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Do outside directors influence the financial performance of risk-trading firms? Evidence from the United Kingdom (UK) insurance industry

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ABSTRACT

We examine the relation between outside board directors and six measures of financial performance using panel data for 1999–2012 drawn from the UK's property-casualty insurance industry. We find that the proportion of outsiders on the board is unrelated to performance; rather it is outsiders' financial expertise that has the most significant financial performance impact. In addition, superior performance can also be related to the financial expertise of inside directors, thereby reinforcing the importance of board-level financial expertise in the insurance industry. Our results have potential commercial and/or policy implications.

1. Introduction

Over the last two decades or so, academic research (e.g., see Pi and Timme, 1993; Lin et al., 2003; Adams et al., 2010) and corporate governance guidelines issued in countries such as the United Kingdom (UK) (e.g., the Cadbury Report, 1992; the Combined Corporate Governance Code, 2012; the Financial Reporting Council (FRC) Report, 2012) and United States (US) (e.g., the Sarbanes-Oxley (SOX) Act, 2002) have highlighted the important role of independent outside (non-executive) directors in monitoring, controlling and advising executive board-level directors, including the Chief Executive Officer (CEO). This is because in theory, independent directors are usually in the best position to supervise the business behavior of executive directors (Masulis and Mobbs, 2014). Many prior studies and policy pronouncements are predicated on the agency theory-based notion that board independence will tend to have a positive impact on firms' performance in that, amongst other things, outside directors will help realign contracting incentive conflicts between shareholders, managers, and other constituents (e.g., creditors), bring new ideas and business contacts, and moderate the excesses of an entrenched and self-utility maximizing CEO (e.g., see Masulis and Mobbs, 2011, 2014; Veprauskaite and Adams, 2013; Baldenius et al., 2014). However, several researchers (e.g., Adams and Ferreira, 2007; Kumar and Sivaramakrishnan, 2008; Faleye et al., 2011) suggest that outside directors could have a negative impact on corporate performance because they are at an informational disadvantage relative to insiders on the board. Indeed, much empirical evidence supports the conjecture that board independence is unrelated to firm performance (e.g., see Adams et al. (2010) for a comprehensive survey of the relevant literature). Therefore, a key question that emerges from recent studies is what functional attributes (e.g., skill sets) of board outsiders are associated with superior results (Larcker, Richardson and Tuna, 2007; Dahya and McConnell, 2007; Dey, 2008). In this paper, we address this question in the context of the UK's property-casualty insurance industry – an important and integral part of the national and global social and economic system (see Section 2).[2]

Effective governance systems are especially apt in the case of the insurance industry as insurance is a risk-taking and risk-bearing activity which involves policyholders making regular premiums to insurance risk carriers in exchange for a promissory commitment to meet future claims on a schedule of risk events. In accounting terms this means that the trading and bearing of risks creates

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[2] Insurance is widely acknowledged to be one of the three main pillars of modern capitalist economies – the other two being the banking sector and financial markets (e.g., see the Geneva Association, 2012).

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contingent liabilities for insurance carriers at the point-of-sale. This necessitates that insurance firms are actively managed as financial 'going concerns' for the mutual benefit of all contracting constituents including investors, managers, and policyholders (Mayers et al., 1997; Boubakri et al., 2008; Boubakri, 2011). This aspect of the governance-performance relation in insurance markets is underpinned by the technical (actuarial) complexity and opaqueness of insurance transactions, and the statutory accounting and reporting requirements within which insurers have to operate (e.g., with respect to capital maintenance) (Serafeim, 2011). The importance of the governance-performance relation in insurance firms is further heightened by the failures of financial institutions during the 2007/8 global economic crisis. The most notable example being the US$182 billion US federal government bailout of the insurance conglomerate – the American International Group (AIG)) (Boubakri, 2011). Doubts about the contribution of board outsiders to corporate governance and the financial performance of UK insurers have also been highlighted in both prior research (e.g., O'Brien, 2006; Hardwick et al., 2011; Atkins et al., 2011) and official investigative reports (e.g., the Penrose Report, 2004; Walker Report, 2009).

In this study, we use 14 years of longitudinal data (1999–2012) drawn from the UK's property-casualty insurance industry to test the effects of six main occupational attributes of board outsiders namely: their representation on the board, independence, financial expertise, insurance experience, firm-based knowledge, and multiple appointments – on ratio-based measures of financial performance, namely, the net profit margin, return on assets, return on equity, solvency, loss ratio, and combined operating ratio, that are commonly used in the insurance industry (e.g., see KPMG, 2014). To deal with possible endogeneity, we follow recent research (e.g., Dass et al., 2014), and estimate two-stage least squares (2SLS) regressions in which board independence is instrumented by the location of insurers. Dass et al. (2014)[3] consider that this procedure produces more efficient and consistent parameter estimates than pooled ordinary least squares (OLS) and standard fixed or random-effects models.

We find that the proportion of board outsiders is unrelated to our performance indicators; rather it is outsiders' financial expertise that has the most significant financial outcomes. In addition, superior performance can also be related to the financial expertise of inside directors. This observation reinforces the functional importance of board-level financial expertise in the technically complex and risk information-sensitive insurance industry.

Three principal contributions emerge from our research. In one of the first studies of its kind, Anderson et al. (2011) examine the impact of board heterogeneity on a single measure of performance – industry-adjusted Tobin's Q – using cross-sectional data from the US corporate sector[4]. In contrast, our approach here focuses on the effects of different outside director traits on multi-dimensional measures of financial performance. Given the predicted importance of independent outside directors in optimizing the governance-performance relation in insurance firms (Boubakri et al., 2008), our dynamic single country/single industry focus enables us to conduct direct tests of our hypotheses. The functional and interactive role of inside and outside board members can also vary between industries as well as across countries that have different corporate governance systems, regulations, and business traditions (e.g., see Defond et al., 2005; Dey, 2008; Bebchuk and Weisbach, 2010). Therefore, the present study avoids the potentially confounding effects that could exist in cross-country/cross-sectional research.

Second, in comprising a range of insurance firms of different size, structure, product-mix, and age, our panel data set addresses a concern highlighted in some previous studies (e.g., Boone et al., 2007; Adams et al., 2011; Cornelli et al., 2013) that most prior research of the governance-performance relation has focused overwhelmingly on large publicly listed US-based companies. The greater variation in our sample of insurance firms (e.g., in terms of size and ownership structure) mitigates sample selection bias and so allows robust tests to be carried out.

Third, as Anderson et al. (2011) make clear in their paper, board heterogeneity and its link with corporate performance is a salient commercial and public policy issue in countries such as the UK and US. Like others before us (e.g., Masulis and Mobbs, 2011), we argue that the effectiveness of corporate boards in meeting financial targets is heavily reliant on how outside directors relate to, and cooperate with, inside directors. Indeed, the question of whether or not shared professional status promotes cooperation between inside and outside board members and improves financial outcomes is largely unexplored. This is also an issue of some theoretical as well as empirical importance in that the control obligations of being a member of a professional body (e.g., in protecting the interests of key stakeholders such as shareholders, policyholders and regulators) is an issue that resonates closely with the supervisory function of boards articulated in agency theory. The performance-effects of board members' characteristics are also likely to be of decision-making interest to the various stakeholders of insurance firms (e.g., shareholders, policyholders, and regulators) (e.g., see Dass et al. 2014). Our results could also be extended to other insurance markets and parts of the economically important financial services sector that have similar organizational, fiduciary, and structural (e.g., regulatory) features to the insurance sector (e.g., banking and pensions fund industries). Moreover, as the interface between inside and outside directors can be important for mitigating information asymmetries, controlling agency costs, and promoting the interests of the owners of firms in other business contexts (e.g., venture capital-supported enterprises – see Lerner, 1995) our results could have even broader cross-industry appeal.

Our paper is organized as follows. Section 2 provides information on the UK's property-casualty insurance. A review of the literature and articulation of our hypotheses follows in Section 3. Section 4 then outlines the research design, including the description of the data, model specification, and definition of the variables used. We then present and discuss the empirical results in Section 5, while conclusions are made in the final section of the paper.

2. Institutional background

The UK's property-casualty insurance industry is the third largest in the world (after the US and Japan) and comprises approximately 300 or so active domestically-owned and foreign-owned companies, subsidiaries and branches of varying size, ownership structure, and product-mix, which currently generates approximately £50 billion (US$84 billion) in gross annual premiums (International Underwriting Association, 2013).[5] In addition, 91 active syndicates

[3] Superior performance is captured by larger values for profit margin, return on assets, and return on equity, and smaller values for solvency, loss ratio and the combined operating ratio.

[4] Tobin's Q is measured as the ratio of the sum of the market value of equity and book value of debt and preference shares over the book value of total assets. Given the preponderance of non-publicly listed firms in our sample, Tobin's Q is inappropriate here. In any case, Anderson et al. (2011, p. 9) acknowledge that computing Tobin's Q for public utilities and financial firms can be problematical (e.g., due to different balance sheet structures) and accordingly, such entities are excluded from their analysis despite the importance of governance in such firms since the 2007/8 global economic crisis. Moreover, Tobin's Q can be mis-specified as it also proxies for other factors such as product-market share and growth opportunities (e.g., see Zou, 2010).

[5] In 2012/13 there were 976 property-casualty insurance entities licensed to operate in the UK but only about a third of these entities actively underwrite insurance business. Non-active insurance operatives include a miscellany of structures such as closed funds in run-off, 'brass plate' branches of overseas firms, and protection and indemnity pools that do not underwrite third party risks.

at the Lloyd's insurance market currently underwrite gross premiums of roughly £26 billion (US$45 billion) per annum, mainly in marine, aviation and transport (MAT) lines of insurance (Lloyd's of London, 2013). Securing 'value added' (e.g., through sustained profitability) and solvency maintenance (e.g., via reinsurance) are key strategic goals for the boards of insurance companies (Adiel, 1996). However, achieving these financial targets depends on the effective coordination and use of financial skills, insurance knowledge and the business acumen of board members, including outside directors (Hardwick et al., 2011). Indeed, recent regulatory and changes in the UK insurance market as well as high profile corporate failures and financial scandals (e.g., as was the case with Equitable Life and Independent Insurance plc) over the last two decades or so have heightened the need for board-level financial expertise, industry-specific knowledge and other capabilities (e.g., with regard to regulatory compliance).[6] These requirements necessitate that outside directors have the requisite personal and skills sets necessary to effectively supervise and influence the strategic decisions of insurers (Boubakri, 2011).

We consider that the UK's property-casualty insurance industry is a good institutional environment within which to frame our research for at least four reasons. First, as we noted earlier, over the last decade, the UK has witnessed some high profile corporate failures – notably the demise of Equitable Life and Independent Insurance plc in the early 2000s. In both cases, financial problems have to some extent been attributed to ineffective monitoring and control by outside directors (Penrose Report, 2004; O'Brien, 2006; Atkins et al., 2011). Therefore, the UK insurance market provides an environment where the performance effectiveness of outside board-level has been called into public question.

Second, as Guest (2008) makes clear, the corporate governance regime in the UK over the last 20 years or so whilst exhibiting some similarities (e.g., an increased tendency towards bigger and more independent boards[7]) is in many ways less prescriptive and penal than in the US under the SOX Act (2002), Dodd-Frank Act (2010), and Securities Exchange Commission (SEC) rules. For example, in the UK there is no equivalent to SOX section 407 which mandates that audit committees (which almost invariably comprise exclusively independent outside directors) have a financial expert or sections 302/404 of SOX that prescribe the annual disclosure of the effectiveness internal controls and risk management systems (e.g., see Hoitash et al., 2009; Linck et al., 2008, 2009). Additionally, Baranchuk and Dybvig (2009) argue that sanctions imposed by SOX on US boards of directors could encourage over-precautionary board-level behavior and the passing-up of potentially profitable investment opportunities so reducing value for shareholders. Masulis and Mobbs (2011) further note that the application of SOX rules in the US corporate sector could lead to sub-optimal board composition such as the appointment of independently diverse but industry-ignorant outsiders who contribute little to strategic decisions. In contrast to the US, the UK corporate sector, including its insurance industry, is not subject to such prescriptions, thereby allowing more direct tests of our hypotheses (e.g., see Dahya and McConnell, 2007).

Third, unlike some European countries (e.g., Norway) board composition in the UK is not subject to statutory controls and quotas (e.g., with regard to gender) (e.g., see Ahern and Dittmar, 2012). Again in contrast to the US, the UK insurance market has a unitary as opposed to a State-based regulatory regime. Indeed, Mayers et al. (1997) acknowledge that variations in the US insurance market state-based regulatory constraints (e.g., with regard to board composition) could confound interpretation of the effectiveness of corporate boards in matters of internal control and performance. In contrast, the UK insurance market is relatively unimpeded by such statutory and regulatory constraints.

Fourth, only about 5% of the total number of insurers actively operating in the UK's property-casualty market during our period of analysis (1999–2012) were publicly listed on the main London Stock Exchange. This means that the market for corporate control is less likely to be an effective governance mechanism in the UK compared with the US where roughly one-third of active property-casualty insurers ($n \sim 100$) are publicly quoted firms. This situation therefore heightens the importance on the effectiveness of the board-performance relation in the UK compared with the US.

3. Theory and hypotheses development

In this section we briefly describe the agency theory of board composition and in particular, the function of independent outside directors. We then put forward our hypotheses.

3.1. Theory of corporate boards

In agency theory, a key board-level mechanism for realizing the shareholder value maximization objective is the appointment of independent outside directors (e.g., see Jensen and Meckling, 1976; Fama and Jensen, 1983; Jensen, 1993). This view also accords with recent corporate governance guidelines such as the UK's Combined Corporate Governance Code (2012), which prescribes that independent directors should comprise a majority of board membership and associated board structures such as audit committees. However, recent research (e.g., Harris and Raviv, 2008; Armstrong et al., 2010; Brickley and Zimmerman, 2010) has challenged the view that increasing board independence is *Pareto-optimal*. For example, Harris and Raviv (2008) argue that optimal board structure emerges endogenously as a result of the influence and bargaining position of the CEO in self-appointing board members. Scholars such as Adams and Ferreira (2007), Kumar and Sivaramakrishnan (2008) and Faleye et al. (2011) argue that if outside directors monitor CEOs and other inside directors too intensely then they risk alienation and losing access to key strategic information. Baranchuk and Dybvig (2009) also consider that the ability of outside directors to make an informed and objective impact on board-level decisions can be inhibited if the lead executive controls the strategic agenda and/or where other directors enter into consensus bargaining when voting on contentious strategic issues. Such a situation is particularly likely to arise in technically complex industries, such as insurance, when outsider directors lack key firm-specific and/or industry-level knowledge, and so become ineffective custodians of shareholders' interests (e.g., see Linck et al., 2008, 2009). Therefore, an absolute majority of outsiders may not be an indicator of the quality of oversight and advice provided to the board of directors (Coles et al., 2008).

Such critique has led researchers to examine the performance impacts of functional (e.g., business) and personal (e.g., professional) attributes of outside directors in the context of other

[6] O'Brien (2006) reports that with Equitable Life the valuation and accounting for liabilities arising from the sale of annuities with guaranteed rates were inconsistent with 'fair value' accounting principles, while some aspects of the actuarial valuation of liabilities (e.g., the assumptions used) escaped external audit scrutiny. Atkins et al. (2011) also note serious lapses of accounting procedure with Independent Insurance plc (e.g., inaccurate loss reserving). We argue later in this paper that such accounting and finance shortcomings underscore the need for board members, including outsiders, to have a high degree of financial expertise and insurance-specific knowledge.

[7] For example, the UK's Cadbury Report (1992) recommends that publicly listed companies (plcs) should have at least three independent outside directors on their boards and a separate CEO and Chairman. The UK's Higgs Report (2003) prescribes that outsiders should comprise at least half of total board members of plcs.

firm-specific variables (e.g., ownership structure). Some scholars (e.g., Raheja, 2005; Harris and Raviv, 2008; Masulis and Mobbs, 2011) note that inside directors are not an homogeneous constituency in firms and that board-level directors with certain characteristics (e.g., financial expertise) could help firms realize better than average market measures of financial performance and so increase their human capital value in the executive labor market. Indeed, Srinivasan (2005) and Tan (2014) note that a key board-level function is to ensure accounting probity and the accuracy of financial statements. This could engender cooperation with, and synergies between, inside and outside directors, particularly if both are financial experts mutually obliged by professional norms to share information and cooperate in the best interests of the firm's stakeholders.[8] It is against this backdrop of how insurance firms have constituted their boards and use information to maximize financial outcomes that we now turn in developing our hypotheses.

3.2. Outside board members

The effectiveness of autonomous outside directors in reducing agency costs and maximizing value for shareholders and other contracting constituents (e.g., creditors) will be influenced by a combination of their personal attributes (e.g., their business acumen) and private incentives (e.g., the protection/promotion of their human capital value) (Lin et al., 2003). Additionally, in the UK the Financial Services and Markets Act (2000) requires the insurance industry regulator to vet and approve outsiders' appointments ex-ante and monitor board-level decisions taken ex-post. Such an 'approved persons' function – which also applies to UK banks and some European insurance markets – is primarily designed to minimize the risk of insolvency – a goal that can benefit plural stakeholders of insurance firms including policyholders and investors (Dewing and Russell, 2008). This process of external validation and monitoring could lower agency costs and reinforce the expected positive outcome between the proportion of independent outsiders on the board and the financial performance of insurance firms.[9] Therefore:

H1. Ceteris paribus, a majority of outside directors on the board is likely to be positively related to superior financial performance.

3.3. Independence of board outsiders

Affiliated ('grey') outside directors are not truly independent board members as they have past or existing contracting relationships with the CEO, other inside executive directors, and/or shareholders (e.g., see Ferris et al., 2003). Borokhovich et al. (2014) consider that 'grey' directors have mixed incentives, which ostensibly makes their contribution to corporate performance unclear. For example, 'grey' outside directors may align themselves with a dominant CEO as a result of personal obligations and social ties (Knyazeva et al., 2013). On the other hand, affiliated outsiders could actively seek to maximize shareholders' utility in order to protect/promote their public reputations for independence and objectivity (Masulis and Mobbs, 2014). Baranchuk and Dybvig (2009) model of board composition posits that having 'grey' directors on the board could increase the traded value of firms as they often possess financially relevant knowledge and/or socio-business networks that enhances their advisory capabilities and directly influences bottom-line results. Consequently:

H2. Ceteris paribus, the proportion of affiliated outside directors on the board is likely to be positively related to superior financial performance.

3.4. Financial expertise of outside directors

Scholars such as Agrawal and Chadha (2005), Armstrong et al. (2010) and Kim et al. (2014) suggest that board-level financial expertise is critically important in securing performance targets in idiosyncratic and technically complex business sectors such as the insurance industry. Board-level financial literacy is likely to be particularly important in the insurance sector as insurers are both recipients of market capital and major institutional investors; plus they operate within an increasingly stringent and complex regulatory environment. As a result, outside financial expertise on the board is likely to promote information flows and economic decision-making with financial analysts, investors, insurance industry regulators, amongst others. In other words, board-level financial expertise helps reduce information asymmetries and lower agency costs in firms (Custódio and Metzger, 2014). In the insurance industry, financial misstatements and other accounting errors increase the risk (and cost) of regulatory scrutiny. For this reason, the disclosure of financial and risk information by insurers tends to favor financial sophisticates such as investment analysts and regulators (Malafronte et al., 2015). Accordingly:

H3. Ceteris paribus, the proportion of outside financial experts on the board is likely to be positively related to superior financial performance.

3.5. Insurance experience of outside directors

Bebchuk and Weisbach (2010) note that board-level executives tend to have informational advantages over outsiders. In a technically complex and highly specialist risk industry, such as insurance, it is clearly important that outside directors have sufficient insurance-specific knowledge to access the necessary information systems and ask the critical questions of executive management in order to adequately perform their corporate governance function. Research (e.g., Raheja, 2005) further suggests that the industry-specific knowledge of outside directors enables them to objectively evaluate and ratify managerial decisions (e.g., with respect to accounting treatments) and so improves the effectiveness of their monitoring capability at the board-level. Therefore:

H4. Ceteris paribus, the proportion of outside directors on the board with insurance experience is likely to be positively related to superior financial performance.

[8] In the context of the present study, a financial expert is defined as a qualified member of a publicly recognized professional body of accountants, actuaries, and insurance underwriters. As we explain later in the paper, social obligations can also bind members of recognized professional bodies (e.g., accountants and actuaries) in a spirit of cooperation (e.g., in terms of sharing firm-level knowledge and information). The sanctions of professional bodies also mitigate the risk of conflicts of interest between members of professional bodies – that could happen, for example, when there are bankers on the board who encourage their colleagues to take high cost loans to finance superfluous investments (Custódio and Metzger, 2014). Professional status also confers reputational benefits for both inside and outside board members and helps ensure that they perform their duties with diligence. Indeed, Masulis and Mobbs (2014) report that reputational protection provides strong incentives for directors to act with due care and commitment in protecting shareholders' interests.

[9] At the time of data collection, the UK's insurance industry regulator was the Financial Services Authority (FSA). Since 1 April 2013 the statutory supervision and regulation of UK insurance companies are conducted by the Prudential Regulation Authority (PRA), whilst matters of insurance market operation are regulated by the Financial Conduct Authority (FCA). Both regulatory bodies are subsidiaries of the Bank of England.

3.6. Firm-specific knowledge of outside directors

Masulis and Mobbs (2011) highlight the importance of firm-specific knowledge in enhancing the performance impact of board-level monitoring and control. Linck et al. (2008) also argue that transferring firm-specific information to outside board members can be time-consuming and costly, thereby increasing the comparative advantage of outside directors with several years' tenure in the firm over newcomers. Given the specialist nature of insurance, acquired firm-specific knowledge and unfettered access to internal information systems are likely to be valuable to outsiders in effectively discharging their board responsibilities and maximizing firm performance. As a result:

H5. Ceteris paribus, the proportion of outside directors on the board with firm-specific experience is likely to be positively related to superior financial performance.

3.7. Over-committed outside directors

Fich and Shivdasani (2006) find that US firms where outside directors have multiple appointments elsewhere tend to have lower market-to-book ratios and inferior profitability than firms where board outsiders are less committed. For this reason, corporate governance guidelines (e.g., the US National Association of Corporate Directors (1996)) tend to recommend that outside directorships should be limited to three appointments (e.g., see Perry and Peyer, 2005).[10] On the other hand, Field et al. (2013) argue that multiple directorships can be a certification of directors' abilities, and they find that busy boards contribute positively to firm value. Cashman et al. (2012) argue that the performance impact of busy outside directors is dependent on the complexity of firms and the industry within which they operate. Given the necessity for board-level outsiders to acquire specialist insurance and firm-specific knowledge as well as secure access to information systems managed by insiders, we predict that on balance heavily committed outside directors are likely to be ineffective board-level monitors and inhibit financial outcomes. Therefore:

H6. Ceteris paribus, the proportion of over-committed outside directors on the board is likely to be negatively related to superior financial performance.

3.8. Inside-outside director relationships

Masulis and Mobbs (2011) report that board-level executives (e.g., the Chief Financial Officer (CFO)) usually have better access to internal accounting information than their outsider counterparts. However, inside directors could be motivated (e.g., by the obligations of their respective professional bodies) to alleviate information asymmetries faced by outsiders and share information to mitigate the risk of reputational-damaging accounting events such as earnings restatements.[11] Such incentives could reduce agency costs, and enhance the performance effectiveness of outside directors. Insurance regulation together with professional norms and obligations could also motivate inside and outside board members to cooperate on accounting and finance matters, and so raise levels of performance. Accordingly:

H7. Ceteris paribus, the interaction between inside and outside financial experts on the board is likely to be positively related to superior financial performance.

4. Research design

In this section we describe the data, specify the modelling procedure, and define the variables used (in Table 1).

4.1. Data

The data set used in this study comprises an unbalanced panel of 92 UK property-casualty insurance firms (1168 firm/year data points) that were operating over the 14 years 1999–2012 and for which complete data were available.[12] We focus analysis at the level of the UK statutory reporting insurance entity, which allows us to relate financial performance and other data to the relevant decision-making unit directly managed by UK board members. The panel data collected comprises: (a) insurance company data sourced from *Standard & Poor's SynThesys* insurance companies' database, which were compiled from the annual statutory solvency returns submitted by UK insurance companies to the insurance industry regulator over the relevant period of analysis – the Financial Services Authority (FSA); and (b) biographical and other data on board composition obtained from published annual reports, industrial companies' databases (e.g., *Thomson Reuters Datastream*), and other sources (e.g., insurance industry directories and online company databases such as *DueDil*). All financial variables used in our analysis are audited end-of-accounting year figures. Data relating to trust funds, protection and indemnity pools, and onshore company ('captive') insurance funds were excluded from our sample selection procedure as such entities do not directly underwrite much, if any, third party insurance business. Insurance syndicates at Lloyd's were also excluded from our sampling frame as until 2005 their accounts were prepared on a triennial rather than a comparative annual basis. We also eliminated firm/year cases with incomplete data and insurers in regulatory run-off (i.e., insurance pools that are technically insolvent and closed to new business). The time period covered by our study

[10] Recent research (e.g., Cashman et al., 2012) reports the increasing time commitments of outside board members. Around 20% of the outside directors in our sample of UK insurance firms had full-time executive positions with other organizations, with about half of this percentage also holding outside directorships on the boards of other firms mostly outside the insurance industry. Based on the 2012 average (non-CEO) board executive annual cash salary among our sample of insurance firms of approximately £200,000 and average annual outside director fees of about £60,000, we estimate that one full-time equivalent board-level executive position equates to roughly three outsider appointments. Therefore, by the standards of Fich and Shivdasani (2006) and the US National Association of Corporate Directors (1996) noted above, we treat an outside director holding another full-time job as 'busy'.

[11] In a similar vein to Perry and Peyer (2005), Masulis and Mobbs (2011) highlight that board-level executive directors (typically CFOs) that sit on other companies' boards (which they label 'certified inside directors') tend to be associated with positive share price performance. However, only an average of about 2% of executive directors in our panel of sample insurance firms could be identified as certified inside directors. Even Masulis and Mobbs (2011) identified only about 10% of board executives as certified insiders in their much larger cross-sectional longitudinal analysis of the US corporate sector. On the other hand, the average proportion of financial experts in our panel data set is split roughly equally between inside and outside directors at respectively 21% and 19% of total board members. For this reason, our interaction is based on the overall degree of professional financial expertise at board-level.

[12] Our panel includes some stock insurers that are subsidiaries of listed entities registered in other jurisdictions such as Europe. Time-series market information is not publicly available for these foreign-owned quoted insurers. Of the 320 or so active insurers over our period of analysis roughly 5% on average were listed on the main London stock exchange during our period of analysis (1999–2012). Insurers listed as plcs in our panel comprise a mix of pure property-casualty insurers (e.g., Admiral), alternative investment market firms (e.g., Personal Insurance), and separately (for statutory purposes) reporting UK subsidiaries of foreign insurance plcs (e.g., Allianz). Moreover, the listed insurers in the (unbalanced) panel are not represented in every year due to various reasons such as takeovers, insolvency, and/or changing registration of incorporation.

Table 1
Variable definitions.

Variables	Definition
Dependent variables	
MARGIN	Profit margin – measured as earnings (after interest & taxes) ÷ gross premiums written
ROA	Return on assets – measured as net operating income before interest and taxes ÷ total assets
ROE	Return on equity – measured as net operating income before interest and taxes/issued (& paid-up)equity
SOL	Solvency position (Leverage) – measured as 1-surplus (capital + reserves)/total assets
LR	Loss ratio – measured as total incurred (paid + reserved) claims/total earned premiums
COR	Combined operating ratio – measured as total incurred (paid + reserved) claims + expenses (acquisition & management)/total earned premiums
Independent variables	
NED	% Independent outside directors on the board
GREYNED	% Grey outside directors on the board
FINNED	% Outside financial experts on the board
INSNED	% Outside directors on the board with insurance experience
FIRMNED	% Outside directors on the board with firm-specific experience (i.e., % outsiders who have been on the same board for more than 3 years)
BUSYNED	% Of busy outsiders on the board, where an outsider is considered to be busy if he or she holds more than 1.5 full time positions (i.e., 1 outside directorship is measured as 0.5 full time position)
BUSYINSNED	% Of busy outsiders on the board with other insurance-based board-level connections
FINED	% Inside (executive) financial experts on the board
Boards-level controls	
SEP	Dummy variable equal to 1 for separate Chairman/CEO, 0 otherwise
CEO_TENURE	CEO tenure in a firm
BSIZE	Board size – the total number of board members
AUD	Dummy variable equal to 1 for an audit committee, 0 otherwise
MEET	Frequency of board interaction – measured as the number of meetings per year
FEM	Gender diversity – % females on the board
NED_TENURE	Average tenure (years) for outside (non-executive) directors
ED_TENURE	Average tenure (years) for inside (executive) directors
Firm-specific controls	
OFORM	Dummy variable equal to 1 for stock insurer, 0 for mutual insurer
CONC	% Shares in issue held by the top-3 shareholders
INSIDE	Dummy variable equal to 1 for managerial share scheme, 0 otherwise
LIST	Dummy variable equal to 1 if an insurer is publicly listed, 0 otherwise
BONUS	Dummy variable equal to 1 for board-level bonus plan, 0 otherwise
P-MIX	Herfindahl index – closer to 1 the more concentrated the product-mix
REINS	Reinsurance ceded divided by gross written premiums
LnSIZE	The nature logarithm of total assets
AGE	The number of years since a firm's establishment
Instrument	
LOCATION	Dummy variable equal to 1 for London-based insurer, 0 otherwise

Note: Financial variables are measured as annual figures.

(1999–2012) represents the earliest and latest years when complete data were available to us at the time the study was carried out. The period of analysis straddles a period of variable macroeconomic conditions (including the 2007/8 global economic crisis) and underwriting cycles (which we control for econometrically using year dummies) during which there were some small changes in the composition of the longitudinal data set (e.g., due to exits from the market). However, using an unbalanced panel design can help minimize any potentially confounding effects in the interpretation of results arising from survivorship bias. Our unbalanced panel sample of 92 firms constitutes roughly one-third of the total number of property-casualty insurers actively operating in the UK over our period of analysis, and comprises a mix of firms of varying size, ownership-type, and product-mix. The size of the panel sample is restricted in that financial (mainly regulatory) firm-level data has to be hand-matched with corporate governance (e.g., board demographic) details that are not always available for many insurance firms. Nonetheless, our mixed sample of insurers account for roughly 70% of total gross market premiums generated in the UK property-casualty insurance market over the period of analysis.

4.2. Model

Using the six performance-related dependent variables defined in Table 1, we estimate the following 2SLS model:

$$PERF_{i,t+1} = \beta_0 + \beta_1 PERF_{i,t} + \beta_2 NEDS_{i,t} + \beta_3 NEDEX_{i,t} + \beta_4 BCONTROLS_{i,t,} + \beta_5 FCONTROLS_{i,t,} + u_{it+1}$$

where subscript i denotes ith firm ($i = 1, \ldots, 1{,}169$), subscript t denotes the tth year ($t = 1999, \ldots, 2012$). $PERF_{it+1}$ is one of our six dependent variables – *MARGIN*, *ROA*, *ROE*, *SOL*, *LR*, and *COR* (as defined in Table 1 below). Current performance measures are included as independent variables as they could influence future financial outcomes (e.g., Wintoki et al., 2012). $NEDS_{it,}$ is a vector of outside director characteristics; $NEDEX_{it}$ is an interaction term between the proportion of outside and inside directors who are financial experts[13]; $BCONTROLS_{it}$ is a vector of six board composition variables and $FCONTROLS_{it,}$ consists of nine firm-specific factors as defined in Table 1 that could influence various aspects of insurers' financial performance. The disturbance term is specified as a two-way error component model ($u_{it} = \mu_i + \lambda_t + \nu_{it}$) comprising unobservable firm-specific effects (μ_i), time-effects (λ_t), and a random disturbance term (ν_{it}). We use the UK location of insurance firms (London versus provincial) as an instrument for board independence. Our reasoning is that close personal ties and social obligations to incumbent board members, and in particular the CEO amongst potential outside

[13] To mitigate multicollinearity the component variables of the interaction term are centered at their mean values before being entered in the regression analysis (e.g., see Jaccard et al., 1990).

directors in the London insurance market could compromise the effectiveness of board independence. However, potential 'cronyism' is in itself unlikely to directly affect the performance of insurance firms. Moreover, to correct for heteroskedasticity and the correlation of errors within firms, parameter estimates derived from our 2SLS modelling procedure are based on robust standard errors clustered at the firm level.

4.3. Board controls

Other governance considerations can affect the level of board independence and financial performance of firms (Knyazeva et al., 2013). Therefore, we control for, and briefly motivate below, six board-level variables that enter our analysis. These board controls are the separation of the Chairman/CEO positions (*SEP*), CEO tenure (*CEO_TENURE*), board size (*BSIZE*), the existence of an audit committee (*AUD*), frequency of board interaction (*MEET*), and gender diversity (*FEM*).

Pi and Timme (1993) suggest that segregating the CEO and Chairman positions (*SEP*) results in a greater congruence between owners' interests and corporate activities, whereas CEO/Chairman duality could exacerbate principal-agent incentive conflicts as control over board-level decisions could reside with a single dominant person. Therefore, segregating the CEO and Chairman positions is likely to improve the financial performance of insurers. Adams et al. (2011) report that CEO tenure (*CEO_TENURE*) can proxy for either human-capital investment or the degree of managerial entrenchment in a firm. However, given the 'high learning curve' associated with leading a firm operating in a technically complex risk-trading industry such as property-casualty insurance, we expect that CEO tenure will be positively related to the financial outcomes. Hardwick et al. (2011) reason that compared with insurers with smaller boards (*BSIZE*), insurance firms with more members (including outsiders) are likely to bring more business knowledge and technical expertise to bear on resource allocation issues, and potentially complex strategic risk decisions. As such, superior financial performance is likely to be increasing in board size. Audit committees (*AUD*) perform many important corporate governance functions, including strengthening the independence of outside directors and providing advice on operational, auditing, financial reporting, and regulatory and fiscal matters (Srinivasan, 2005). Veprauskaite and Adams (2013) note that board effectiveness can be improved by the flow and exchange of information through board meetings (*MEET*). We argue that the frequency of dialogue amongst directors will be particularly important in promoting economic value in such a multifaceted risk business as property-casualty insurance. Adams and Ferreira (2009) note that female directors tend to have better attendance records at board meetings, less obligated to the patronage of a dominant CEO, and allocate more effort to monitoring and controlling agency incentive conflicts than their male colleagues. However, Adams and Ferreira (2009) find that the average effect of gender diversity on firm performance is negative – an observation they attribute, at least in part, to intrusive and over-zealous monitoring by female directors. Accordingly, we predict that female directors (*FEM*) are likely to have a negative impact on the financial performance of insurance firms. We also include the average tenures for outside and executive directors (*NED_TENURE* and *ED_TENURE*) as control variables.

4.4. Firm-specific controls

The board governance-performance relation could also be influenced by the characteristics of insurance firms. Therefore, we further account for the effects of nine firm-specific variables in our analysis, namely: organizational form (*OFORM*), ownership concentration (*CONC*), managerial ownership (*INSIDE*), public listing status (*LIST*), CEO incentive compensation (*BONUS*), product-mix (*P-MIX*), reinsurance (*REINS*), firm size (*lnSIZE*), and firm age (*AGE*).

Regarding *OFORM*, Mayers et al. (1997) postulate that mutual forms of insurance organization are likely to perform financially less well than stock insurance firms because of the inherent difficulties that disparate policyholder-owners face in controlling managerial opportunism and the absence of the discipline of the market for corporate control. Cornelli et al. (2013) add that firms with dominant (block) shareholders (*CONC*) will expect the board of directors to actively monitor and control the decisions of CEOs. Based on their analysis, we expect that a concentrated ownership structure will be positively related to firms' financial performance. Saunders et al. (1990) posit that insider ownership (*INSIDE*) motivates managers to act like risk-taking shareholders thus improving financial performance. Miller's (2011) analysis from the US property-casualty insurance industry further suggests that public exchange traded insurers (*LIST*) are likely to be motivated to outperform other insurers in order to attract inflows of global investment and reduce their market cost of equity. We also include an indicator variable (*BONUS*) in our analysis as such an incentive scheme can directly motivate CEOs to optimize their firm's financial performance (Adams et al., 2011). A diversified product-mix (*P-MIX*) can further produce economies of scale and scope for insurers, enabling them to realize input efficiencies and improve financial results (Mayers et al., 1997). As loss-contingent capital, reinsurance (*REINS*) can improve capital allocation and usage and thus enhance profitability through increased underwriting capacity, lower insolvency risk, and reduced taxes (Adiel, 1996). Reinsurers can also act as effective monitors and controllers of agency problems in primary insurers by limiting excessive and/or ill-considered managerial risk-taking in underwriting and investment decisions, thereby promoting their corporate financial strength and future profitability (Plantin, 2006). Therefore, we predict a direct link between the level of reinsurance and superior financial performance. Financial performance is likely to improve as insurance firms grow bigger as a result of economies of scale and scope, and increased product-market share. This situation can also arise because compared with their smaller counterparts, large insurers are able to retain and attract the managerial talent needed by them to realize operational efficiencies (Hardwick et al., 2011). Therefore, all else equal, we expect firm size (*lnSIZE*) to be positively related to financial performance. What is more, well-established insurers are likely to have competitive advantages over relatively new entrants in terms of acquired product-market knowledge, established distribution networks, and an existing customer-base (Giroud and Mueller, 2010). Therefore, the financial performance of insurers is likely to be increasing in the length of time operating in the market (*AGE*). Definitions of the variables used in this study are given in Table 1.

5. Empirical results

5.1. Summary statistics

Table 2 gives the descriptive statistics for our six performance measures – *MARGIN*, *ROA*, *ROE*, *SOL*, *LR* and *COR* – for the panel period 1999–2012. The first three ratios measure insurers' profitability; *SOL* reflects the solvency position; and *LR* and *COR* capture underwriting performance. The means of these six ratios for our panel are 0.08, 0.11, 0.19, 0.65, 0.80, and 0.89, respectively. These values indicate sound average rates of financial performance over the period of analysis though Table 2 highlights substantial variation across the panel of sample insurance firms. From Table 2 we also observe that on average, 22% of board members (*FINED*) have a professional financial qualification, while nearly 60% of all board

Table 2
Descriptive Statistics.

	N	MEAN	MEDIAN	STD	MIN	MAX
MARGIN	1168	0.08	0.08	0.06	−0.40	0.46
ROA	1168	0.11	0.10	0.07	−0.50	0.42
ROE	1168	0.19	0.20	0.15	−0.62	0.60
SOL	1168	0.65	0.65	0.10	0.40	0.94
LR	1168	0.80	0.84	0.10	0.54	0.99
COR	1168	0.89	0.91	0.09	0.61	1.30
NED	1168	0.59	0.63	0.11	0.00	0.80
FINED	1168	0.22	0.20	0.15	-0.13	0.62
GREYNED	1168	0.40	0.40	0.28	0.00	1.80
FINNED	1168	0.19	0.20	0.12	0.00	0.63
INSNED	1168	0.50	0.50	0.31	0.00	1.00
FIRMNED	1168	0.53	0.57	0.28	0.00	1.00
BUSYNED	1168	0.36	0.34	0.29	0.00	1.00
BUSYINSNED	1168	0.52	1.00	0.50	0.00	1.00
SEP	1168	0.87	1.00	0.34	0.00	1.00
CEO_TENURE	1168	3.75	3.00	2.25	1.00	14.00
BSIZE	1168	7.57	8.00	2.24	3.00	13.00
AUD	1168	0.75	1.00	0.43	0.00	1.00
MEET	1168	11.57	12.00	5.25	2.00	28.00
FEM	1168	0.03	0.00	0.07	0.00	0.40
NED_TENURE	1168	3.98	4.00	1.12	1.00	7.00
ED_TENURE	1168	5.03	5.00	0.96	2.00	8.00
BONUS	1168	0.80	1.00	0.40	0.00	1.00
OFORM	1168	0.90	1.00	0.31	0.00	1.00
CONC	1168	0.66	0.70	0.30	0.00	1.00
INSIDE	1168	0.36	0.00	0.48	0.00	1.00
LIST	1168	0.18	0.00	0.39	0.00	1.00
P-MIX	1168	0.58	0.58	0.22	0.13	1.00
REINS	1168	0.31	0.31	0.07	0.03	0.75
lnSIZE	1168	4.57	3.95	1.68	2.30	10.00
AGE	1168	46.46	33.00	33.07	1.00	133.00
LOCATION	1168	0.59	1.00	0.49	0.00	1.00

Note: This table presents the mean, median, standard deviation, minimum and maximum values for our dependent and independent variables for all available sample years from 1999 to 2012. All variables are given in Table 1. For the full panel the raw (unlogged) value of firm size (*SIZE*) is £655 million; the mean value of equity is £25 million; average earnings before interest and tax (EBITA) is £61 million; and average annual gross premiums is £700 million.

members are outsiders (*NED*). This latter observation reflects UK corporate governance guidelines (e.g., the 2003 Higgs Report) that recommend that at least half of board members should be outside directors. Our observation that a majority of board members are outsiders is also compatible with Miller's (2011) research from the US property-casualty insurance industry. Turning to the particular characteristics of outside directors, Table 2 (panel A) indicates that on average, board membership consists of 40% 'grey' outsiders (*GREYNED*); 19% are financial experts (*FINNED*); 50% of outside directors have insurance industry experience (e.g., as former(re)insurance senior executives) (*INSNED*); 53% of outsiders have been with the board for three or more years (*FIRMNED*); 36% of outsiders are deemed 'busy' (*BUSYNED*); and 52% of outside directors with other insurance industry-related board seats are deemed to be over-committed (*BUSYINSNED*). These summary statistics thus reflect the financial and technical nature of insurance.

Table 2 further reports summary statistics for our control variables. Consistent with UK corporate governance guidelines (e.g., the 1992, Cadbury Report), the CEO does not hold the position of Chairman (*SEP*) in 87% of our firm-year observations. However, this feature of our UK sample is opposite to the US corporate sector where most firms (e.g., 74% in the case of Miller (2011)) tend not to separate the CEO and Chairman positions. Average CEO tenure (*CEO_TENURE*) for our sample period is about four years, which is slightly lower than the average five years reported in O'Sullivan and Diacon (1999) survey of corporate governance practices in the UK life insurance sector. The mean value for the number of directors on the board (*BSIZE*) is around eight members, while a majority (75%) of the insurance firms in our panel sample have audit committees (*AUD*). We also note that the average board size for the insurance firms in our data set is about optimal in terms of monitoring and control effectiveness according to Yermack (1996). Overall, our findings suggest consistency in the board structure of UK insurance firms over time. The average number of board meetings per year (*MEET*) is approximately 12 per annum, which is more than the mean figure of nine annual meetings reported in Veprauskaite and Adams (2013) for publicly listed industrial firms operating in the UK. This higher average rate of frequency of interaction amongst directors in this study hints at a greater need for board-level dialogue and information exchange in insurers relative to firms operating in other less specialist industries. The average proportion of females on the boards of our panel sample of insurance firms (*FEM*) is very low (at 3%); but this proportion rises from 1% in 1999 to 8% in 2012 (see panel B). This pattern of low female representation on the boards of UK insurers is nevertheless closely mirrored in UK plcs over the same period (Gregory-Smith et al., 2014). Average tenures for outside (non-executive) and (inside) executive directors for our panel sample period are about 4 and 5 years, respectively. In addition, on average 80% of our firm-year observations have earnings-related bonus plans for CEOs (*BONUS*) but only just over a third (36%) specifically have equity ownership schemes as part of inside executive compensation (*INSIDE*). For our sample of firm/year observations, 89% relate to stock insurers (*OFORM*), roughly two-thirds have dominant shareholders (*CONC*), 18% are publicly listed firms (*LIST*), with the average length of time of operating in the UK (*AGE*) being approximately 47 years. The mean panel sample values for product-mix (*P-MIX*), reinsurance (*REINS*) and firm size (*LnSIZE*) are 0.58, 0.31, and 4.57, respectively. Additionally, about 60% of the insurers in our data set are London-based.

A within panel time trend analysis (untabulated) indicates that the proportion of financial executives grew slightly from 20% in 1999 to 22% in 2012. The increase is particularly noticeable with regard to board outsiders where the proportion grew from 52% in 1999 to 66% in 2012. This points to a modest rise in independent board-level financial scrutiny and advice over our sample period in line with developments in corporate governance guidelines, the introduction by the International Accounting Standards Board (2005) of IFRS 4: Insurance Contracts, and regulatory reforms such as Solvency II.[14] We also observe percentage increases for 'grey' outsiders (from 35% to 45%), financial outside directors (from 18% to 21%), insurance industry-experienced outside board members (from 49% to 52%), and outsiders with firm-specific experience (from 51% to 55%). Although the proportion of heavily committed outside directors on the board remains fairly constant over time, the proportion of 'busy' outsiders with other insurance-related board-level connections increased dramatically from 34% to 67% between 1999 and 2012. This suggests a growing endogenous demand for insurance knowledge on boards over our period of analysis in line with growing global competition and regulatory developments (Berry-Stölzle et al., 2013).

[14] IFRS 4 covers, amongst other things, the recognition and treatment of accounting items (e.g., reserves), the valuation of assets and liabilities, and in particular, added disclosures (e.g., regarding risk management policies). Sensitivity tests (unreported) indicated that IFRS 4 had a statistically insignificant impact on board composition and financial performance amongst our panel sample of UK insurance firms. The insignificant effects of corporate governance developments during our period of analysis (e.g., the Higgs Report, 2003) could also reflect that such initiatives are targeted primarily at publicly listed firms that comprise a minority of our panel sample. Solvency II relates to the European Union's (EU) new insurance company capital and risk management rules that will be implemented for European insurers on 1 January 2016. Given its regulatory and financial importance Solvency II has attracted the attention of the boards of UK insurers since 2007/8 when the new proposals were first reported in a draft EU Insurance Framework Directive.

Table 3
Performance measures conditional on the level of proportion of directors.

	Obs.	*MARGIN*	*ROA*	*ROE*	*SOL*	*LR*	*COR*
Panel A: By NED							
Low: *NED* ⩽ Mean	526	0.06	0.09	0.18	0.69	0.83	0.92
High: *NED* > Mean	642	0.09	0.12	0.20	0.62	0.78	0.87
p-value (*F*-test) for the difference		0	0	0.01	0	0	0
Panel B: By FINED							
Low: *FINED* < Mean	609	0.07	0.10	0.17	0.68	0.83	0.91
High: *FINED* > Mean	559	0.09	0.12	0.21	0.62	0.78	0.87
p-value (*F*-test) for the difference		0	0	0	0	0	0
Panel C: By GREYNED							
Low: *GREYNED* < Mean	595	0.06	0.09	0.18	0.70	0.83	0.92
High: *GREYNED* > Mean	573	0.10	0.12	0.20	0.60	0.77	0.86
p-value (*F*-test) for the difference		0	0	0.07	0	0	0
Panel D: By FINNED							
Low: *FINNED* < Mean	592	0.07	0.10	0.19	0.67	0.82	0.90
High: *FINNED* > Mean	576	0.09	0.12	0.18	0.64	0.79	0.87
p-value (*F*-test) for the difference		0	0	0.50	0	0	0
Panel E: By INSNED							
Low: *INSNED* < Mean	546	0.06	0.09	0.17	0.69	0.83	0.91
High: *INSNED* > Mean	622	0.10	0.12	0.20	0.62	0.78	0.87
p-value (*F*-test) for the difference		0	0	0	0	0	0
Panel F: By FIRMNED							
Low: *FIRMNED* < Mean	578	0.06	0.10	0.19	0.68	0.82	0.91
High: *FIRMNED* > Mean	590	0.10	0.11	0.18	0.63	0.79	0.87
p-value (*F*-test) for the difference		0	0.027	0.31	0	0	0
Panel G: By BUSYNED							
Low: *BUSYNED* < Mean	670	0.09	0.11	0.20	0.64	0.79	0.87
High: *BUSYNED* > Mean	498	0.07	0.09	0.17	0.68	0.83	0.92
p-value (*F*-test) for the difference		0	0	0	0	0	0
Panel H: By BUSYINSNED							
Low: *BUSYINSNED* < Mean	556	0.07	0.10	0.19	0.68	0.83	0.91
High: *BUSYINSNED* > Mean	612	0.09	0.11	0.19	0.63	0.78	0.87
p-value (*F*-test) for the difference		0	0	0.57	0	0	0

Note: For each year, we group the sample into low and high categories depending on whether the measure for the level of proportion of directors is below or above its mean value. The mean value for each performance measure is reported for each defined category. The ANOVA test is then conducted to test for statistically significant differences in mean values between low and high groups. The *F*-statistics' *p*-values are 2-tail. Variable definitions are given in Table 1. A firm's better financial performance is captured by larger values for *MARGIN*, *ROA*, *ROE* and smaller values for *SOL*, *LR* and *COR*.

In Table 3, we conduct an analysis of variance (ANOVA) to test whether our six financial performance measures differ significantly according to the various indicators of board director characteristics used in this study. We categorize firm/year observations into low and high groups based upon whether the measure of the relevant director characteristic is below or above its mean value. Panel A of Table 3 shows that a high (above-mean) aggregate level of NEDs on the board has larger *MARGIN*, *ROA*, and *ROE*, and lower *SOL*, *LR* and *COR*, compared with board-rooms with low (below-mean) proportion of NEDs. The F-statistics indicate that differences between the mean values of the high and low categories are statistically significant (at $p < 0.01$, 2-tail). A similar pattern is also observed in Panels B–H of Table 3 for the low and high levels of financial executives, and other outside directors' traits. However, for *FINNED*, *FIRMNED*, and *BUSYINSNED*, the differences for ROE are not statistically significant.

The correlation analysis in panel A of Table 4 indicates that our profitability measures *MARGIN*, *ROA* and *ROE* are negatively correlated with the solvency and underwriting performance measures *SOL*, *LR* and *COR*. This is consistent with our intuition that more profitable firms operating in the property-casualty sector of insurance markets usually have lower leverage, indicating less default risk for policyholders. Also, more profitable insurers tend to have lower than expected claims and operating costs. Panel A also shows that *NED*, *FINED*, *GREYNED*, *FINNED*, *INSNED* and *FIRMNED* are positively correlated with the profitability measures *MARGIN*, *ROA* and *ROE*, and negatively correlated with the solvency and underwriting performance measures *SOL*, *LR* and *COR* (the one exception being the correlation between *FINNED* and *ROE*). On the other hand, *BUSYNED* is negatively associated with the three profitability measures and positively correlated with the solvency and underwriting performance measures. However, when overcommitted outsiders have other insurance industry connections (*BUSYINSNED*), their presence on the board tends to be positively linked with superior financial performance. These bivariate results, along with those reported in Table 3, support our pre-stated hypotheses. Panel B of Table 4 presents the correlation matrix between directors' characteristics. Many of them are significantly correlated with each other, but most associations are moderate. Further, we derive variance inflation factors (VIFs) for all of our independent variables; all VIF values are below 10 suggesting that bias due to multicollinearity is unlikely to be problematical when interpreting our empirical results.[15] Panel C of Table 4 gives the correlation coefficient matrix between directors' characteristics and key firm characteristics. It shows that in general, (each type of) outside (non-executive) directors are more prevalent in publicly listed, large, more established companies with managerial share scheme.

5.2. Multivariate results

Table 5 reports the results of our multivariate analysis of the relation between directors' characteristics and firm performance. To deal with endogeneity, we adopt the 2SLS approach by

[15] VIFs are computed as $1(1 - R^2)$, where R^2 is derived from regressing individual independent variables on all other independent variables (Kennedy, 2003, p. 213).

Table 4
Panel A: correlation matrix between dependent variables and director characteristics.

	MARGIN	*ROA*	*ROE*	*SOL*	*LR*	*COR*
ROA	0.46***					
ROE	0.41***	0.77***				
SOL	−0.42***	−0.33***	−0.22***			
LR	−0.47***	−0.44***	−0.34***	0.50***		
COR	−0.47***	−0.45***	−0.34***	0.48***	0.92***	
NED	0.32***	0.31***	0.20***	−0.40***	−0.30***	−0.29***
FINED	0.22***	0.17***	0.16***	−0.33***	−0.31***	−0.30***
GREYNED	0.40***	0.25***	0.14***	−0.53***	−0.36***	−0.34***
FINNED	0.20***	0.19***	0.03	−0.24***	−0.23***	−0.20***
INSNED	0.39***	0.19***	0.19***	−0.46***	−0.27***	−0.27***
FIRMNED	0.36***	0.14***	0.09***	−0.37***	−0.21***	−0.22***
BUSYNED	−0.28***	−0.18***	−0.20***	0.32***	0.24***	0.26***
BUSYINSNED	0.20***	0.12***	−0.02	−0.28***	−0.23***	−0.22***

Panel B: Correlation matrix for director characteristics

	NED	*FINED*	*GREYNED*	*FINNED*	*INSNED*	*FIRMNED*	*BUSYNED*
FINED	0.09***						
GREYNED	0.44***	0.11***					
FINNED	0.31***	−0.48***	0.31***				
INSNED	0.25***	0.13***	0.63***	0.18***			
FIRMNED	0.20***	0.08***	0.53***	0.15***	0.65***		
BUSYNED	−0.20***	−0.01	−0.43***	−0.19***	−0.49***	−0.60***	
BUSYINSNED	0.36***	0.01	0.25***	0.18***	0.06**	0.03	−0.06**

Panel C: Correlation matrix between director characteristics and key firm characteristics

	OFORM	*CONC*	*INSIDE*	*LIST*	*P-MIX*	*REINS*	*lnSIZE*	*AGE*
NED	−0.09***	−0.19***	0.11***	0.18***	−0.16***	−0.22***	0.19***	0.13***
FINED	0.05	0.08***	0.09***	0.10***	−0.05*	−0.04	0.17***	0.11***
GREYNED	−0.09***	−0.09***	0.21***	0.22***	−0.20***	−0.17***	0.34***	0.00
FINNED	−0.20***	−0.27***	0.10***	0.16***	−0.10***	−0.22***	0.13***	0.11***
INSNED	−0.03	0.02	0.18***	0.08***	−0.05*	0.01	0.26***	0.04
FIRMNED	−0.01	0.06**	0.16***	0.07***	0.00	0.03	0.22***	−0.09***
BUSYNED	−0.10***	−0.12***	−0.01	0.05*	0.06**	−0.13***	0.00	0.08***
BUSYINSNED	−0.14***	−0.11***	0.24***	0.26***	−0.09***	−0.22***	0.22***	0.05*

Note: This table presents Pearson correlation coefficients for the matrix between dependent variables and director characteristics in panel A, the matrix for director characteristics in Panel B, and the matrix between director characteristics and key firm characteristics in Panel C. ***,**,* indicate statistical significance at the 1%, 5% and10% levels respectively in 2-tail tests. Variable definitions are given in Table 1. A firm's better financial performance is captured by larger values for *MARGIN*, *ROA*, *ROE* and smaller values for *SOL*, *LR* and *COR*.

'instrumenting' board independence (*NED*) on location (London-based insurance firms versus provincial insurers) and all other independent variables in our regression analysis. Analysis for the first-stage 2SLS regression results revealed that our instrumental variable is inversely related to board independence and statistically significant (at $p \leqslant 0.05$ 1-tail) in tests of both current and future performance. These tests therefore support our choice of insurer location as an instrumental variable.

Our results for the second-stage regressions indicate that the coefficient estimate for *NED* is not statistically significant for any of our six selected financial performance indicators, contrary to Hypothesis 1. However, financial outsiders (*FINNED*) and financial inside executives (*FINED*) are positively linked with superior performance. In economic (percentage point) terms, and holding other factors constant, a one standard deviation (from Table 2, 12%) increase in *FINNED* predicts a 0.4% to 0.5% increase in our accounting earnings-based measures, and a 0.5% reduction in leverage and a 1.0–1.1% improvement in underwriting performance thereby supporting Hypothesis 3. Similarly, a single standard deviation (from Table 2, 15%) increase in *FINED* is associated with a 0.5% to 0.64% increase in our profitability indicators, a 0.8% decline in leverage and a 1–2% improvement in underwriting results.[16] These observations are also consistent with the view expressed by recent research (e.g., Dey, 2008) that it is the functioning of board independence rather than its composition that has the most significant impact on a firm's financial outcomes. On the other hand, contrary to Hypothesis 7 the interaction term between *FINNED* and *FINED* is not significantly related to superior performance in general, indicating no evident professional complementarities between inside and outside financial experts.

In line with Hypotheses 2 and 4, we find that 'grey' outside directors (*GREYNED*) and board outsiders with insurance experience (*INSNED*) have some beneficial financial impacts in that *GREYNED* is negatively related to *SOL* (at $p < 0.05$, 1 tail), and *INSNED* is positively linked with *MARGIN* (at $p < 0.05$, 1 tail). Therefore, in percentage point terms, a one standard deviation (from Table 2, 0.28) increase in *GREYNED* is associated with a 0.56% decrease in *SOL*, and a single standard deviation (from Table 2, 0.31) increase in *INSNED* is associated with a 0.31% increase in *MARGIN*. However, we do not observe any statistically significant impact for *GREYNED* and *INSNED* on other performance measures. Our observations with regard to *GREYNED* and *INSNED* accord with the views of Raheja (2005), Borokhovich et al. (2014), and others also perceive that the incentives for appointing 'impure' outside directors is complex and obtuse. For example, 'grey' or industry-related directors could be elected to boards to improve certain aspects of firm performance such as increased profitability that simultaneously benefit the compensation plans of the CEO and other inside

[16] As in Masulis and Mobbs (2014), the economic significance is computed as the standard deviation of the independent variable from Table 2 multiplied by the relevant coefficient estimate from Table 5.

Table 5
The impact of director characteristics on current firm performance.

Variables	First stage regression	Second stage regression							
	NED	Expected sign	*MARGIN*	*ROA*	*ROE*	Expected sign	*SOL*	*LR*	*COR*
INTERCEPT	0.42***		−0.04	−0.01	−0.03		0.01	0.21***	0.22**
	(7.64)		(−0.77)	(−0.07)	(−0.24)		(0.18)	(2.66)	(2.54)
L.PER			0.81***	0.74***	0.81***		0.85***	0.79***	0.79***
			(19.32)	(12.12)	(17.61)		(32.13)	(37.49)	(37.63)
NED		+	0.02	0.05	0.02	–	0.12	0.00	0.02
			(0.22)	(0.32)	(0.09)		(0.74)	(0.01)	(0.14)
LOCATION	−0.02**								
	(−1.65)								
FINED	0.03	+	0.03***	0.04***	0.04**	–	−0.04***	−0.10***	−0.09***
	(0.64)		(2.71)	(2.77)	(1.65)		(−3.40)	(−7.01)	(−5.27)
FINNED	−0.02	+	0.03***	0.03***	0.04**	–	−0.02**	−0.10***	−0.08***
	(−0.43)		(3.73)	(2.25)	(1.68)		(−1.78)	(−5.24)	(−4.14)
FINNED × FINED	−0.16	+	0.05**	−0.02	−0.11	–	−0.02	−0.02	−0.03
	(−0.63)		(1.67)	(−0.34)	(−1.08)		(−0.37)	(−0.27)	(−0.35)
GREYNED	0.08***	+	−0.00	0.00	0.01	–	−0.02*	−0.01	−0.01
	(3.31)		(−0.36)	(0.28)	(0.54)		(−1.56)	(−0.69)	(−0.83)
INSNED	0.02	+	0.01**	−0.00	0.01	–	−0.01	0.01	0.01
	(1.26)		(1.96)	(−0.48)	(0.46)		(−0.82)	(0.84)	(0.86)
FIRMNED	−0.03	+	0.01**	−0.00	−0.02*	–	−0.01	−0.00	−0.00
	(−1.09)		(2.27)	(−0.59)	(−1.52)		(−0.74)	(−0.23)	(−0.42)
BUSYNED	−0.03	–	−0.00	−0.01*	−0.02*	+	0.01**	0.01*	0.01**
	(−1.22)		(−0.16)	(−1.30)	(−1.40)		(1.86)	(1.51)	(1.78)
BUSYINSNED	0.01	+	0.00	−0.00	−0.01**	–	−0.00	−0.01**	−0.00
	(1.15)		(0.36)	(−0.94)	(−1.72)		(−1.24)	(−1.72)	(−1.12)
SEP	0.07***		−0.00	−0.01	−0.02		−0.01	0.00	0.00
	(3.66)		(−0.28)	(−0.44)	(−0.72)		(−0.73)	(0.01)	(0.00)
CEO_TENURE	−0.00		−0.00	−0.00*	−0.00		0.00	0.00	0.00
	(−0.27)		(−0.34)	(−1.56)	(−1.15)		(0.65)	(0.58)	(0.95)
BSIZE	0.01***		0.00*	0.00*	0.00		−0.00	0.00	0.00
	(2.35)		(1.55)	(1.37)	(0.86)		(−0.87)	(0.67)	(0.22)
AUD	0.01		0.00	0.00	0.00		0.00	0.00	0.00
	(0.48)		(0.94)	(0.57)	(0.42)		(0.59)	(0.34)	(0.02)
MEET	0.01***		−0.00	−0.00	0.00		−0.00	0.00	0.00
	(3.17)		(−0.70)	(−0.26)	(0.33)		(−0.82)	(0.60)	(0.41)
FEM	−0.03		−0.00	0.01	0.04**		0.01	0.01	0.00
	(−0.51)		(−0.35)	(0.71)	(1.76)		(0.36)	(0.43)	(0.17)
BONUS	0.01		−0.01**	−0.00	0.00		0.00	0.00	0.00
	(0.45)		(−1.72)	(−0.79)	(0.45)		(0.50)	(0.52)	(0.74)
OFORM	0.03		0.01*	−0.00	0.04***		−0.00	0.01	0.00
	(0.92)		(1.55)	(−0.49)	(3.06)		(−0.02)	(0.84)	(0.48)
CONC	−0.02		−0.01	−0.01*	−0.01		0.02***	−0.00	0.00
	(−0.88)		(−1.10)	(−1.50)	(−0.51)		(2.60)	(−0.20)	(0.26)
INSIDE	0.01		−0.00	0.00	0.01		−0.00	−0.00	0.00
	(0.47)		(−0.33)	(1.11)	(1.06)		(−1.22)	(−0.15)	(0.04)
LIST	0.02		−0.00	0.00	0.01		−0.01*	−0.00	−0.00
	(0.95)		(−0.35)	(0.07)	(1.21)		(−1.55)	(−0.54)	(−0.34)
P-MIX	0.01		0.01	0.01	0.01		0.00	0.00	−0.00
	(0.47)		(1.06)	(0.69)	(1.08)		(0.43)	(0.24)	(−0.54)
REINS	−0.18***		0.01	0.02	0.05		0.07***	0.02	0.02
	(−2.71)		(0.59)	(0.47)	(0.67)		(2.48)	(0.55)	(0.68)
lnSIZE	−0.02***		0.00	−0.00*	−0.01**		0.00*	0.00	0.00
	(−2.98)		(0.48)	(−1.42)	(−1.72)		(1.50)	(0.18)	(0.18)
AGE	−0.00*		0.00	0.00	0.00		0.00	−0.00	−0.00
	(−1.37)		(1.24)	(0.81)	(0.34)		(1.13)	(−0.49)	(−0.96)
NED_TENURE	0.01***		−0.00	−0.00	−0.00		0.00	−0.00	−0.00
	(3.08)		(−0.47)	(−0.88)	(−0.64)		(0.11)	(−0.50)	(−0.04)
ED_TENURE	−0.01*		0.00	0.00	0.00		0.00	−0.00**	−0.00**
	(−1.35)		(0.03)	(0.64)	(0.61)		(1.18)	(−1.93)	(−1.72)
Year effects	Yes		Yes	Yes	Yes		Yes	Yes	Yes
Observations	1076		1076	1076	1076		1076	1076	1076
Adjusted R−squared	0.549		0.747	0.728	0.813		0.863	0.828	0.800

Note: This table reports the 2SLS estimates by instrumenting board independence (*NED*) on location (London-based versus others) and other exogenous independent variables in our regressions. Variable definitions are given in Table 1. A firm's better financial performance is captured by larger values for *MARGIN*, *ROA*, *ROE* and smaller values for *SOL*, *LR* and *COR*. The *t*-statistics computed from firm clustered standard errors are reported in parentheses, while ***,**,* indicate statistical significance at the 1%, 5% and10% levels respectively. The significance levels for the independent variables are 1-tail tests, and for the interaction terms 2-tail tests. To reduce the effects of multicollinearity the component variables of the interaction terms are centered at their mean values before being entered in the regression analysis following Jaccard et al. (1990). *L.PER* is the lagged dependent variables (*MARGIN*, *ROA*, *ROE*, *SOL*, *LR* and *COR*). Expected signs are given for our primary variables only.

directors as well as reducing the risk (and costs) of regulatory intervention. In terms of *FIRMNED* (Hypothesis 5), only the coefficient estimate for *MARGIN* is statistically significant and 'correctly' signed (at $p \leqslant 0.01$, 1-tail). Therefore, for the most part firm-specific board-level knowledge does not enhance financial performance. Instead, long tenure on the board could engender inertia amongst outside directors. It could also indicate that incumbent outside directors are less familiar than new appointments with emergent external (e.g., regulatory) issues that have economic consequences for insurance firms. In addition, in

Table 6
The impact of changes in director characteristics on changes in firm performance.

Variables	Expected sign	(1) *ΔMARGIN*	(2) *ΔROA*	(3) *ΔROE*	Expected sign	(4) *ΔSOL*	(5) *ΔLR*	(6) *ΔCOR*
INTERCEPT		0.01	0.02**	0.02		−0.02	0.00	−0.00
		(0.58)	(2.09)	(1.02)		(−1.40)	(0.16)	(−0.15)
L.ΔPER		−0.19**	−0.05	−0.14***		−0.13***	−0.09***	−0.17***
		(−1.99)	(−0.61)	(−3.31)		(−4.27)	(−3.04)	(−4.33)
ΔNED	+	0.00	0.03	0.06*	−	−0.02	−0.03	−0.02
		(0.14)	(1.08)	(1.39)		(−1.14)	(−0.80)	(−0.50)
ΔFINED	+	0.05***	0.06***	0.08**	−	−0.02	−0.13***	−0.11***
		(2.46)	(2.40)	(1.81)		(−0.89)	(−3.16)	(−2.52)
ΔFINNED	+	0.04**	0.03	0.05	−	−0.01	−0.10**	−0.09**
		(1.94)	(1.09)	(0.91)		(−0.30)	(−2.27)	(−1.95)
ΔFINED x ΔFINNED	+	−0.04	0.00	0.18*	−	−0.03	−0.13	−0.10
		(−0.58)	(0.04)	(1.68)		(−0.43)	(−1.33)	(−1.22)
ΔGREYNED	+	0.01	0.00	−0.02	−	0.01	−0.01	−0.01
		(0.63)	(0.11)	(−0.64)		(0.50)	(−0.73)	(−0.80)
ΔINSNED	+	0.00	−0.02	0.01	−	−0.00	0.04***	0.04***
		(0.16)	(−0.97)	(0.33)		(−0.26)	(2.68)	(2.53)
ΔFIRMNED	+	0.00	−0.01	−0.01	−	0.00	−0.03	−0.02
		(0.04)	(−0.72)	(−0.38)		(0.15)	(−1.08)	(−0.94)
ΔBUSYNED	−	0.00	0.00	0.01	+	0.00	0.01	−0.02
		(0.06)	(0.18)	(0.49)		(0.26)	(0.53)	(−0.63)
ΔBUSYINSNED	+	0.00	−0.02**	−0.02	−	−0.01**	0.00	0.00
		(0.04)	(−1.96)	(−1.24)		(−1.88)	(0.18)	(0.21)
SEP		0.01**	−0.00	−0.00		0.00	0.00	0.00
		(1.94)	(−0.18)	(−0.17)		(0.38)	(1.09)	(1.10)
CEO_TENURE		−0.00	−0.00*	−0.00*		0.00	0.00	0.00
		(−0.56)	(−1.36)	(−1.36)		(0.47)	(0.25)	(0.36)
BSIZE		0.00*	−0.00	−0.00		0.00	0.00	0.00
		(1.37)	(−0.08)	(−0.16)		(1.26)	(0.87)	(0.54)
AUD		0.00**	0.00	0.00		−0.00**	−0.00*	−0.00*
		(1.87)	(0.14)	(0.88)		(−1.68)	(−1.56)	(−1.45)
MEET		−0.00*	0.00	0.00		0.00**	0.00	0.00*
		(−1.29)	(0.48)	(0.49)		(1.77)	(0.91)	(1.42)
FEM		0.01	0.03**	0.04**		−0.01	0.01	0.01
		(0.50)	(2.12)	(1.73)		(−0.94)	(0.61)	(0.54)
BONUS		−0.01***	−0.01***	−0.02***		−0.00	−0.00	0.00
		(−3.62)	(−2.83)	(−2.76)		(−0.12)	(−0.38)	(0.22)
OFORM		0.01***	0.02***	0.02**		0.00	0.00	−0.00
		(2.72)	(2.94)	(1.90)		(0.32)	(0.13)	(−0.33)
CONC		−0.01*	−0.00	−0.00		0.01**	0.00	0.00
		(−1.43)	(−0.36)	(−0.10)		(1.85)	(0.38)	(0.92)
INSIDE		−0.00*	−0.00	−0.01		−0.00	−0.00	−0.00
		(−1.30)	(−0.67)	(−1.27)		(−0.64)	(−0.95)	(−0.21)
LIST		0.00	−0.00	−0.00		−0.00	0.00	0.00
		(0.55)	(−0.92)	(−0.25)		(−1.03)	(0.19)	(0.01)
P-MIX		0.00	−0.01	−0.00		0.00	−0.00	−0.00
		(0.23)	(−1.16)	(−0.04)		(0.40)	(−0.07)	(−0.60)
REINS		0.00	−0.00	0.01		−0.00	−0.00	−0.00
		(0.00)	(−0.07)	(0.25)		(−0.10)	(−0.28)	(−0.04)
lnSIZE		−0.00	−0.00	−0.00		0.00	−0.00	−0.00
		(−0.31)	(−0.85)	(−0.14)		(0.46)	(−0.88)	(−1.26)
AGE		0.00	0.00	0.00		−0.00	−0.00	−0.00
		(1.01)	(0.65)	(0.99)		(−1.26)	(−0.42)	(−1.00)
NED_TENURE		−0.00	0.00	−0.00		0.00	−0.00	0.00
		(−1.00)	(0.59)	(−0.97)		(0.77)	(−0.95)	(0.05)
ED_TENURE		−0.00	−0.00	0.00		−0.00	−0.00	−0.00
		(−0.86)	(−0.91)	(0.72)		(−0.09)	(−0.41)	(−0.56)
Year effects		Yes	Yes	Yes		Yes	Yes	Yes
Observations		984	984	984		984	984	984
Adjusted R-squared		0.0675	0.0342	0.0368		0.0149	0.285	0.277

Note: The dependent variables are the changes of our financial performance measures from year $t-1$ to year t. The independent variables include the change of each financial performance measure from year $t-2$ to year t (*L.ΔPER*), the changes of director characteristic measures from year $t-1$ to year t, and all of our control variables. Variable definitions are given in Table 1. A firm's better financial performance is captured by larger values for *MARGIN*, *ROA*, *ROE* and smaller values for *SOL*, *LR* and *COR*. The *t*-statistics computed from firm clustered standard errors are reported in parentheses, while ***,**,* indicate statistical significance at the 1%, 5% and10% levels respectively. The significance levels for the independent variables are 1-tail tests, and for the interaction terms 2-tail tests. To reduce the effects of multicollinearity the component variables of the interaction terms are centered at their mean values before being entered in the regression analysis following Jaccard et al. (1990).

accordance with Hypothesis 6, the variable *BUSYNEDS* is inversely and significantly linked with superior financial performance in all cases except for *MARGIN*. Consistent with Cashman et al. (2012), our results therefore suggest that in technically complex and information-sensitive sectors, such as insurance, over-committed outside directors are likely to have a negative impact of firm performance. For the most part, the estimated coefficients for our firm-specific control variables are insignificant. Statistically significant firm-specific control variables tend to be size-related – for example, insurers with bigger boards tend to have moderately higher profit margins (at $p \leqslant 0.10$, 1 tail), while larger firms have unexpectedly negative impacts on *ROA*, *ROE* and *SOL* (at $p \leqslant 0.10$,

Table 7
Two-stage least square regressions of changes in performance on indicators for firms with board structure changes.

Panel A: first stage – logit regressions

	Indicators for firms with Increases in the following board characteristics						
Variables	(1) *NED*	(2) *FINED*	(3) *FINNED*	(4) *GREYNED*	(5) *INSNED*	(6) *FIRMNED*	(7) *BUSYNED*
INTERCEPT	−3.98***	−3.54***	−3.10***	−1.17	−1.44**	−1.67***	−3.32***
	(−6.00)	(−6.58)	(−3.88)	(−1.59)	(−2.18)	(−3.58)	(−5.45)
NED	5.35***						
	(6.09)						
FINED		2.37***					
		(6.63)					
FINNED			3.77***				
			(7.49)				
GREYNED				0.44*			
				(1.90)			
INSNED					−0.05		
					(−0.24)		
FIRMNED						0.12	
						(0.62)	
BUSYNED							0.94***
							(4.20)
SEP	−0.38*	0.17	−0.29	0.06	−0.10	0.01	0.82**
	(−1.92)	(0.96)	(−1.12)	(0.35)	(−0.32)	(0.05)	(2.43)
CEO_TENURE	−0.05**	−0.02	0.01	−0.07**	0.00	−0.02	−0.00
	(−2.33)	(−0.73)	(0.30)	(−2.39)	(0.15)	(−0.98)	(−0.19)
BSIZE	0.07**	0.07**	0.03	0.10***	0.06*	0.08*	0.13***
	(2.33)	(2.05)	(0.74)	(2.70)	(1.68)	(1.95)	(4.02)
AUD	0.07	0.59***	0.22	0.24	0.30	−0.07	0.63***
	(0.49)	(3.45)	(1.22)	(1.14)	(1.44)	(−0.49)	(2.99)
MEET	−0.06***	−0.04***	−0.05**	−0.03	−0.00	0.02	−0.05***
	(−3.32)	(−2.67)	(−2.38)	(−1.41)	(−0.24)	(1.13)	(−2.79)
FEM	0.53	0.58	1.65**	−0.64	−0.73	−0.57	−0.75
	(0.64)	(0.76)	(2.10)	(−0.78)	(−0.78)	(−0.81)	(−0.75)
BONUS	0.00	0.14	−0.01	−0.08	0.27	0.06	0.17
	(0.01)	(0.75)	(−0.02)	(−0.38)	(0.90)	(0.25)	(0.59)
OFORM	−0.30	−0.30	0.58	0.03	−0.27	0.08	−0.66**
	(−0.96)	(−0.97)	(1.61)	(0.11)	(−0.81)	(0.30)	(−2.06)
CONC	−0.05	−0.05	−0.35	−0.00	0.03	−0.27	0.31
	(−0.20)	(−0.17)	(−1.40)	(−0.01)	(0.11)	(−1.25)	(1.55)
INSIDE	0.07	0.19	0.11	−0.16	−0.12	0.02	0.05
	(0.50)	(1.39)	(0.75)	(−1.31)	(−0.84)	(0.13)	(0.36)
LIST	−0.16	−0.34*	−0.29	−0.05	0.09	0.26*	−0.26*
	(−0.73)	(−1.91)	(−0.97)	(−0.31)	(0.43)	(1.74)	(−1.91)
P-MIX	0.04	0.23	−0.21	0.01	0.25	−0.27	0.05
	(0.18)	(0.80)	(−0.56)	(0.04)	(0.81)	(−0.95)	(0.23)
REINS	2.35***	0.23	0.08	−1.88	−0.57	1.48***	−0.27
	(3.64)	(0.36)	(0.09)	(−1.50)	(−0.57)	(2.64)	(−0.50)
lnSIZE	0.11*	0.01	0.04	0.01	0.01	−0.02	0.07*
	(1.84)	(0.15)	(0.56)	(0.20)	(0.21)	(−0.40)	(1.65)
AGE	−0.00	−0.00	0.00	0.00	0.00	−0.00	−0.00
	(−0.10)	(−0.02)	(0.18)	(0.19)	(0.66)	(−0.51)	(−0.83)
NED_TENURE	−0.17***	−0.03	0.04	0.07	0.05	−0.07	−0.07
	(−2.96)	(−0.44)	(0.57)	(1.20)	(0.80)	(−1.11)	(−1.09)
ED_TENURE	−0.04	0.17***	0.09	−0.12*	−0.18**	−0.08	0.06
	(−0.71)	(2.72)	(1.17)	(−1.75)	(−2.49)	(−1.57)	(0.97)
Observations	1076	1076	1076	1076	1076	1076	1076
Pseudo R-Squared	0.0943	0.0934	0.1122	0.0504	0.0288	0.0398	0.0811

Panel B: Second stage – OLS regressions

Variables	Expected sign	(1) *ΔMARGIN*	(2) *ΔROA*	(3) *ΔROE*	Expected sign	(4) *ΔSOL*	(5) *ΔLR*	(6) *ΔCOR*
INTERCEPT		0.01	0.02	0.02		−0.02	0.01	0.00
		(0.53)	(1.09)	(0.56)		(−1.38)	(0.70)	(0.24)
L.ΔMARGIN		−0.21**						
		(−2.17)						
L.ΔROA			−0.05					
			(−0.59)					
L.ΔROE				−0.15***				
				(−3.49)				
L.ΔSOL						−0.15***		
						(−4.72)		
L.ΔLR							−0.11***	
							(−3.52)	
L.ΔCOR								−0.18***
								(−4.03)

Table 7 (*continued*)

	Panel B: Second stage – OLS regressions							
Variables	Expected sign	(1) *ΔMARGIN*	(2) *ΔROA*	(3) *ΔROE*	Expected sign	(4) *ΔSOL*	(5) *ΔLR*	(6) *ΔCOR*
Pr(ΔNED > 0)	+	−0.00	0.00	0.00	−	0.02*	−0.02	−0.02
		(−0.27)	(0.01)	(0.10)		(1.36)	(−1.13)	(−1.25)
Pr(ΔFINED > 0)	+	0.03***	0.04**	0.01	−	−0.01	−0.03*	−0.03*
		(2.03)	(1.88)	(0.17)		(−0.61)	(−1.42)	(−1.32)
Pr(ΔFINNED > 0)	+	0.03**	0.02*	0.01	−	0.02	−0.03*	−0.03
		(2.37)	(1.34)	(0.52)		(1.25)	(−1.37)	(−1.03)
Pr(ΔGREYNED > 0)	+	−0.02	−0.01	−0.10	−	0.00	−0.05	−0.03
		(−0.35)	(−0.09)	(−1.04)		(0.04)	(−0.65)	(−0.49)
Pr(ΔINSNED > 0)	+	0.02	0.10	0.00	−	0.05	−0.09	−0.08
		(0.28)	(1.03)	(0.02)		(0.71)	(−1.16)	(−0.97)
Pr(ΔFIRMNED > 0)	+	−0.01	−0.04	−0.05	−	0.03	−0.05	0.02
		(−0.24)	(−0.63)	(−0.40)		(0.62)	(−0.65)	(0.28)
Pr(ΔBUSYNED > 0)	−	−0.02	−0.00	−0.04	+	−0.00	0.02	0.02
		(−0.94)	(−0.14)	(−0.85)		(−0.09)	(0.81)	(0.64)
SEP		0.01***	0.00	0.00		0.00	0.00	0.00
		(2.45)	(0.06)	(0.46)		(0.66)	(0.57)	(0.40)
CEO_TENURE		−0.00	−0.00	−0.00		−0.00	0.00	0.00
		(−0.81)	(−1.14)	(−1.15)		(−0.74)	(0.33)	(0.87)
BSIZE		0.00	−0.00	0.00		−0.00	0.00**	0.00
		(0.38)	(−0.50)	(0.99)		(−0.41)	(1.80)	(1.02)
AUD		0.00	−0.01	0.01		−0.01**	0.00	0.00
		(0.85)	(−0.90)	(1.01)		(−1.72)	(0.17)	(0.36)
MEET		−0.00	0.00	−0.00		0.00*	−0.00	−0.00
		(−0.31)	(0.81)	(−0.16)		(1.40)	(−0.01)	(−0.05)
FEM		−0.01	0.02*	0.01		−0.01	0.03*	0.04*
		(−0.96)	(1.40)	(0.53)		(−0.89)	(1.38)	(1.41)
BONUS		−0.01***	−0.02***	−0.02**		−0.00	0.00	0.00
		(−3.57)	(−3.41)	(−2.63)		(−0.53)	(0.96)	(1.02)
OFORM		0.01***	0.02***	0.02*		0.00	−0.00	−0.00
		(3.02)	(3.67)	(1.98)		(0.10)	(−0.27)	(−0.65)
CONC		−0.00	−0.01	−0.00		0.01*	−0.00	0.00
		(−0.90)	(−0.88)	(−0.37)		(1.94)	(−0.47)	(0.58)
INSIDE		−0.00*	−0.00	−0.01		−0.00	−0.00	−0.00
		(−1.34)	(−0.07)	(−0.95)		(−0.42)	(−0.80)	(−0.30)
LIST		−0.00	−0.00	−0.01		−0.00	0.00	−0.00
		(−0.08)	(−0.42)	(−0.45)		(−1.02)	(0.55)	(−0.29)
P−MIX		−0.00	−0.01*	0.00		0.00	0.00	0.00
		(−0.63)	(−1.49)	(0.14)		(0.54)	(0.07)	(0.36)
REINS		0.01	0.02	−0.00		−0.01	−0.00	−0.02
		(0.43)	(0.89)	(−0.01)		(−0.25)	(−0.10)	(−0.49)
lnSIZE		0.00	−0.00	0.00		0.00	−0.00**	−0.00*
		(0.34)	(−0.58)	(0.03)		(0.73)	(−1.78)	(−1.64)
AGE		−0.00	−0.00	0.00		−0.00	−0.00	−0.00
		(−0.17)	(−0.10)	(0.80)		(−1.12)	(−0.40)	(−0.50)
NED_TENURE		−0.00	0.00	−0.00		0.00	−0.00	0.00
		(−0.65)	(0.09)	(−0.68)		(0.72)	(−0.50)	(0.57)
ED_TENURE		−0.00	0.00	0.00		0.00	−0.00*	−0.00
		(−0.48)	(0.05)	(0.15)		(0.57)	(−1.58)	(−1.06)
Year effects		Yes	Yes	Yes		Yes	Yes	Yes
Observations		912	912	912		912	912	912
Adjusted R-squared		0.0877	0.0269	0.0310		0.0254	0.283	0.280

Note: The two-stage model comprises a logit regression in the first stage and an OLS regression in the second stage. The dependent variables in the first stage are indicators for firms with increases in a certain board characteristic from year $t-1$ to year t. The estimated probabilities are then incorporated in the second stage regression. The dependent variables in the second stage are the changes of our financial performance measures from year $t-1$ to year t. The independent variables include the change of each financial performance measure from year $t-2$ to year t (*L.ΔPER*), the probabilities for increases of director characteristic measures from year $t-1$ to year t that are predicted with the first stage regressions, and all of our control variables. Variable definitions are given in Table 1. A firm's better financial performance is captured by larger values for *MARGIN, ROA, ROE* and smaller values for *SOL*, *LR* and *COR*. The *t*-statistics computed from firm clustered standard errors are reported in parentheses, while ***,**,* indicate statistical significance at the 1%, 5% and10% levels respectively. The significance levels for the independent variables are 1-tail tests, and for the interaction terms 2-tail tests.

1 tail, or better), possibly reflecting the adverse effects of increased complexity arising from increased scale of operations.

Table 5 also shows that several firm-related control variables such as *P-MIX* and *AGE* do not statistically influence the performance function of independent outside directors. This suggests that the potential economic advantages associated with diversification and accumulated product-market knowledge could be blunted by recent developments in the commercial and regulatory environments within which UK insurers operate (e.g., as a result of new technology and capital maintenance rules such as Solvency II). Such changes could necessitate that outside board members need to be increasingly sophisticated in their financial specialty in order to have a positive impact on performance.[17]

[17] To test for reverse causality between the traits of outside directors and performance we conducted sensitivity tests using financial outcome variables relating to the annual period following the measurement of our explanatory variables. The re-estimated results are qualitatively similar to those reported in Table 5. Furthermore, to estimate the effects of the 2007/8 global financial crisis on the performance of our panel sample of insurance firms we included a dummy variable into our analysis to discriminate between the performance effects before and after 2008. However, the results of this sensitivity test were not statistically significant. This accords with the observation of Malafronte et al. (2015) that diversified underwriting and investment portfolios plus maintained liquidity enabled insurers to weather the effects of the 2007/8 global financial crisis better than banks.

5.3. Sensitivity analysis

In this section, we report the results of sensitivity tests that were conducted in order to address concerns about possible endogeneity. We use changes of performance measures as a function of changes of board compositions, with lag changes of performance measures included as independent variables in the regressions. The results are reported in Table 6.

Moreover, we estimate 2SLS square regressions of changes in performance for insurance firms with board structure changes. First, we estimate a logit model of the determinants of whether a firm has an increase in a certain board characteristic (i.e., indicators set to 1 for observations with increase, 0 otherwise). We then insert the estimated probabilities into second-stage ordinary least squares (OLS) regressions that use changes of performance measures as independent variables. These results are reported in Table 7.

The results for the above sensitivity analysis are generally consistent with our main conclusions that outside directors are not associated with superior firm performance, but that outsiders' financial expertise along with executives' financial expertise help improve financial outcomes. This observation reinforces the need for financial board-level expertise in the insurance industry. The sensitivity analysis also reveals the importance of the use of multiple measures for financial performance as it is not necessarily the case that insurers can realize superior outcomes across all measures of financial performance.

6. Conclusion

We examine the relation between outside board directors and six measures of financial performance using panel data for 1999–2012 drawn from the UK's property-casualty insurance industry. We find that the proportion of board outsiders is unrelated to our performance indicators; rather outsiders' financial expertise along with executives' financial expertise have the most significant financial outcomes. This observation reinforces the functional importance of board-level financial expertise in the technically complex and risk information-sensitive insurance industry. These matters are of potential concern in a knowledge intensive and highly technical sector such as insurance where a tacit understanding of risk management is a core competence. Finally, our key finding that financial expertise matters over other attributes of outside directors could help guide future corporate governance guidelines and institutional regulations for insurers and other financial firms.

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