because it has a balanced mix of bank types (see Section III below). The UK is also one of the world's largest banking centres and it is thus an important object of study for its global relevance.

As well as their theoretical implications, our empirical findings have important policy implications. Whereas governance standards derived from agency theory recommend that separating the roles of CEO and Chairman is a suitable policy for bringing additional incentives into play in the control of banks, our findings suggest that such separation could have important adverse impacts at the bank level (and consequently for wider financial stability). This is consistent with less-formal, descriptive evidence. For instance, the investigation into the failure of the Royal Bank of Scotland (Financial Services Authority, 2011) makes reference to decisions that amounted to the CEO intruding on the role of the Chairman and Board in setting strategy, including in respect of acquisitions, and to the Chairman lacking sufficient banking experience to reverse this situation. Our results show that bank regulatory agencies should focus both on differences in incentives and the potential for adverse effects arising from confusion.

The rest of the paper is organized as follows. Section 2 summarises the literature. Section 3 describes methods and data, Section 4 reports the results and Section 5 discusses conclusions and policy recommendations.

2 Literature review

Our study contributes to the literature that analyses the role of corporate governance for bank performance. Specifically, we investigate whether different governance structures affect simultaneously bank risk and return. Agency theory predicts that bank performance is determined by the incentives of the agents. By empowering these agents and aligning their incentives to for instance shareholders, a bank can achieve higher risk-adjusted returns. Agents will then take informed decisions on the level of risk to achieve an expected return.

Past literature on the consequences of combining or separating the CEO and Chairman roles underlines how the personal-level incentives of individuals in these roles differ. Šilingienė *et al* (2015) summarise the relevant literature and report that firm performance is a major factor in determining CEO remuneration, suggesting that CEOs may prioritise return over risk management in their decisions. By contrast, Goh and Gupta (2016) report that firm performance is not a determinant of NED or Chairman Remuneration in the UK, suggesting that returns may weigh less heavily in the decisions of these agents. By the same token, Mallin *et al* (2015) provide similar evidence for firms in the UK and Italy. This is consistent with the UK Corporate Governance Code (1998, 2010, 2012, 2014, 2016), which states that NEDs' pay should not involve share options or other performance-related elements. Similarly, Chen and Ebrahim (2018) report that CEO risk-taking increases further when they are under threat of turn-over for a sample of US banks. Anginer *et al* (2018) introduce a further element by arguing that in a theoretical baseline condition with no pay structures such as bonuses designed specifically to incentivise profit-seeking, CEOs would seek to minimise risk so as to protect their position. Once such bonuses exist, CEO preferences reverse and become profit-seeking and risk-tolerant.

An influential review of corporate governance in UK banks, including remuneration, conducted during the global financial crisis of 2007-2009, concluded that CEO and executive remuneration lacked sufficient sensitivity to risk, being mainly profit-based, but did not find the same issue for bank Chairmen (Walker, 2009). Related to this, successive iterations of the UK Corporate Governance Code (1998, 2010, 2012, 2014, 2016) have not required Chairmen (or NEDs or Board Committees) to act as representatives of shareholders to anything like the extent presumed in research based on agency theory, and UK bank regulation effectively makes Chairmen representatives of regulators and customers (Financial Conduct Authority Handbook, 2018 and earlier editions), while bank Chairmen are typically members of UK elite society with august reputations and connections to protect (Renneboog and Zhao, 2011). These factors make the incentives of Chairmen more risk averse.

What this literature shows is that it is reasonable to regard the incentives of the CEO as being strongly profit-seeking and those of Chairmen and NEDs as supporting the minimisation of risk more than the maximisation of profit. It is true that, in finance and governance theory, NEDs and Chairmen are generally seen as representing the interests of shareholders, and thus seeking to maximise risk-adjusted returns (Mallin, 2014). However, the findings discussed above make clear that CEOs almost always have incentives that are more profit-oriented (and less risk-sensitive) than those of Chairmen, especially in the period under consideration.

Empirical studies with financial services firms as the observational unit have sought to test how personal-level incentives play out at the bank level. Lu and Boateng (2017) report that CEO duality increases credit risk exposure in UK banks. Duru *et al* (2016) show that not separating the roles of CEO and Chairman has adverse effects on a firm's return on assets, return on sales and return on equity, albeit moderated by an independent board. Other empirical studies report the opposite conclusions. Pathan (2009) examines the effects of combining the CEO and Chairman roles and finds that a dual CEO-Chairman has a negative effect on bank risk. Akbar *et al* (2017) analyse the broad UK financial services industry (banks plus insurers, fund managers and investment services firms) and document that combining the roles of CEO and Chairman lowers risk-taking. They argue that this occurs because more concentrated power decreases risk-taking incentives due to reputational issues and employment risks. However, this interpretation may be misleading: they see a joint CEO-Chair as essentially a powerful CEO with the incentives agency theory would suggest (to protect insiders by lowering risk). This is at odds with literature we cite above (Šilingienė et al, 2015, Goh and Gupta, 2016 and Dey *et al*, 2011) showing that, in the UK, CEO remuneration structures incentivise risk-taking much more than the remuneration structures of Chairmen, and that joint CEO-Chairmen have especially high pay-based incentives to take risk.

It has been suggested that conflicting results such as these are context-dependent, with the presence of a joint CEO-Chairman having different consequences in different settings. Tang (2017) reports the effect of CEO-Chairman duality in the US Computer Industry as being contingent on the presence or absence of a block-holding external director. Krause *et al* (2013) argue that the effects of having a joint CEO-Chairman are complex, context-dependent and difficult to generalise.

An important limitation of the body of literature cited above is that it relies on agency theory as its sole theoretical underpinning, which implies that differing incentives between different agents within banks are the only determinant of outcomes at the bank level. Empirical results may be more easily interpreted if we expand this theoretical paradigm. For instance, we might also expect the presence of two roles at the top of an organisation – the CEO and Chairman – with closely related mandates, and an incomplete contract problem where not every scenario where they will have to divide responsibilities is foreseeable, to lead to confused overlap between their roles, or to inaccurate perceptions by one of these parties that they are less accountable for some issue because they each assume it is the preserve of the other. We might expect this situation to cause managerial inefficiencies, such as increased risk without a compensating increase in returns.

Some literature has considered these possibilities. Rus et al (2011) argue that the level of accountability for specific objectives experienced by leaders such as CEOs is important, indicating that anything which dilutes the accountability for risk that CEOs perceive (such as through the perception that an independent Chairman is taking care of it) may have important effects. Yang and Zhao (2014) argue that industrial firms with a joint CEO-Chairman have a performance advantage in the aftermath of a major change in competitive conditions (the introduction of the North American Free Trade Agreement), strongly suggesting that they gained this advantage by being able to respond more quickly and decisively to changing economic conditions. Brickley *et al* (1997) likewise argued that separating the roles of CEO and Chairman entailed costs that outweighed the advantages in the case of US non-financial corporations. In the special case of Vietnam, Pham *et al* (2015) show that the presence of a joint CEO-Chairman leads to superior returns for M&A acquirers.

Certain practitioner literature likewise argues that sharing power between the CEO and Chairman may be unrealistic and may create confusion of roles and responsibilities, with important consequences for the firm (Oliver Wyman Delta, 2004). We advance the extant literature by employing a simultaneous equations framework in which we control for the effects of risk and return upon one another. This is key because it enables us to identify situations in which risk decreases but returns do not, contrary to predictions founded on agency theory.

Importantly, our paper is also the first time the “confusion hypothesis” has been examined in the case of the banking sector, which has unique features (like the presence of deposit insurance) that alter the incentive environment and agents’ behaviour (Forssbaeck, 2011).

Compared to studies that examine the remuneration-based incentives of CEOs and Chairmen, there are no similar studies for the Chief Risk Officer (CRO), another key agent whose independence tends to be safeguarded in corporate governance rules. However, regulation in the UK requires that remuneration of control functions is appropriately aligned to risk-taking incentives and that control functions are not subject to remuneration-based incentives that could undermine their motivation to limit risk (Financial Conduct Authority Handbook, Systems and Controls Sourcebook, Chapter 19, 2018).

Results in the literature on the effects of having a CRO as a full Board Director may be compared with those for an independent Chairman, because both represent the presence of individuals empowered independently of the CEO. Aebi *et al* (2012) find that a CRO on the Board has a positive impact on returns, while Dong *et al* (2014) show that it has a negative impact on risk. However, these studies are based on narrow research contexts (a crisis period for the former and Chinese banks for the latter) and represent the opposite effect of senior-level monitoring from that reported for the Chairman, making them difficult to interpret.

Using the same arguments as used earlier in the case of an independent Chairman, it may be more likely that an independent CRO leads to inefficient outcomes because it leads to a confused overlap of roles, potentially including weakening the focus of the CEO on risk management.

In the case of Non-Executive Directors, these individuals form a more diffuse group with no clear personal managerial roles, so they may be less likely to cause the CEO confusion over the boundaries of his or her role or dilute his or her personal focus on risk. Therefore, having more NEDs can be expected to cause less risk and less return, in the way their personal incentives and the analysis of agency theory would suggest. The effects of NEDs and Committees may be as agency theory predicts, while the effects of independent individuals such as the Chairman and CEO may be more complex.

A high proportion of independent directors on a bank's Board appears to lead to reduced risk and possibly reduced performance. Analysis from the International Monetary Fund (Brandão-Marques *et al,* 2014) finds that independence at Board level leads to reduced risk, a result that is also found by Pathan (2009). Aebi *et al* (2012) finds that director independence leads to reduced profitability in a crisis period. A dissenting argument is provided by Anginer *et al* (2014), which reports that independence in the governance structure at Board level leads to increased bank risk-taking. Similarly, Anginer *et al* (2018) suggest that shareholder-friendly corporate governance appears to increase both stand-alone and systemic risk because of bank incentives to shift risk onto the financial safety net.

In summary, our exploration of the literature suggests that the predictions of agency theory are necessary but not sufficient to explain governance dynamics in banks. Other considerations, such as confusion of decision-making when agents have overlapping roles, are also important in determining how governance affects risk and performance, and are likely to imply that empowering independent Chairmen will have different effects from empowering independent NEDs. Using variables that account for different governance structures and a simultaneous-equations framework, we test the following hypothesis:

H1: Independence in the governance structure of a bank affects risk and return together, in the same direction.

3 Method and Data

3.1 Method

We employ a simultaneous-equation framework, for the first time in the literature on independence in bank governance structures. This is important because, in any setting where there is simultaneity between dependent variable Y_1 and dependent variable Y_2. We statistically model the effect of an explanatory variable X_1 upon Y_1, if X_1 also directly affects Y_2. If we omit simultaneity from our model, we will have confounded a direct effect on Y_1 with an indirect effect *via* the channel of simultaneity. Consequently, the OLS estimator of Y_1 on X_1 will be biased and inconsistent. Our approach avoids this issue.

The specifications we use are as follows:

$$LI_{it} = \beta_0 + \beta_1 L.JOINT_{it} + \beta_2 L.CROB_{it} + \beta_3 L.DR_{it} + \beta_4 L.DR^2{}_{it} + \beta_5 L.DR^3{}_{it} + \beta_6 L.REMC_{it} + \beta_7 ROA_{it} + \beta_8 L.ROA_{it} + \boldsymbol{\beta_9 L.CTRLS_{it}} + \boldsymbol{\beta_{10} YRD_{it}} + \varepsilon_{it} \quad (1)$$

$$ROA_{it} = \beta_0 + \beta_1 L.JOINT_{it} + \beta_2 L.CROB_{it} + \beta_3 L.DR_{it} + \beta_4 L.DR^2{}_{it} + \beta_5 L.DR^3{}_{it} + \beta_6 L.REMC_{it} + \beta_7 LI_{it} + \beta_8 L.LI_{it} + \boldsymbol{\beta_9 L.CTRLS_{it}} + \boldsymbol{\beta_{10} YRD_{it}} + \varepsilon_{it} \quad (2)$$

$$LI_{it} = \beta_0 + \beta_1 L.DR_{it} + \beta_2 L.DR^2{}_{it} + \beta_3 L.DR^3{}_{it} + \beta_4 L.LNED_{it} + \beta_5 L.CUMUL_{it} + \beta_6 L.CROC_{it} + \beta_7 ROA_{it} + \beta_8 L.ROA_{it} + \boldsymbol{\beta_9 L.CTRLS_{it}} + \boldsymbol{\beta_{10} YRD_{it}} + \varepsilon_{it} \quad (3)$$

$$ROA_{it} = \beta_0 + \beta_1 L.DR_{it} + \beta_2 L.DR^2{}_{it} + \beta_3 L.DR^3{}_{it} + \beta_4 L.LNED_{it} + \beta_5 L.CUMUL_{it} + \beta_6 L.CROC_{it} + \beta_7 LI_{it} + \beta_8 L.LI_{it} + \boldsymbol{\beta_9 L.CTRLS_{it}} + \boldsymbol{\beta_{10} YRD_{it}} + \varepsilon_{it} \quad (4)$$

Subscripts *i* and *t* represent bank and year, respectively. The term L. indicates a lag of one year. The β terms are parameters or, when shown in bold, vectors of parameters. The ε terms are idiosyncratic error. Parameter numbering is separate for each equation and is not cross-referenced in empirical tables. The term Φ represents the Probit transformation. Equations (1)-(2) are used to estimate direct effects of governance variables, while (3)-(4) are used to test for interactions amongst governance variables. Equations (1)-(2) are estimated simultaneously with one another, as are (3)-(4).

To measure returns, we use Return on Assets (ROA) as a dependent variable because it is a measure of bank portfolio performance that is normalised to a measure of bank size. As a measure of risk, we use Loan Impairments as a ratio of gross loans (LI) because it is a pure measure of adverse asset outcomes and is again normalised to balance sheet size. Similar measures of risk and return are used in the literature, for instance Aebi *et al* (2012) uses return on equity while Forrsbaeck (2011) and Iannotta *et al* (2007) use measures of loan impairments normalised to an indicator of bank size. Other literature uses non-performing loans as a dependent variable (Ghosh, 2015; Oliver Wyman, 2015), however this would be unsuitable for use in our models that have risk-return simultaneity as an essential feature, since non-performing loans are a stock measure, while returns are a flow measure, and the simultaneous-equations model should use two flow measures to ensure that we are comparing like-with-like.

Our choices of ROA and LI as dependent variables is driven also by the fact that our work is motivated by the history of instability in the banking system. To inform refinements to banking policy and regulation, we aim to understand factors which affect outcomes at the bank level, especially bank solvency. That is, we are interested in the operations of banks and the accounting measures they report, especially the solvency position of their accounts, and not in effects of bank risk on the wealth of shareholders or in any external, market-based measure of bank risk. In addition, we aim to include as many observations as possible in our sample. The use of market risk measures such as distance to default (Merton, 1974) would imply excluding from mutual banks, which account for 40% of the total number of banks in our sample.

Measures of loan impairments and non-performing loan balances are used by regulators, academics and advisors to track levels of stress, at the national and bank-specific levels (Ghosh, 2015, Oliver Wyman, 2014 and IMF Financial Stability Reports and associated data releases, April 2011, April 2013 and November 2016). It is notable that the data reported in these sources has temporal and spatial patterns consistent with economic experience, indicating that it is a reliable measure of realised risk. In the US and UK, for instance, impaired loans were low prior to 2007, rose sharply during the crisis years and declined again from 2010. In Italy and Spain, by contrast, impaired loans continued to rise for several years after 2010.

It could be argued that loan impairments may be flawed as a measure of risk if accounting and audit practices are so poor that impairments are not recognised at all. However, it is not plausible that the measure could be flawed to this extent, and the temporal and spatial patterns found in the studies outlined above indicate that the loan impairments ratio functions well as an indicator of realised risk. It is possible that the full extent of loan impairments takes time to emerge, but this is addressed partly by the fact that our study employs lagged regressors.

The beginning of section 3.5 explains why variables that affect financial risk and return for banks are expected to also influence the probability of bank failure, directly and indirectly. To test this possibility, we also use as dependent variable a measure of combined failure (CF) that takes the value 1 when banks become insolvent or participate in a government scheme designed to prevent imminent insolvency, zero otherwise. The dependent variable is defined in this way in order to capture all outcomes that amount, effectively, to bank failure. Equation (5) presents this specification:

$$CF_{it} = \Phi(\beta_0 + \beta_1 L.JOINT_{it} + \beta_2 L.CROB_{it} + \beta_3 L.DR_{it} + \beta_4 L.REMC_{it} + \boldsymbol{\beta_5 L.CTRLS_{it}} + \boldsymbol{\beta_6 YRD_{it}}) + \varepsilon_{it} \quad (5)$$

In equations (1)-(5), explanatory variables of interest are dictated by hypothesis H1. These consist of the presence of a joint CEO-Chairman (JOINT), the presence of a Chief Risk Officer as a full Board member (CROB), the ratio of Non-Executive Directors as a proportion of Board size (DR) and the presence of a Remuneration committee (REMC). We also include squares and cubes of DR to allow for the possibility that DR has nonlinear effects if increasing numbers of NEDs initially affect decisions but further increases have different effects due to making Boards large and unwieldly or diluting individual accountability.

We include a range of controls (CRTLS) encompassing financial and institutional features of banks. Specifically, we include exposures of banks to one another (BNK) on the basis that this can transmit risk (Tian *et al,* 2013), the extent of securities holdings (SEC) as for example in Allen and Jagtiani (2000), the extent of fee-earning advisory activity (ADV) as this can affect the risk-return trade-off through diversification effects (Pennathur *et al,* 2012), current deposits as a proportion of total liabilities (CDL) as insufficient deposit financing can affect risk and return (King, 2013), the equity ratio (ER) as leverage is one of the most basic drivers of risk and return (Atrill and McLaney, 2006 and Valencia, 2014) and bank size as a ratio of GDP (SIZE) as this has been identified as a driver of risk-taking behaviour (Bhagat *et al,* 2015).

The choice of equity ratio (statistically equivalent to leverage ratio) as a control variable, rather than some ratio of regulatory capital, is made because equity ratio is a well-defined concept, based on established accounting standards (Atrill and McLaney, 2006 and International Accounting Standards Board, 2015). Regulatory capital ratios, by contrast, have a denominator (Risk-Weighted Assets, RWAs) that is quantified based on bank-internal models (Bank for International Settlements, 2006 and 2009). There is evidence of inconsistency in the quantification of RWAs across banks, with the same assets attracting very different RWA treatments in different banks (e.g. Ferri and Pesic, 2017; for the UK, see Haldane, 2013).

We include dummy-variable controls for state majority ownership (STATE), mutual ownership (MUT) and majority ownership by a foreign parent (FOR), because the literature suggests these have important effects on bank risk and return (e.g. Iannotta *et al* 2007 and 2013 and Shleifer and Vishny, 1997). We likewise use a range of controls reflecting the governance structure because the literature suggests governance can have important effects on bank risk and return (Shleifer and Vishny, 1997). Measures used include board size (BRS), the presence of a commercial Director as a full Board member (CDB), regulatory permission to use the Internal Ratings Based approach for credit risk (IRB), the proportion of the Board who are female (FEM), the proportion of the Board who have no previous financial services experience (NEXP), the presence of executive remuneration disclosures (ERD) and average pay across all levels of seniority (AP). These measures were carefully selected to encompass a diverse range of aspects of governance.

To allow for effects that other outcomes of interest to managers and shareholders may have, we control for Growth in Total Assets (GTA) and Loan Interest Income (LII). One rationale for including these as controls is that basic accounting (e.g. Atrill and McLaney, 2006) shows that one outcome may affect another, for instance if higher LII contributes to higher ROA. As another rationale, we argue the outcomes a bank has experienced in respect of one metric of interest may affect how it pursues other outcomes of interest in the succeeding periods. For instance, if the loan book has experienced faster growth in assets, this may affect how it allocates assets, and thus financial outcomes.

All regressors and bank-specific controls are included at a lag of one year to allow for the possibility that effects take one annual accounting cycle to appear and to reinforce the case for exogeneity. The exceptions are ROA and LI, which are modelled as simultaneous and are each included as regressors unlagged and at a lag of one year. This is because the accounting effects of one on the other (Atrill and McLaney, 2006) are expected to appear immediately, while the simultaneity predicted by finance theory exists in the long run (Jones, 2012).

A number of important interaction terms are included. We control for the possibilities that independent agents in governance are substitutes or complements for one another. Specifically we use the term cumulative governance (CUMUL) which takes the value 3 if a bank has all three of an independent Chairman, CRO on the Board and NEDs being over 50% of the Board. It takes the value 2 if two of these are the case, 1 if only one of them is true and zero if none of them are true. We use the term CRO or Chair (CROC), which takes the value 1 if either an independent Chairman or CRO (or both) is present. We also use the term Low NED (LNED), which takes the value 1 if NEDs are less than half the Board, such that they are unable to form a majority vote. We test these interactions using equations that do not also contain the individual terms in the interaction, to avoid severe multicollinearity.

Finally, to control for external conditions that vary over time but which are identical for all banks, such as macroeconomic and regulatory conditions, we use dummy variables representing each year from 2004 to 2012 (**YRD**). The year 2003 is taken as the base year. Part of the rationale for this is that there is a business cycle that varies through time (Romer, 2006) and which can affect outcomes for banks (Allen and Gale, 1998). The other part of the rationale is that regulatory conditions vary through time and this can also have impacts for banks (Noss and Toffano, 2016).

The same set of controls is used across dependent variables, because the literature suggests that attributes of banks which affect risk also affect performance and because there is no reason for different indicators of risk and return to differ in the bank attributes that affect then. Using a comprehensive set of regressors throughout avoids issues with confounding.

Our multi-equation models are estimated by Two-Stage Least Squares (2SLS) and the Generalised Method of Moments (GMM), with the use of two estimators serving as a robustness check. Compared to 2SLS, GMM is more likely to satisfy the relevant moment conditions but can be vulnerable to a weak instruments problem. Models with a binary dependent variable are estimated as Probit models with numerical optimisation to maximise the likelihood that parameters fit the data. These are all standard estimators for models of these kinds (Greene, 2012). Estimates of parameters and their standard errors are reported, along with standard diagnostic tests to assess the reliability of these quantities (Greene, 2012).

3.2 Data

To test the hypothesis stated in Section 2.1, data was extracted from Bankscope and combined with manually-sourced data on governance and ownership. Bankscope contains data on several hundred financial variables, using a standardised format, and encompasses both annual and quarterly data.

The data we employ relates to the United Kingdom and is at annual frequency for all years from 2003 to 2012, since quarterly data is severely incomplete. This covers both a benign economic period (2003-2007) and a stressed period of roughly equal duration (2007-2012). We use data relating to the UK for two reasons: a) the UK has a well-established corporate governance framework where for example the meaning of what constitutes a Chairman or a NED is clear and stable over time, and b) the UK banking sector is globally significant and is thus often taken as a benchmark in terms of corporate governance arrangements.

Without selection by business model (which involves removing from the data entities that are not true banks, such as investment managers and brokerages) or by parent / subsidiary status, we obtain data on 711 legal entities for the United Kingdom. We remove firms that are not retail, commercial, corporate, investment or universal banks and ensure that only one entity per corporate group (the consolidated parent entity in all but two cases) is present in the data. This reduces the sample to 115 banks and total observations for these 115 banks over the 10-year period numbered 762. In the context of the UK, this represents the population at the time. [2]

For each bank we manually collected data from annual reports and the Pillar 3 disclosures required under Basel 2 and 3 regulations. The data collected in this way relate to ownership type, features of governance and regulatory permission to use the Internal Ratings Based (IRB) approach for measuring and managing credit risk. The use of manually-collected data gives us unique information not used in other studies.

The data we use from Bankscope are on an annual, calendar-year basis, with variables presented with universal definitions across banks, based on the Fitch Universal format. For banks that do not have a December year end, we have data for the nearest bank year-end to the December year-end. For our analysis, this detail has limited impact as the great majority of the banks in our sample have a December year end for financial accounting purposes.[3]

[2] Where banks are established *de novo* and come into existence during a year, a record is included for them in our data for the year in which they come into existence. Where banks cease to exist during a year due to failure, a record is also included for them for that year, but not for subsequent years. Where banks cease to exist during a year due to merger or acquisition, no record is included for them for that year in order to avoid double-counting with the new group entity that is thereby created and which is also present in the data set.

[3] Out of 111 entities for which we could obtain annual reports, 85 (77%) had year ends at the end of December and 106 (95%) had year ends between the end of September and the end of March. Since the external economic and regulatory conditions that are included in our models (captured through year dummies) tend to be very stable from one year to the next and the fundamental characteristics of banks themselves change slowly, a slight mismatch in the time points at which banks are compared would have minimal effect on the analysis.

We record governance data collected from annual reports and pillar III disclosures as the values that prevailed for most of the calendar year. For instance, if a bank had 8 non-executive directors for most of the year but lost one of them three months before the calendar year-end, then we record the number of NEDs present for the year as 8. This is possible because banks disclose arrival and departure dates for directors during the year. In this way, performance and impairments accumulated over the year are compared with the governance structure that prevailed for most of the year. This definitional point is unlikely to be important for comparisons across banks since the explanatory variables we use are remarkably stable over time.

In cases where a foreign parent has control over a UK branch or subsidiary, the composition of the foreign parent's Board was used as the basis of the governance and ownership data we collected. A separate UK Board was used only where the annual reports of the company state explicitly that it has decision-making independence from the parent. This convention provides further support for the argument that governance variables are exogenous: if a characteristic originates with an overseas parent entity, it is less likely to be subject to reverse causality in which it is affected by financial characteristics of the branch or subsidiary.

For a few continental European parent entities where there is both a supervisory Board and a managerial Board, we include the supervisory Board only in defining variables relating to Board composition. This is because the supervisory Board has oversight over the managerial Board and can over-rule its decisions, while the managerial Board is more similar to an Executive Committee in a UK corporate governance context.

Non-Executive Directors are defined in our data as directors who do not have any executive responsibilities identified by the annual report. In applying corporate governance codes and guidelines, banks may operate slightly different definitions of non-executive status, such as having no executive responsibilities and having had no such responsibilities with the same or a related organisation at any time in the past. Since banks vary in their application of definitions established in governance codes – such as in what counts as a 'related organisation' – adopting their definitions could lead to inconsistency in our data. We therefore adopt the simpler, more objective standard of simply counting NEDs as directors who do not have specifically identified executive responsibilities. By this definition, Chairmen and Vice / Deputy Chairmen of banks are classified as non-executive if they do not have specific identified executive responsibilities and instead serve mainly to oversee the CEO and other executives.

Variables used in this paper are as shown in Table 1 below.

<Insert Table 1 about here>

Descriptive statistics confirm that variables were suitable for inclusion in econometric models. They reveal that means, standard deviations and outliers all have economically plausible values. The regressors of interest demonstrate a very high degree of autocorrelation (greater than 0.86 in all cases). This supports the argument that institutional features are very stable over time for banks and can be treated as exogenous variables that are effectively predetermined. Possible problems of autocorrelation are addressed using clustered standard errors.

Table 1 shows that, of 760 data points in the data, encompassing 115 unique entities, there is a wide range of entity sizes, ranging from balance sheets equivalent to 205% of UK GDP, down to the equivalent of 0.0008% of GDP. The data include international banks, large national banks and building societies, banks and building societies covering a region of the UK, and local players with a small number of branches. Business models of entities in the data include universal banking, corporate banking and retail banking. The variable Joint CEO-Chairman takes a value of 1 (indicating the roles are combined) for nine percent of the sample and a sufficient number of data points to satisfy the $n > 30$ criterion for avoiding effects of influential outliers. Entities in the data where the roles of CEO and Chairman are combined include investment banks, large international banks, UK regional banks, private banks and small local banks. In the majority of cases, the combined status of the CEO and Chairman roles exists for only 1-2 years, with exceptional cases where it persists for 4-5 years. The shorter durations work well for our analysis because they imply that our sample contains the same banks in both possible states for the variable of interest. In addition, influential outlier analysis reveals no influential outliers in the sample.

Missing data was imputed by backward replacement in which a missing value is replaced with the value at the subsequent time point for the relevant variable and bank or, if this was not possible, replacement with the average value for the relevant variable across all observations. This approach takes advantage of the autocorrelation present in the data. Importantly, no imputation was carried out for dependent variables or governance or ownership variables. Since these are central to the issues being examined, results should ideally not be dependent on assumptions made in respect of imputation. This approach means that observation number increases when regressors are dropped for robustness testing, with this variation strengthening the argument that results are robust. A very limited number of extreme outliers (no more than 3 observations per model) defined in terms of the value of the dependent variable were excluded in estimation to avoid undue influence on parameter estimates.

4 Results

Using simultaneous equation modelling, we investigate the relationship between corporate governance indicators and risk and performance measures in UK banking. We argue that, contrary to the predictions of agency theory, the presence of a Joint CEO-Chairman lowers bank risk without affecting returns. By contrast, a higher proportion of NEDs and the presence of a Remuneration Committee both lead to lower rates of bank failure, a finding more consistent with agency theory, and suggesting that there are fundamental differences between the effects of empowering an independent Chairman and the effects of empowering independent NEDs. This contrast is best explained by the literature discussed in Section 2 on the consequences of separating these roles in terms of confusion and conflictual overlap.

4.1 Effects of a Joint CEO-Chairman

We find that the presence of a Joint CEO-Chairman leads to lower risk, as measured by loan impairments as a ratio of gross loans. This suggests that the more risk-averse incentives of an *independent* Chairman (compared to the CEO) are not what determine the effects of this independent role, especially when we consider the findings of Dey *et al* (2011) showing that the remuneration of Joint CEO-Chairmen is more profit-oriented than that of CEOs. Instead it suggests that factors beyond the incentive differences emphasised by agency theory are important, specifically the confusion and dilution of focus that can arise from overlapping roles (Yang and Zhao, 2014 and Rus *et al*, 2011).

<Insert Table 2 about here>

The estimates in Table 2 suggest that the presence of a Joint CEO-Chairman negatively affects impairments. These results are robust to using a GMM estimator with standard errors clustered by bank was used as a complement. Results are reported in Table 3.

<Insert Table 3 about here>

Tables 2 and 3 show that the presence of a Joint CEO-Chairman negatively affects loan impairments. Table 3 suggests that this explanatory variable also negatively affects returns, however, using different specifications[4], we find results in line with Table 2 where the variable Joint CEO-Chairman lacks a statistically robust effect on returns.

These empirical results would be surprising if we based our thinking entirely on agency theory, with its focus on differing personal incentives, and believed, as regulators appear to, that the most important feature of independent Chairmen (aside from basic competence) is the fact that they have weaker pay-based incentives than CEOs to pursue profit and take risk. Literature we cite in Section 2 shows that regulators are correct to believe that UK bank CEOs, and especially Joint CEO-Chairmen, have strong pay-based incentives to take risk whereas independent Chairmen lack such incentives (Šilingienė et al, 2015, Goh and Gupta, 2016 and Dey *et al*, 2011).

Instead of interpreting empirical results in a way that relies on agency theory as its only behavioural model, our findings are consistent with the interpretation of the literature that we discuss in Sections 1 and 2: that agency theory is not the only thing that matters and that the presence of overlapping roles at the top of the governance structure can lead to confusion, dilution of focus and sub-optimal outcomes for the firm.

This effect of a Joint CEO-Chairman is not specific to our data – the same finding is reported by for example Pathan (2009) using data for the US, although Pathan (2009) does not link the empirical result to role overlap and role confusion, or contrast it with different effects of different kinds of independence, as we do.

One way to dismiss our result would be to argue that that independent Chairmen force better recognition of impairments, whereas unhindered CEOs are able to conceal them. If this were so, it would create the appearance that a Joint CEO-Chairman lowers risk. However, it could equally be argued that a

[4] Results available from the authors on request.

higher ratio of NEDs on the Board would lead to better recognition of impairments since ensuring 'true and fair' public accounting is a major function of Boards (UK Financial Reporting Council, 2014), and that this could create the appearance of an effect on risk contrary to theoretical expectations. But this effect is not evident, so the 'impairments recognition' argument is not plausible.

Another interpretation could be that Joint CEO-Chairmen are remunerated differently from CEOs who are not also Chairmen. Shareholders and Boards might give the former incentives that are less profit-seeking and less risk-tolerant. However, Dey *et al* (2011) report the opposite: that CEO remuneration has a higher profit-linked component when the role is combined with that of Chairman. This study used data for corporates in general (not just banks) but it nevertheless suggests that pay does not explain our result.

A more useful behavioural interpretation is provided by Yang and Zhao (2014). They report that separating the roles of CEO and Chairman leads to lower firm performance. They also report that this negative effect is greater in firms with greater complexity and higher information costs (as indicated by expenditures on marketing and R&D, the level of intangible assets and investment analysts' forecasting errors). They suggest that this means that separation of the roles of CEO and Chairman has negative effects because of slower and more difficult decision-making.

Another useful study in interpreting these results is Rus *et al* (2011). They find that the gain-seeking behaviour of leaders is moderated when accountability for firms' direction is more concentrated on them. It is possible that, when the roles of CEO and Chairman are combined, there is no-one else the CEO can assume is exercising oversight over risk, so they are more focused on managing risk. This effect can exist alongside that identified by Yang and Zhao (2014) and, indeed, is complementary to it. Therefore, we can conclude that having a Joint CEO-Chairman leads to lower risk because it permits clearer decision-making and makes CEOs more focused on managing risk.

4.2 Potential Interactions of the Chairman and CRO

A surprising feature of the above results is that governance variables do not have as many effects on accounting risk and return as expected. The Director Ratio appears to have no effects at all, even though having enough NEDs on the Board is considered a core principle of good corporate governance

(UK Corporate Governance Code 2016). Meanwhile, estimates of the effects of a low NED ratio (NEDs being less than half of the Board) are inconsistent and unreliable. Having a CRO as a full Board member likewise does not appear to have any robustly-detectable effects. This is again surprising as we expected that an independent CRO would have the same effects on risk and/or return as an independent Chairman.

One possible technical interpretation is that these explanatory variables are affected by multicollinearity that prevents the detection of significant results. Variance Inflation Factors for the regressors in question are: Low NED: 4.07, CRO Present on Board: 3.41, and Director Ratio: 2.95. These values are not extreme, and are no larger than for other regressors where we detect significant effects, so it is not likely that they caused an otherwise highly-significant result to become insignificant.

To further test the possibility that significant associations are overlooked because of multicollinearity, the four regressors mentioned above were used in models with no other regressors, other than year dummies as controls. In this setting VIFs for the regressors were: Director Ratio: 1.92, Low NED: 1.60, and CRO Present on Board: 1.02. However, once again, no significant relationship of these regressors with any dependent variable was found (results not shown but available upon request). Thus, given the results from these stripped-down models, it is unlikely that multicollinearity is the reason no significant relationships are detected.

Another possible reason why we do not find some of the effects expected relates to a further gap in the relevant empirical literature. The empirical literature ignores the possibility that internal agents with similar incentives to one another (such as the Chairman, NEDs and the CRO) may act as complements or substitutes for one another. For instance, an independent Chairman may be more effective in a setting where there are many NEDs on the Board to support his or her decisions. Alternatively, an independent Chairman and a CRO may each have such powers to influence decisions that they are redundant, with the presence of either having the same effect as the presence of both.

We address this possibility by using interaction terms. Specifically, we use the term cumulative governance (CUMUL) which takes the value 3 if a bank has all three of an independent Chairman, CRO on the Board and NEDs being over 50% of the Board. It takes the value 2 if two of these are the case, 1 if only one of them is true and zero if none of them are true. We also use the term CRO or Chair (CROC), which takes the value 1 if either an independent Chairman or CRO (or both) is present. Taken together, these test the possibilities that features of corporate governance which empower agents with similar preferences are either substitutes or complements for one another. Interaction terms are computed after missing-value replacement so that the interaction values are consistent with the post-replacement values of the underlying terms.

Estimation results obtained with these interaction terms added to models are as follows (Tables 4 and 5), with underlying terms in the interactions excluded to avoid severe multicollinearity. Equations (3) and (4) are as explained in Section 3, while (3b) and (4b) are versions of these with regressors dropped for robustness testing.

<Insert Table 4 about here>

As in the previous sub-section, because it is necessary to show robustness to a change in estimation procedure, a GMM estimator with clustered standard errors was used as a complement to the results shown in Table 4. Results are as follows. Models are estimated using the same equations (3) and (4) as in the preceding table.

<Insert Table 5 about here>

Results in Tables 4 and 5 point to one new finding. There is evidence that the variable CRO or Chair has a positive effect on loan impairments. This is not what we would expect if we believed that only personal incentives matter in determining the effects of a given role, such that empowering risk-averse agents would lead to lower impairments. However, it is consistent with the view that overlapping roles at the most senior levels lead to confusion and diluted focus.

Having an independent Chairman (one of the criteria in the variable CRO or Chair) is simply the negation of having a Joint CEO-Chairman. However, the effect reported here is not simply the converse of that detected for the variable Joint CEO-Chairman in sub-section 3.1. If the effects of having or lacking an independent Chairman were the only ones present, diluting this variable with a supposedly irrelevant term (the presence of an independent CRO) in the interaction variable CRO or Chair would substantially reduce the absolute value of parameter magnitudes. Instead, we find magnitudes of 1.9, 4.5 and 4.6 across model variants and estimators (compared to 1.5, 2.9 and 4.2 in sub-section 3.1). The parameter values actually increase – suggesting that the presence of a CRO on the Board likely has a similar effect to an independent Chairman, although the interaction term is required for the effect to be detectable due to substitution effects.

Observing that the variable CRO or Chair yields significant results, while Cumulative Governance does not, suggests that a CRO and Chairman can act as substitutes for one another but that there is no sense in which those structures that are considered good governance (independent Chairman, independent CRO and many NEDs) are complements of one another. The latter is consistent with the finding that CRO and Chairman are substitutes (rather than complements) and the finding that NEDs have different effects from either of these.

4.3 Limited Financial Effects of Non-Executive Directors

No significant effects of the Director Ratio on financial outcomes at operating level were detected in the previous sections. It appears that the proportion of NEDs on the Board has no effect on banks' accounting outcomes. Can this be true when our results are considered in the context of the wider literature? If it is true, what does that imply for regulators and policymakers?

The lack of any financial effect of the Director Ratio must be understood in the context of a literature where there is a consensus on the role of Directors who are independent from management, but at least one major study that dissents from the consensus. Analysis from the International Monetary Fund (Brandão-Marques *et al,* 2014) finds that independence at Board level leads to reduced risk. Likewise, Pathan (2009) reports that director independence has a negative impact on bank risk. By contrast, a study by the World Bank (Anginer *et al*, 2014) reports that independence in the governance structure at Board level leads to increased bank risk-taking

These studies have important limitations. The World Bank study relied on composite measures of independence at the Board level and is thus hard to interpret in terms of the effects of any one, clearly-defined governance structure. Meanwhile, the IMF study relied on controls at the country level in a way that leaves it particularly vulnerable to bias at the level of bank observational units.

The study by Pathan (2009) used a different setting from us (the United States) and dependent variables relating to stock prices and composite measures of bank risk. However, Pathan's work was most like our own in terms of methodology: it used panel models with individual variables and a good number of controls. Comparing our results to those of Pathan (2009) suggests that the effects of having more NEDs on the Board are context-specific. The effects are evident for certain indicators and settings but not evident for others. Crucially, one of the ways in which an effect is evident is a higher rate of bank failure when NEDs are fewer in number, as reported in sub-section 4.5 below. So NEDs are effective, just not as broadly effective as the literature and corporate governance guidelines would suggest.

4.4 Comparison with Single-Equation Models

A principal motivation of the multi-equation framework used above is to ensure that results for other regressors relating to such features as ownership and governance are unbiased and consistent by omitting simultaneity of risk and return. This being so, it is important to show how parameter estimates differ when equations (1) and (2) above are re-estimated using single-equation OLS. Results obtained from such re-estimation are presented in Table 6.

<Insert Table 6 about here>

The lagged positive association of risk and return reported above would be overlooked if single-equation models were used. A number of other important biases would also occur if we relied on single-equation models. First, it would have appeared as if state majority ownership lowers loan impairments, the opposite of what the literature on agency theory predicts (Shleifer and Vishny, 1997). Second, we would have concluded that mutual ownership has no interesting effects at all, again contrary to relevant theory (Shleifer and Vishny, 1997). Third, it would have appeared as if Board size positively affects both impairments and returns. Fourth, it would have appeared that a Joint CEO-Chairman has a negative effect on both impairments and returns, rather than impairments alone as in Tables 2 and 3. Fifth, and finally, it would appear as if the presence of a remuneration committee has a positive effect on both returns and impairments. Each of these biases would alter the interpretation of specific empirical results in important ways and, more fundamentally, are supportive of the general contention that ignoring simultaneity causes bias. It is therefore key that future studies on bank ownership and governance account for (or at least test for) simultaneity between risk and return.

4.5 Governance and Bank Failure

One would expect effects of ownership and governance on bank risk and performance at the accounting level to exist alongside effects of the same regressors on bank failure. *Ceteris paribus* we would expect any characteristic which increases performance to reduce the probability of failure, and any characteristic which increases asset risk to increase the probability of failure. If something reduces performance and risk, then it would be expected that the larger of these two effects would be dominant in terms of effects on the probability of failure.

The argument that governance is likely to be important in determining the probability of bank failure is reinforced by the work of Liang *et al* (2016). In a study using data mining techniques and a data set from Taiwan, they show that corporate governance indicators are useful in bankruptcy prediction.

To determine if governance affects the likelihood of bank failure in the ways we suggest, additional models with an indicator of combined failure. These are new to the literature and the estimation results are reported in Table 7.

<Insert Table 7 about here>

The presence of a remuneration committee lowers the probability of bank failure and a higher proportion of NEDs on the Board likely has the same effect (although the latter is not fully robust). This indicates that these structures work as intended: ensuring oversight of risk-taking and ensuring that remuneration policy is aligned with risk management.

So, while these features of Board-level governance do not have effects on the measures of bank accounting outcomes we use, they clearly must affect other outcomes, such that they have effects on the likelihood of bank failure. This confirms hypotheses H1 and the discussion in Section 2: the predictions of agency theory are the main determinant of how aspects of governance and ownership affect risk and return in cases where an aspect of governance does not lead to confusion of roles.

The contrast of this finding with that for Joint CEO-Chairman reveals that a heterogeneity of actors and behaviours exists in bank corporate governance and that agency theory is a necessary but not sufficient explanation for understanding bank governance. Our findings can be explained by stating that agency theory explains the effects of independent NEDs and independent Committees, but that the confusion hypothesis is needed to explain the effects of independent Chairmen.

Indeed, the observation that independent Chairmen and independent NEDs and independent Committees affect different risk outcomes (loan impairments versus bank failure) provides further evidence that there is heterogeneity in actors, behaviours and outcomes across different kinds of independence in the governance structure.

5 Conclusions

Understanding the relationship between corporate governance and bank risk and performance is important in terms of giving the right incentives to management for the efficient and cautious running of the banking sector.

Our unique, original contribution is to use simultaneous equation modelling to test the predictions of agency theory. By finding that combining the CEO and Chairman roles lowers risk without robustly affecting return, we provide evidence that complexity and confusion play a role. We conclude that independence in bank governance is a relevant determinant of bank risk and return, but factors other than the incentive conflicts between senior agents within banks matter in determining bank risk and return.

Combining the roles of CEO and Chairman leads to lower loan impairments, likely because of less-confused decision-making and a clearer accountability for risk management on the CEO. By contrast, oversight by a Remuneration Committee and NEDs leads to a lower rate of bank failure, probably because there is no confusion of individual roles in this case, such that the predictions of agency theory (different agents pursuing different incentives) are the main force at play.

The nature of these differing findings show that we must consider constraints beyond those considered in agency theory to understand the effects of governance and to design good governance structures. Indeed, the fact that different aspects of corporate governance affect different outcomes, even when the incentives at play should have been aligned by the presence of independent structures, strongly suggests that the effects of corporate governance are not as simple as aligning the incentives of different agents.

Our findings contribute to the policy debate on the role of corporate governance structures in bank risk and performance. Our results suggest there should be no reliance on oversight by independent Chairmen to restrain risk as this measure is counter-productive. Instead, banks should rely on other oversight structures to rein-in over-mighty CEOs. The results presented here indicate that having sufficient oversight by competent NEDs and Board committees is one viable approach. It follows that independence in the governance structure does matter for bank risk and return, but it must be the right kind of independence.

References

Aebi, V, Sabato, G, Schmid, M, 2012. Risk management, corporate governance and bank performance in the financial crisis. Journal of Banking and Finance 36, 3213-3226. https://doi.org/10.1016/j.jbankfin.2011.10.020

Akbar, S., Kharabsheh, B., Poletti-Hughes, J., & Shah, S. Z. A., 2017. Board structure and corporate risk taking in the UK financial sector. International Review of Financial Analysis 50, 101-110. https://doi.org/10.1016/j.irfa.2017.02.001

Allen, F, and Gale, D, 1998. Optimal financial crises. Journal of Finance Vol. LIII, No. 4, 1245-1283. https://doi.org/10.1111/0022-1082.00052

Allen, L. and Jagtiani, J., 2000. The risk effects of combining banking, securities and insurance activities. Journal of Economics and Business 52(6), 485-497. https://doi.org/10.1016/S0148-6195(00)00033-3

Anginer, D., Demirguc-Kunt, A., Huizinga, H., Ma, K., 2014. Corporate governance and bank insolvency risk. World Bank Policy Research Working Paper 7017.

Anginer, D., Demirguc-Kunt, A., Huizinga, H., Ma, K. 2018. Corporate Governance of Banks and Financial Stability. Journal of Financial Economics 130: 327-346. https://doi.org/10.1016/j.jfineco.2018.06.011

Atrill, P., and McLaney, E., 2006. Accounting and Finance for Non-Specialists. Prentice Hall, New Jersey.

Bank for International Settlements, 2006. Basel II: International Convergence of Capital Measurement and Capital Standards – Comprehensive Version.

Bank for International Settlements, 2009. Basel III: International Regulatory Framework for Banks.

Bhagat, S., Bolton, B., and Lu, J., 2015. Size, leverage, and risk-taking of financial institutions. Journal of Banking and Finance 59, Pages 520-537. https://doi.org/10.1016/j.jbankfin.2015.06.018

Brandão Marques, L., Oppers, S., Araújo Ribeiro, I., Asai, K., Beauchamp, J., Deb, P., Duma, N., Ehrentraud, J., Khadarina, O., Khan, A., Pancorbo, A., Pazarbaşiog˘lu, C., Singh, R., Wuensch, O., Hong, H., Poonam, K., 2014. Risk-taking by banks: the role of governance and executive pay. International Monetary Fund Financial Stability Report, October 2014, Chapter 3.

Brickley, J.A., Coles, J.L., Jarell, G., 1997. Leadership structure: Separating the CEO and Chairman of the Board. Journal of Corporate Finance 3(3): 189-220. https://doi.org/10.1016/S0929-1199(96)00013-2

Chen, Z. and Ebrahim, A., 2018. Turnover threat and CEO risk-taking behavior in the banking industry. Journal of Banking and Finance 96: 87-105. https://doi.org/10.1016/j.jbankfin.2018.08.007

Dey, A., Engel, E. and Liu, X, 2011. CEO and board chair roles: To split or not to split? Journal of Corporate Finance 17(5), Pages 1595-1618. https://doi.org/10.1016/j.jcorpfin.2011.09.001

Dong, Y., Meng, C., Firth, M., and Hou, W., 2014. Ownership structure and risk-taking: Comparative evidence from private and state-controlled banks in China. International Review of Financial Analysis 36, 120-130. https://doi.org/10.1016/j.irfa.2014.03.009

Duru, A., Iyengar, R.J. and Zampelli, E.M., 2016. The dynamic relationship between CEO duality and firm performance: The moderating role of board independence. Journal of Business Research 69(10): 4269-4277. https://doi.org/10.1016/j.jbusres.2016.04.001

Fama, E.F., 1980. Agency problems and the theory of the firm. Journal of Political Economy 88, 288–307. https://doi.org/DOI: 10.1086/260866

Ferri, G. and Pesic, V., 2017. Bank regulatory arbitrage via risk weighted assets dispersion. Journal of Financial Stability 33(C): 331-345. https://doi.org/10.1016/j.jfs.2016.10.006

Financial Conduct Authority, Fines Database. https://www.fca.org.uk/news/news-stories/2018-fines.

Financial Conduct Authority Handbook, Systems and Controls Sourcebook. https://www.handbook.fca.org.uk/handbook/SYSC/

Financial Services Authority, 2011. The Failure of the Royal Bank of Scotland.

Forssbaeck, J, 2011. Ownership structure, market discipline and banks' risk-taking incentives under deposit insurance. Journal of Banking and Finance 35, 2666-2678. https://doi.org/10.1016/j.jbankfin.2011.02.024

Ghosh, A., 2015. Banking-industry specific and regional economic determinants of non-performing loans: Evidence from US states. Journal of Financial Stability 20, 93-104. https://doi.org/10.1016/j.jfs.2015.08.004

Goh, L. and Gupta, A., 2016. Remuneration of non-executive directors: Evidence from the UK. British Accounting Review 48(3): 379-399. https://doi.org/10.1016/j.bar.2015.05.001

Greene, WH. 2012. Econometric Analysis. Pearson, London.

Haldane, A. 2013. Constraining discretion in bank regulation. Paper presented at the Federal Reserve Bank of Atlanta Conference on "Maintaining financial stability: holding a tiger by the tail(s)", Federal Reserve Bank of Atlanta.

Iannotta, G, Nocera, G, Sironi, A, 2007. Ownership structure, risk and performance in the European banking industry. Journal of Banking and Finance 31, 2127-2149. https://doi.org/10.1016/j.jbankfin.2006.07.013

Iannotta, G, Nocera, G, Sironi, A, 2013. The impact of government ownership on bank risk. Journal of Financial Intermediation 22, 152-176. https://doi.org/10.1016/j.jfi.2012.11.002

International Accounting Standards Board, 2015. International Financial Reporting Standards IFRS 2015 (Blue Book) Consolidated without early application.

International Monetary Fund Financial Stability Reports and associated data releases, April 2011, April 2013 and November 2016.

Jones, C., 2012. Financial Economics. Routledge, Abingdon.

King, M.R., 2013. The Basel III Net Stable Funding Ratio and bank net interest margins. Journal of Banking and Finance 37(11), 4144-4156. https://doi.org/10.1016/j.jbankfin.2013.07.017

Krause, R., Semadeni, M., and Canella, A.A., 2013. CEO Duality: A Review and Research Agenda. Journal of Management 40(1):252-282. https://doi.org/10.1177/0149206313503013

Liang, D., Lu, C., Tsai, C., and Shih, G., 2016. Financial ratios and corporate governance indicators in bankruptcy prediction: A comprehensive study. European Journal of Operational Research 252(2), 561-572. https://doi.org/10.1016/j.ejor.2016.01.012

Lu, J., and Boateng, A., 2017. Board composition, monitoring and credit risk: evidence from the UK banking industry. Review of Quantitative Finance and Accounting, Forthcoming. https://doi.org/10.1007/s11156-017-0698-x

Mallin, C., 2014. Corporate Governance. Fifth ed. Oxford University Press, Oxford.

Mallin, C., Melis, A. and Gaia, S., 2015. The remuneration of independent directors in the UK and Italy: An empirical analysis based on agency theory. International Business Review 24(2), 175-186. https://doi.org/10.1016/j.ibusrev.2014.07.006

Mare, D., Moreira, F. and Rossi, A., 2017. Nonstationary Z-sore measures. European Journal of Operations Research 260(1), 348-358. https://doi.org/10.1016/j.ejor.2016.12.001

Merton, R. C., 1974. On the pricing of corporate debt: The risk structure of interest rates. Journal of Finance 29(2), 449-470. https://doi.org/10.1111/j.1540-6261.1974.tb03058.x

Noss, J. and Toffano, P. (2016). Estimating the impact of changes in aggregate bank capital requirements on lending and growth during an upswing. Journal of Banking and Finance 62: 15-27. https://doi.org/10.1016/j.jbankfin.2015.09.020

Oliver Wyman, 2014. European Retail and SME Credit.

Oliver Wyman Delta, 2004. Separating The Roles of CEO and Chairman.

Pathan, S, 2009. Strong boards, CEO power and bank risk-taking. Journal of Banking and Finance 33: 1340-1350. https://doi.org/10.1016/j.jbankfin.2009.02.001

Pennathur, A.K., Subrahmanyam, V, Vishwasrao, S, 2012. Income diversification and risk: Does ownership matter? An empirical examination of Indian banks. Journal of Banking and Finance 36: 2203-2215. https://doi.org/10.1016/j.jbankfin.2012.03.021

Pham, N. and Oh, K.B., 2015. Mergers and acquisitions: CEO duality, operating performance and stock returns in Vietnam. Pacific Basin Finance Journal 35(A): 298-316. https://doi.org/10.1016/j.pacfin.2015.01.007

Renneboog L. and Zhao Y., 2011. Us knows us in the UK: on director networks and CEO compensation. Journal of Corporate Finance 17(4): 1132-1157 https://doi.org/10.1016/j.jcorpfin.2011.04.011

Romer, D, 2006. Advanced Macroeconomics. McGraw-Hill, New York.

Rus, D., Van Knippenberg, D., and Wisse, B., 2012. Leader power and self-serving behavior: The Moderating Role of Accountability. The Leadership Quarterly 23(1), Pages 13-26. https://doi.org/10.1016/j.leaqua.2011.11.002

Shleifer, A., Vishny, R.W., 1997. A survey of corporate governance. Journal of Finance 52, 737–783. https://doi.org/10.1111/j.1540-6261.1997.tb04820.x

Šilingienė, V., Stukaitė, D. and Radvila G., 2015. The Remuneration Determinants of Chief Executive Officers: A Theoretical Approach. Procedia – Social and Behavioral Sciences 213(1): 848-854. https://doi.org/10.1016/j.sbspro.2015.11.494

Tang, J., 2017. CEO duality and firm performance: The moderating roles of other executives and blockholding outside directors. European Management Journal 35(3): 362-372. https://doi.org/10.1016/j.emj.2016.05.003

Tian, S., Yang, Y. and Zhang, G., 2013. Bank capital, interbank contagion and bailout policy. Journal of Banking and Finance 37(8), 2765-2778. https://doi.org/10.1016/j.jbankfin.2013.03.024

UK Financial Reporting Council; UK Corporate Governance Code (formerly the Combined Code), 1998, 2010, 2012, 2014 and 2016.

Valencia, F., 2014. Monetary policy, bank leverage and financial stability. Journal of Economic Dynamics and Control 47, 20-38. https://doi.org/10.1016/j.jedc.2014.07.010

Walker, D., 2019. A review of corporate governance in UK banks and other financial industry entities (“The Walker Report”). Institute of Chartered Accountants of England and Wales.

Yang, T. and Zhao, S. 2014. CEO duality and firm performance: Evidence from an exogenous shock to the competitive environment. Journal of Banking and Finance 49: 534-552. https://doi.org/10.1016/j.jbankfin.2014.04.008

Tables

Table 1 Variables used and descriptive statistics.

Variable	Definition	**Obs.**	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**Number of "1s" / Total Obs.**
ROA	Net income over total assets, all multiplied by 100	756	0.37	2.25	-33.48	23.93	N/A
ROE	Net income over total equity, all multiplied by 100	756	4.42	23.67	-511.35	69.47	N/A
LII	Loan interest income over gross loans, all multiplied by 100	560	6.65	13.58	0.00	258.49	N/A
GTA	Total assets at the current year minus total assets at the preceding year, all over total assets at the preceding year and then multiplied by 100	643	9.13	25.98	-60.67	208.32	N/A
LI	Loan impairment charge over gross loans, all multiplied by 100	645	0.63	1.90	-17.33	29.91	N/A
CF	Takes a value of 1 if any of the following occurred: default or bankruptcy, bailout or stress acquisition, asset protection, tier 1 breach or regulatory capital breach	760	0.07	0.26	0	1	54 / 760
STATE	Takes a value of 1 if a national government owns more than 50% of the shares, and 0 otherwise	751	0.05	0.21	0	1	39 / 751

Variable	Definition	Obs.	Mean	Std. Dev.	Min.	Max.	Number of “1s” / Total Obs.
MUT	Takes a value of 1 if the bank is owned by depositors and / or employees, and 0 otherwise	760	0.40	0.49	0	1	305 / 760
FOR	Takes a value of 1 if the bank is owned by a parent entity that is based outside the United Kingdom, and 0 otherwise	760	0.29	0.45	0	1	218 / 760
BRS	Number of non-executive directors plus number of executive directors	529	11.53	3.73	0	31	N/A
DR	Proportion of the Board who are Non-Executive Directors	528	0.72	0.14	0.27	1	N/A
REMC	Takes value 1 if a Remuneration Committee is present, and 0 otherwise	556	0.89	0.32	0	1	489 / 556
ERD	Takes value 1 if executive remuneration is disclosed, and 0 otherwise	554	0.63	0.48	0	1	349 / 554
JOINT	Takes a value of 1 if the Board Chairman and CEO of the bank are the same individual, and 0 otherwise	532	0.09	0.28	0	1	43 / 532
CROB	Takes a value of 1 if a Chief Risk Officer (CRO) is present as a full director on the Board of the bank, and 0 otherwise	528	0.06	0.24	0	1	38 / 528

Variable	Definition	Obs.	Mean	Std. Dev.	Min.	Max.	Number of "1s" / Total Obs.
CDB	Takes a value of 1 if a Commercial Director is present as a full director on the Board of the bank, and 0 otherwise	553	0.40	0.49	0	1	216 / 553
FEM	The proportion of the Board who are female	456	0.13	0.08	0	0.5	N/A
NEXP	The proportion of the Board who have not previously worked in financial services	371	0.43	0.23	0	1	N/A
CROC	Takes a value of 1 if either Chief Risk Officer (CRO) is present as a full director on the Board or there is a Chairman separate from the CEO, and 0 otherwise	760	0.74	0.44	0	1	562 / 760
CUMUL	Takes the value 3 if a bank has all three of an independent Chairman, CRO on the Board and NEDs being over 50% of the Board. Takes the value 2 if two of these are the case, and so on	617	1.90	0.48	0	3	N/A
LNED	Takes a value 1 if NEDs are less than half the Board, and 0 otherwise	760	0.07	0.25	0	1	53 / 760
IRB	Takes a value of 1 if the bank has permission from the national financial services regulators to use the Internal Ratings Based (IRB) approach for credit risk measurement and management, and 0 otherwise	754	0.10	0.29	0	1	72 / 754
EXP	Loans and advances to banks over total assets	700	0.19	0.20	9.5E-05	0.99	N/A
SEC	Total securities holdings over total assets	730	0.21	0.21	0	1.00	N/A

Variable	Definition	Obs.	Mean	Std. Dev.	Min.	Max.	Number of "1s" / Total Obs.
ADV	Net fees and commissions over total assets	701	0.01	0.03	-0.01	0.39	N/A
ER	Equity over total assets	760	0.09	0.11	0.00	0.99	N/A
CDL	Customer current deposits over total liabilities	665	0.56	0.33	0	1.00	N/A
SIZE	Total bank assets over GDP (with total bank assets first multiplied by 1,000,000 to reflect the fact that it was in millions while GDP was in units)	760	0.07	0.26	7.9E-05	2.05	N/A
AP	Total remuneration expenditure divided by the number of employees (in GBP thousands)	598	150	680	10	1011	N/A
YRD	Year dummies that take the value of 1 for each particular year between 2003 and 2012, and zero otherwise	-	-	-	-	-	N/A

Note: The mean, standard deviation and outliers for these variables all have economically reasonable values. Outliers have been checked and relate to cases where the denominator and / or numerator changed sharply or the variable took an extreme value due to stress or other special conditions. For instance, very low negative return on equity occurs when there are large losses and these have caused the equity (denominator in the ratio) to become very small. A few extreme outliers are removed in regression analysis to avoid excessive impact on estimates, and influential observations analysis has been carried out to verify that such excessive impacts have indeed been avoided.

Table 2 2SLS estimation results for effects of governance in models with simultaneity of risk and return.

	Model 1		Model 2	
	(1) LI	(2) ROA	(1b) LI	(2b) ROA
L.JOINT	**-3.992***** **(1.518)**	**-0.341** **(0.669)**	**-4.200**** **(1.997)**	**-0.474** **(0.553)**
L.CROB	**-0.574** **(0.641)**	**-0.276** **(0.475)**	**-0.271** **(0.793)**	**-0.310** **(0.438)**
L.DR	**141.4** **(113.1)**	**-107.8** **(87.87)**	**0.470** **(2.107)**	**-0.995** **(1.128)**
L.DR2	**-231.2** **(166.7)**	**155.5** **(127.9)**		
L.DR3	**121.5** **(80.95)**	**-74.00** **(61.29)**		
L.REMC	**-0.114** **(0.609)**	**0.889*** **(0.531)**	**0.0102** **(0.729)**	**0.771*** **(0.424)**
ROA	-4.568*** (1.499)		-5.443** (2.315)	
L.ROA	2.164** (1.005)		2.864* (1.604)	
LI		-1.721*** (0.664)		-1.605*** (0.514)
L.LI		0.796* (0.442)		0.724** (0.345)
L.BRS	0.0330 (0.0590)	0.115** (0.0565)	0.0591 (0.0688)	0.105** (0.0443)
L.CDB	-0.512 (0.333)	0.0524 (0.230)	-0.378 (0.371)	-0.0480 (0.190)
L.FEM	-1.543 (1.721)	0.0207 (1.293)	-1.121 (2.113)	-0.0116 (1.157)
L.NEXP	0.812 (0.823)	0.556 (0.610)	0.779 (1.035)	0.525 (0.561)
L.LNED	1.202 (1.819)	-2.433* (1.460)	1.485 (1.841)	-1.439* (0.842)
L.GTA	0.000432 (0.00529)	0.00256 (0.00427)	0.00197 (0.00680)	0.00196 (0.00380)
L.LII	0.0256 (0.0230)	-0.0265* (0.0157)	0.0321 (0.0315)	-0.0228* (0.0123)
L.STATE	-1.077 (0.715)	-1.227* (0.654)	0.260 (1.024)	-1.396** (0.674)
L.MUT	-2.700*** (0.880)	-0.806* (0.462)	-2.816** (1.125)	-0.904** (0.420)
L.FOR	-2.001** (0.774)	-0.845* (0.473)	-2.087** (0.998)	-0.852* (0.437)
L.ERD	-0.290 (0.368)	-0.204 (0.278)	-0.536 (0.483)	-0.156 (0.252)
L.AP	-1.321 (1.871)	-1.293 (1.468)	1.384 (2.521)	-1.774 (1.467)
L.IRB	-1.692** (0.703)	-0.491 (0.370)	-2.019** (1.004)	-0.482 (0.342)
L.EXP	-2.585 (2.431)	3.758* (2.197)	-2.625 (3.062)	3.254** (1.642)
L.SEC	-1.565 (1.773)	2.677 (1.732)	-2.390 (2.528)	2.516* (1.471)
L.ADV	73.11** (30.33)	-17.53 (22.52)	92.68** (47.01)	-15.65 (19.17)
L.ER	-30.40 (20.73)	35.28* (19.21)	-40.97 (31.12)	31.72** (14.87)

L.CDL	1.649	-1.058	1.916	-0.846
	(1.033)	(0.791)	(1.387)	(0.603)
L.SIZE	0.898	-0.271	0.794	-0.202
	(0.717)	(0.492)	(0.876)	(0.426)
Constant	-23.31	22.01	4.152	-1.507
	(23.97)	(18.75)	(2.939)	(1.425)
Observations	297	297	297	297
VIFs	1.32-7.36	1.32-7.47	1.30-7.23	1.30-7.35
F statistic	9.49	3.94	7.07	4.83
Pr > F	<0.001	<0.001	<0.001	<0.001
Pr > F aux reg	>0.999	>0.999	>0.999	>0.999
Pr > Hall-Pagan	0.011	<0.001	<0.001	<0.001
Pr > Breusch-Pagan	<0.001		<0.001	

Year dummies included but not shown
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Equation numbers are as stated in the main text. Where two equations are estimated simultaneously they are shown under the heading of the same model. Dependent variables are stated at the top of columns and explanatory variables in rows. Equations are estimated using two-stage least squares. Estimated parameter values are shown along with star symbols for statistical significance. Classical standard errors are in parentheses. Diagnostic testing using Hall-Pagan, Breusch-Pagan and system tests shows the presence of non-spherical error variance, such that this work is complemented by GMM estimation with clustered standard errors (next results table). VIFs vary from 1.30 to 7.47 but this has not prevented detection of significant relationships or caused sign reversal (shown using smaller sets of regressors). VIF estimates exclude powers of the director ratio. Auxiliary regression using functions of residuals as dependent variable shows no empirical evidence of mis-specification for any dependent variable. Pr>F is the probability of obtaining an F at least as large as was obtained under the null hypothesis that the regression coefficients are all zero. Pr>F aux reg is the probability of obtaining an F statistic at least as large as was obtained in an auxiliary regression of functions of residuals on regressors (a test for mis-specification) under the null hypothesis that the auxiliary regression coefficients are all zero. (Bivariate tests also confirmed absence of mis-specification; results not shown.) Pr> Breusch-Pagan and Pr>Hall-Pagan are probabilities of obtaining test statistics at least as extreme as those obtained under the null hypothesis of spherical error variance.

Table 3 GMM estimation results for effects of governance in models with simultaneity of risk and return.

	Model 2	
	(1) LI	(2) ROA
L.JOINT	**-1.569**** **(0.719)**	**-0.976**** **(0.482)**
L.CROB	**-0.451*** **(0.232)**	**-0.266*** **(0.145)**
L.DR	**1.844** **(43.05)**	**8.455** **(23.71)**
L.DR2	**-15.71** **(63.18)**	**-19.75** **(34.56)**
L.DR3	**12.68** **(30.75)**	**12.41** **(16.71)**
L.REMC	**0.499**** **(0.240)**	**0.219*** **(0.129)**
ROA	-1.838*** (0.132)	
L.ROA	0.300*** (0.0841)	
LI		-0.512*** (0.0274)
L.LI		0.0162 (0.0417)
L.BRS	0.0692*** (0.0239)	0.0385*** (0.0147)
L.CDB	-0.215* (0.114)	-0.129* (0.0740)
L.FEM	-0.968** (0.491)	-0.758** (0.306)
L.NEXP	0.669** (0.272)	0.422** (0.175)
L.LNED	-1.253** (0.595)	-0.509 (0.360)
L.GTA	-0.000273 (0.00256)	0.000116 (0.00142)
L.LII	-0.0118* (0.00652)	-0.00235 (0.00308)
L.STATE	-1.019* (0.585)	-0.541* (0.293)
L.MUT	-1.485*** (0.384)	-0.869*** (0.209)
L.FOR	-1.142** (0.494)	-0.715*** (0.257)
L.ERD	-0.240 (0.165)	-0.133 (0.0879)
L.AP	-1.302 (0.953)	-0.578 (0.488)
L.IRB	-0.687*** (0.242)	-0.428*** (0.145)
L.EXP	1.203 (0.907)	0.259 (0.537)
L.SEC	0.714 (0.747)	0.232 (0.400)
L.ADV	26.70*** (5.738)	19.71*** (2.617)
L.ER	6.473**	0.775

	(2.784)	(1.230)
L.CDL	0.00385	0.176
	(0.307)	(0.178)
L.SIZE	0.192	0.0907
	(0.265)	(0.145)
Constant	2.423	-0.106
	(9.474)	(5.260)
Observations	299	299
VIFs	1.29-7.36	1.32-7.47
GMM criterion Q(b)	$1.02 \times e^{-17}$	$1.97 \times e^{-19}$
Pr > F endo reg	>0.999	>0.999

Year dummies included but not shown
Clustered standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Equation numbers are as in Table 2. The two equations are estimated simultaneously and so are shown under the heading of the same model. Dependent variables are stated at the top of columns and explanatory variables in rows. Equations are estimated using the generalised method of moments. Estimated parameter values are shown along with star symbols for statistical significance. Clustered standard errors are in parentheses, as a means to address the assumed presence of non-spherical error variance. VIFs for this set of regressors vary from 1.29 to 7.47, but this has not prevented the detection of significant associations or caused sign reversals (shown using shorter equations). Auxiliary regression using functions of residuals as dependent variable shows no empirical evidence of mis-specification for any dependent variable. Pr>F aux reg is the probability of obtaining an F statistic at least as large as was obtained in an auxiliary regression of functions of residuals on regressors (a test for mis-specification) under the null hypothesis that the auxiliary regression coefficients are all zero. (Bivariate tests also confirmed absence of mis-specification; results not shown.)

Table 4 2SLS estimation results for interactions amongst governance terms in models with simultaneity of risk and return.

	Model 1		Model 2	
	(3) LI	(4) ROA	(3b) LI	(4b) ROA
L.DR	**121.0**	**-103.2**	**1.366**	**-0.900**
	(114.7)	**(80.34)**	**(2.224)**	**(1.074)**
L.DR2	**-201.7**	**148.6**		
	(168.9)	**(116.4)**		
L.DR3	**108.3**	**-70.74**		
	(82.25)	**(55.68)**		
L.LNED	**1.239**	**-2.722***	**1.886**	**-1.694***
	(2.154)	**(1.544)**	**(2.249)**	**(0.958)**
L.CUMUL	**-0.410**	**-0.292**	**-0.140**	**-0.295**
	(0.674)	**(0.466)**	**(0.826)**	**(0.437)**
L.CROC	**4.594****	**0.644**	**4.499****	**0.764**
	(1.864)	**(0.792)**	**(2.244)**	**(0.692)**
L.REMC	**-0.126**	**0.877***	**-0.000684**	**0.778***
	(0.655)	**(0.511)**	**(0.767)**	**(0.425)**
ROA	-4.828***		-5.662**	
	(1.711)		(2.519)	
L.ROA	2.359**		3.026*	
	(1.153)		(1.748)	
LI		-1.706***		-1.615***
		(0.631)		(0.514)
L.LI		0.785*		0.732**
		(0.419)		(0.345)
L.BRS	0.0113	0.116**	0.0435	0.104**
	(0.0664)	(0.0564)	(0.0730)	(0.0444)
L.FEM	-1.804	0.0317	-1.291	-0.0247
	(1.870)	(1.281)	(2.224)	(1.163)
L.NEXP	1.112	0.527	1.002	0.552
	(0.898)	(0.587)	(1.087)	(0.553)
L.GTA	-0.000214	0.00259	0.00145	0.00190
	(0.00563)	(0.00423)	(0.00706)	(0.00381)
L.LII	0.0281	-0.0261*	0.0343	-0.0230*
	(0.0255)	(0.0151)	(0.0339)	(0.0123)
L.STATE	-1.225	-1.205*	0.151	-1.426**
	(0.767)	(0.623)	(1.039)	(0.664)
L.MUT	-2.681***	-0.819*	-2.824**	-0.895**
	(0.938)	(0.452)	(1.182)	(0.421)
L.FOR	-2.093**	-0.841*	-2.163**	-0.856*
	(0.851)	(0.467)	(1.064)	(0.440)
L.ERD	-0.356	-0.198	-0.587	-0.160
	(0.396)	(0.272)	(0.512)	(0.253)
L.AP	-1.404	-1.279	1.315	-1.810
	(2.008)	(1.443)	(2.627)	(1.465)
L.IRB	-1.779**	-0.491	-2.093*	-0.482
	(0.779)	(0.366)	(1.077)	(0.343)
L.EXP	-2.666	3.692*	-2.705	3.297**
	(2.635)	(2.072)	(3.241)	(1.637)
L.SEC	-1.403	2.612	-2.270	2.574*
	(1.855)	(1.618)	(2.606)	(1.454)
L.ADV	74.35**	-16.80	93.93*	-16.30
	(32.98)	(21.12)	(49.79)	(19.01)
L.ER	-33.22	34.79*	-43.43	32.04**
	(23.35)	(18.22)	(33.67)	(14.85)
L.CDL	1.789	-1.043	2.049	-0.852

	(1.157)	(0.760)	(1.503)	(0.606)
L.SIZE	1.056	-0.274	0.911	-0.196
	(0.802)	(0.488)	(0.940)	(0.428)
Constant	-22.71	21.05	-0.656	-1.798
	(25.40)	(17.65)	(2.420)	(1.435)
Observations	297	297	297	297
VIFs	1.33-7.30	1.32-7.51	1.33-7.18	1.32-7.29
F statistic	8.44	4.08	6.59	4.83
Pr > F	<0.001	<0.001	<0.001	<0.001
Pr > F aux reg	>0.999	>0.999	>0.999	>0.999
Pr > Hall-Pagan	<0.001	<0.001	<0.001	<0.001
Pr > Breusch-Pagan	<0.001		<0.001	

Year dummies included but not shown

Clustered standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Equation numbers are as stated in the main text. Where two equations are estimated simultaneously they are shown under the heading of the same model. Dependent variables are stated at the top of columns and explanatory variables in rows. Equations are estimated using two-stage least squares. Estimated parameter values are shown along with star symbols for statistical significance. Classical standard errors are in parentheses. Diagnostic testing using Hall-Pagan, Breusch-Pagan and system tests shows the presence of non-spherical error variance, such that the next results table uses GMM with clustered standard errors as a complement. VIFs for this set of regressors vary from 1.32 to 7.51, but this has not prevented the detection of significant associations or caused any reversals of sign (shown using shorter equations). VIFs for powers of the director ratio were excluded. Auxiliary regression using functions of residuals as dependent variable shows no empirical evidence of mis-specification for any dependent variable. Pr>F is the probability of obtaining an F at least as large as was obtained under the null hypothesis that the regression coefficients are all zero. Pr>F aux reg is the probability of obtaining an F statistic at least as large as was obtained in an auxiliary regression of functions of residuals on regressors (a test for mis-specification) under the null hypothesis that the auxiliary regression coefficients are all zero. (Bivariate tests also confirmed absence of mis-specification; results not shown.) Pr>Breusch-Pagan and Pr>Hall-Pagan are probabilities of obtaining test statistics at least as extreme as those obtained under the null hypothesis of spherical error variance.

Table 5 GMM estimation results for effects of governance interactions in models with simultaneity of risk and return.

	Model 1	
	(3) LI	(4) ROA
L.DR	**-11.82**	**0.565**
	(40.37)	**(21.93)**
L.DR2	**4.610**	**-8.020**
	(59.23)	**(31.88)**
L.DR3	**3.086**	**6.888**
	(28.94)	**(15.46)**
L.LNED	**-1.550****	**-0.674**
	(0.727)	**(0.455)**
L.CUMUL	**-0.376***	**-0.222**
	(0.215)	**(0.135)**
L.CROC	**1.920****	**1.189****
	(0.790)	**(0.533)**
ROA	-1.832***	
	(0.133)	
L.ROA	0.307***	
	(0.0867)	
LI		-0.512***
		(0.0274)
L.LI		0.0185
		(0.0421)
L.BRS	0.0620***	0.0342**
	(0.0234)	(0.0140)
L.FEM	-1.034**	-0.807**
	(0.500)	(0.322)
L.NEXP	0.775***	0.489***
	(0.273)	(0.186)
L.GTA	-0.000555	-3.30e-05
	(0.00250)	(0.00139)
L.LII	-0.0123*	-0.00245
	(0.00633)	(0.00297)
L.STATE	-1.070*	-0.572*
	(0.608)	(0.305)
L.MUT	-1.423***	-0.835***
	(0.385)	(0.208)
L.FOR	-1.137**	-0.717***
	(0.504)	(0.264)
L.REMC	0.515**	0.226*
	(0.229)	(0.125)
L.ERD	-0.262	-0.146
	(0.171)	(0.0943)
L.AP	-1.320	-0.585
	(0.985)	(0.504)
L.IRB	-0.680***	-0.427***
	(0.245)	(0.148)
L.EXP	1.327	0.315
	(0.886)	(0.524)
L.SEC	0.864	0.316
	(0.760)	(0.403)
L.ADV	25.33***	19.10***
	(5.698)	(2.735)
L.ER	6.863**	0.884
	(2.753)	(1.210)
L.CDL	-0.00952	0.176

	(0.307)	(0.181)
L.SIZE	0.228	0.112
	(0.276)	(0.154)
Constant	4.006	0.740
	(9.294)	(5.139)
Observations	299	299
VIFs	1.33-7.18	1.32-7.29
GMM criterion Q(b)	$2.00 \times e^{-17}$	$3.24 \times e^{-19}$
Pr > F aux reg	>0.999	>0.999

Year dummies included but not shown

Clustered standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Equation numbers are as in Table 4. The two equations are estimated simultaneously and are shown under the heading of the same model. Dependent variables are stated at the top of columns and explanatory variables in rows. Equations are estimated using the generalised method of moments. Estimated parameter values are shown along with star symbols for statistical significance. Clustered standard errors are in parentheses. The presence of non-sphericity is assumed, such that clustered standard errors are used. VIFs for this set of regressors vary from 1.33 to 7.29, but this has not prevented the detection of significant associations or caused sign reversals (shown using shorter equations with less multicollinearity). VIFs for powers of the director ratio are excluded. Auxiliary regression using functions of residuals as dependent variable shows no empirical evidence of mis-specification for any dependent variable. Pr>F aux reg is the probability of obtaining an F statistic at least as large as was obtained in an auxiliary regression of functions of residuals on regressors (a test for mis-specification) under the null hypothesis that the auxiliary regression coefficients are all zero. (Bivariate tests also confirmed absence of mis-specification; results not shown.)

Table 6 Estimation results for models of ROA and loan impairments using single-equation OLS.

	(1) LI	(2) ROA
ROA	**-1.372*** (0.196)**	
L.ROA	**0.0758 (0.159)**	
LI		**-0.397*** (0.0526)**
L.LI		**-0.0488 (0.0385)**
L.GTA	-0.00236 (0.00393)	-0.000503 (0.00171)
L.LII	-0.0174** (0.00842)	-0.000109 (0.00286)
L.STATE	-0.878* (0.476)	-0.228 (0.293)
L.MUT	-1.387 (1.342)	-0.910 (0.845)
L.FOR	-1.246*** (0.443)	-0.765*** (0.280)
L.BRS	0.0908*** (0.0231)	0.0443** (0.0198)
L.DR	0.180 (0.622)	-0.138 (0.405)
L.REMC	0.693** (0.269)	0.218* (0.129)
L.ERD	-0.279 (0.188)	-0.175 (0.106)
L.AP	-0.730 (0.927)	0.137 (0.647)
L.JOINT	-1.157*** (0.429)	-0.987* (0.502)
L.CROB	-0.358 (0.300)	-0.181 (0.161)
L.CDB	-0.0304 (0.0975)	-0.0864 (0.0795)
L.FEM	-0.202 (0.563)	-0.636* (0.344)
L.NEXP	0.683** (0.276)	0.372* (0.193)
L.IRB	-0.638** (0.281)	-0.458*** (0.168)
L.EXP	1.738** (0.774)	-0.0180 (0.437)
L.SEC	0.793 (0.777)	-0.167 (0.325)
L.ADV	14.22** (5.665)	24.03*** (3.627)
L.ER	12.74*** (3.431)	-2.722 (2.231)
L.CDL	-0.325 (0.263)	0.291 (0.191)
L.SIZE	0.00187 (0.251)	0.0375 (0.154)
Constant	-0.482 (0.709)	0.685 (0.480)

Observations	303	297
R-squared	0.884	0.852
VIFs	1.24-7.67	1.29-7.48
F statistic	795.4	40.0
Pr > F	<0.001	<0.001
F (aux reg)	0.00	0.00
Pr > F aux reg	>0.999	>0.999
Pr > Breusch-Pagan	<0.001	<0.001

Year dummies included but not shown
Clustered standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Equation numbers are as stated in the main text. Dependent variables are stated at the top of columns and explanatory variables in rows. Equations are estimated using OLS. Estimated parameter values are shown along with star symbols for statistical significance. Clustered standard errors are in parentheses. Diagnostic testing using the Breusch-Pagan test reveals the presence of heteroskedasticity, such that clustered standard errors are used. VIFs vary from 1.24 to 7.48, but this has not prevented the detection of significant associations or caused sign reversal (shown by taking smaller sets of regressors). Pr>F is the probability of obtaining an F at least as large as was obtained under the null hypothesis that the regression coefficients are all zero. Pr>F aux reg is the probability of obtaining an F statistic at least as large as was obtained in an auxiliary regression of functions of residuals on regressors (a test for mis-specification) under the null hypothesis that the auxiliary regression coefficients are all zero. (Bivariate tests also confirmed absence of mis-specification; results not shown.) Pr>Breusch-Pagan is the probability of obtaining a test statistic at least as extreme as that obtained under the null hypothesis of spherical error variance.

Table 7 Probit estimation results for governance as a determinant of bank failure.

	(5) CF	(5b) CF	(5c) CF
L.JOINT	**0.398**	**0.889**	**-0.0881**
	(0.828)	**(0.547)**	**(0.417)**
L.CROB	**-0.349**	**-0.284**	**0.460**
	(0.874)	**(0.565)**	**(0.593)**
L.DR	**-9.247*** **	**-3.317**	**-1.118**
	(3.522)	**(2.136)**	**(1.280)**
L.REMC	**-2.808*** **	**-0.985** **	**-0.737** **
	(0.743)	**(0.497)**	**(0.329)**
L.GGL	0.00714		
	(0.00550)		
L.GTA	0.0233***		
	(0.00853)		
L.LI	-0.111		
	(0.435)		
L.ROA	0.0560		
	(0.303)		
L.ROE	-0.0221***		
	(0.00610)		
L.STATE	8.760***	2.061***	1.172***
	(1.827)	(0.694)	(0.407)
L.MUT	0.998	-0.736	0.192
	(1.349)	(0.639)	(0.478)
L.FOR	5.887***	1.176**	0.913**
	(1.579)	(0.592)	(0.425)
L.BRS	0.0832	0.0422	0.0178
	(0.103)	(0.0694)	(0.0498)
L.ERD	3.731***	0.808	0.577
	(0.910)	(0.559)	(0.397)
L.AP	-5.424	-3.572	0.0313
	(4.198)	(2.739)	(0.0694)
L.CDB	-0.842**	-0.505*	-0.109
	(0.360)	(0.300)	(0.272)
L.FEM	2.664	-1.148	-0.822
	(3.035)	(2.394)	(1.914)
L.NEXP	5.794***	2.211**	0.478
	(1.609)	(0.985)	(0.709)
L.IRB	-5.956***	0.268	0.0678
	(1.602)	(0.492)	(0.425)
L.EXP	-5.784***	-2.188*	
	(1.436)	(1.217)	
L.SEC	-7.575***	-4.444**	
	(2.462)	(1.982)	
L.ADV	-73.17	-83.80**	
	(52.53)	(34.92)	
L.ER	5.221	2.362	
	(10.08)	(1.710)	
L.CDL	0.138	-0.818	
	(0.851)	(0.553)	

L.SIZE	1.718*	0.0362	
	(0.894)	(0.683)	
Constant	0.941	2.264	-1.063
	(2.042)	(1.428)	(0.803)
Observations	294	384	406
Pseudo-R-squared	0.591	0.376	0.235
VIFs (these regressors)	1.28 – 7.3	1.27 – 6.23	1.18 – 3.15
Wald Chi^2	2225.7	463.7	422.0
Pr > Chi^2	<0.001	<0.001	<0.001
Pr < Smith-Blundell	<0.001	<0.001	<0.001

Year dummies included but not shown
Clustered standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Equation numbers are as in section 2.1. Dependent variables are stated at the top of columns and explanatory variables in rows. Equations are estimated using maximum likelihood with numerical optimisation. Estimated parameter values are shown along with star symbols for statistical significance. Clustered standard errors are in parentheses and are used to address the presumed presence of non-spherical error variance. Pr>Chi^2 is the probability of obtaining a Chi^2 at least as large as was obtained under the null hypothesis that the regression coefficients are all zero. Pr<Smith-Blundell is the probability of obtaining a Smith-Blundell statistic at least as small as was obtained under the null that regressors are endogenous.