DO FINANCIAL EXPERTS ON THE BOARD MATTER? AN EMPIRICAL TEST FROM THE UNITED KINGDOM'S NON-LIFE INSURANCE INDUSTRY

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Abstract

We examine the relation between board-level financial expertise and six measures of performance using panel data drawn from the United Kingdom's (UK) non-life insurance industry. We find that collectively, financial experts have a beneficial influence on the performance outcomes of insurers. We also observe that board-level qualified accountants and actuaries are linked with superior performance in all six of our selected financial outcome measures. Professional insurance underwriters are associated with sound solvency levels (low leverage) and underwriting results, but not positive earnings-based measures. This suggests that underwriters may not be as adept at group-level earnings enhancement as accountants and actuaries. Additionally, we find that the introduction of IFRS 4 in 2004/5 did not have a significant impact on board composition and financial outcomes. Finally, we consider that our results could have commercial and/or policy implications.

1 INTRODUCTION

Recent corporate governance research has focused on the personal attributes (e.g., the technical knowledge and managerial experience) of board directors and the link with financial performance (e.g., see Anderson, Reeb, Upadhyay and Zao, 2011; Masulis, Wang and Xie, 2012; Kim, Mauldin and Patro, 2014)[1]. For example, Anderson et al. (2011) find that in the United States (US) corporate sector, board heterogeneity has a valuation premium. Other US studies of the governance-performance relation have focused on the financial expertise of board-level directors (e.g., see Defond, Hann and Hu, 2005; Güner, Malmendier and Tate, 2008; Hoitash, Hoitash and Bedard, 2009). However, such studies use samples drawn from publicly listed firms and find little consistent and compelling evidence that the financial expertise of directors impacts positively on corporate results no matter how performance is measured. Such ambiguity could reflect the broad definition of financial expertise and multiple measures of performance used in prior research.

In the present study, we use longitudinal data (1999 to 2012) on a mix of firms of different organizational characteristics drawn from the United Kingdom's (UK) non-life (property-casualty) insurance industry to conduct specific empirical tests of the effect of three specific categories of professional financial expertise – professionally qualified accountants, actuaries, and insurance underwriters[2,3] - on six often used ratio-based measures of insurance

[1] Inspired by Jensen and Meckling's (1976) conception of the modern firm as a 'nexus of contracts', Armstrong, Guay and Weber (2010, p. 181) define corporate governance as ". . . the subset of a firm's contracts that help align the actions and choices of managers with the interests of shareholders." This definition accords with our view that professional financial experts contribute important informational and contracting advantages that facilitate the process of governance in non-life insurance firms.

[2] We define professionally qualified accountants as members of the UK's Consultative Committee of Accountancy Bodies (CCAB) or their overseas equivalent (e.g., the American Institute of Certified Public Accountants); professionally qualified actuaries are taken as members of the UK's Institute/Faculty of Actuaries or overseas equivalent (e.g., the US Society of Actuaries); and professional insurance underwriters are defined as members of the UK's Chartered Insurance Institute or overseas equivalent (e.g., the US Chartered Property Casualty Underwriters). All members of such professional bodies are qualified by examination and experience, and subject to continuing professional development (CPD) requirements. Our definition of financial expert is thus more precise than that used in prior US research. For example, Hoitash et al. (2009) follow the US Sarbanes-Oxley (SOX) Act (2002) and so adopt a broad definition of financial expert that includes board members that hold/have held senior executive positions (e.g., Chief Operating Officers) and/or individuals who may have a 'financial label' but no formal financial qualifications. Other board-level financial experts (e.g., Chartered Financial Analysts), accounting and finance academics, and individuals who were multi-professionally qualified were not observed from our sample of non-life insurance firms. Furthermore, as insurers receive premiums (funds) in advance of the payment of claims, secured bank finance tends not to be used by insurance firms thereby reducing the need for insurers to appoint bankers to their boards. Where debt is used by insurers it is subordinate to the fixed claims of policyholders and normally subject to prior approval by the insurance industry regulator.

[3] We do not dispute that non-professionally qualified directors (e.g., individuals with acquired firm and/or insurance industry experience) can contribute to improving financial performance. However, we take the view

company performance, namely, the net profit margin (*MARGIN*), return on assets (*ROA*), return on equity (*ROE*), solvency/leverage (*SOL*), loss ratio (*LR*), and the combined ratio (*COR*). These six financial measures reflect dimensions of the financial strength and condition of non-life insurance firms that link directly with the board-level financial specialties examined in the present study. Our use of multiple outcome measures is also likely to accommodate the interests of various stakeholders in the insurance sector such as investors, policyholders, and industry regulators. Accounting for the governance and regulatory interests of plural stakeholders is particularly apt for UK insurance firms as such interests are further protected by government regulation and statutes such as the Financial Services Markets Act (FMSA) (2000) (Dewing and Russell, 2006, 2008).

We consider that the governance function of financial experts and their impact on the economic performance of insurance firms is an important topic for research. We say this because insurance is essentially a financial contracting mechanism designed to indemnify policyholders for future losses in return for regular premiums. By its nature, therefore, insurance transactions create explicit contingent liabilities for insurers at the point-of-sale. This contractual obligation necessitates that insurance firms charge 'actuarially fair' rates of premium and that they are actively managed as commercial 'going concerns' (Boubakri, Dionne and Triki, 2008). Froot and O'Connell (2008) also report that the selection and actuarial pricing of risks is inherently difficult in the non-life sector of the insurance market due to their heterogeneous and unpredictable nature. Such complexities in estimating, and hence accounting for, risks and associated future losses requires a high degree of accounting and actuarial expertise in order to minimize loss reserving errors and avoid the potential share price implications of reporting restatements (Anthony and Petroni, 1997). These aspects of the insurance business are further complicated by industry-specific regulations, external capital maintenance rules, and statutory solvency monitoring requirements. Serafeim (2011) further argues that accounting probity and effective financial reporting are particularly important in insurance firms given the promissory nature of indemnity transactions and the difficulties associated with the valuation and matching of insurance companies' assets and

that professional finance status confers on the holder a higher degree of public credibility and technical competence compared with those that are not professionally qualified. These qualities are especially important in highly complex and tightly regulated sectors such as financial services (e.g., see Kim et al., 2014). Additionally, the ethical standards and monitoring of professional bodies helps mitigate the risk of conflicts of interest such as those that might arise from bankers influencing board members to take out expensive loans to finance negative net present value (NPV) projects. As a result, unlike scholars such as Günar et al. (2008), our study conveniently avoids the potentially confounding effects of such biases on corporate performance.

liabilities. Compliance with these commercial, regulatory, and public policy requirements as well as the intrinsically technical and idiosyncratic nature of insurance thus means that the insurance industry, more than most other industrial sectors, has to effectively utilize the expertise of financial specialists, notably accountants, actuaries, and underwriters, at the board-level. Indeed, the importance of financial and risk management expertise on the boards of UK insurers is reflected in both financial regulation and legislation (e.g., the FSMA, 2000) as well as the national corporate governance code (e.g., the Cadbury Report, 1992) (Dewing and Russell, 2004)[4].

Of our financial period indicators, net profit margin, return on assets and return on equity are profit-based measures of performance, leverage is a solvency-based measure of financial condition, and the loss ratio and combined ratio capture underwriting performance. We find that collectively, financial experts have a beneficial influence on the performance outcomes of insurers. Board-level qualified accountants and actuaries are linked with superior performance in all six of our selected financial outcome measures. Professional insurance underwriters are associated with sound solvency levels (low leverage) and underwriting results, but not with positive earnings-based measures. This suggests that underwriters may not be as adept at group-level earnings enhancement as accountants and actuaries. Additionally, we find that the introduction of IFRS 4 in 2004/5 did not have a significant impact on board composition and financial outcomes.

Our study contributes to the literature on the link between board member characteristics and the financial effectiveness of corporate governance. For example, evidence that board-level financial expertise either collectively, and/or in terms of speciality, matters in terms of financial performance could help shape future corporate governance guidelines and practices, especially as they relate to the insurance sector. By focusing on the UK's non-life insurance industry where finance skills and expertise are integral to business activities (e.g., risk selection, policy design and product pricing), our study further avoids potential biases arising from cross-country/cross-sectional analysis (e.g., see Nissim, 2013). For example, the functional role of board-level financial experts can vary between industries

[4] Note that the 'approved persons' regime of the UK's FSMA (2000, section 59(1-7)) and supporting insurance regulations do not *mandate* that board members of insurance firms need to have formally recognized professional (e.g., accountancy or actuarial) qualifications as a condition of their appointment. However, the i*mplication* is that professional status would help determine whether a prospective board member of an insurance firm is likely to be viewed by the insurance industry regulator to be a 'fit and proper' person under the terms of the FSMA (2000). The UK insurance regulator during the period of our analysis (1999 to 2012) was the Financial Services Authority (FSA).

and over time as well as across countries which are at different stages of professional and institutional development (e.g., see Defond et al., 2005). As in Custódio and Metzger (2014), we therefore exploit exogenous within-country/intra-industry variations to directly test the changing performance-effects of board-level financial experts in a longitudinal setting. Our selection of firms of different size, ownership-type, and governance structures drawn from the UK insurance industry with its explicit stakeholder interest further enables us to benefit from increased within sample variation and mitigate potential selection bias that can arise in studies using data drawn from predominantly shareholder-focused publicly traded firms. Despite the single country/single industry focus of the present study, our research on the performance-financial expertise relation could nevertheless have wider implications. For example, board-level financial expertise can clearly have implications for other economically significant sectors engaged in the bearing and trading of extreme financial risks such as banking and the investment industries (Hodge and Ponk, 2006). In addition, the appointment of financially and risk management adept directors to boards can be important for the viability of firms engaged in the development of emergent but high risk 'new science' products such as those involving new technology (Kwon and Yin, 2006). In this sense, the results of our study could have application beyond the insurance industry and thus have broader appeal. Additionally, our use of two-stage least squares (2SLS) regression helps alleviate endogeneity concerns resulting from unobserved firm-level hetereogeneity and simultaneity (Dass, Kini, Nanda, Onal and Wang, 2014). The inclusion of time dummies in our model specification also helps control for time-related factors (e.g., underwriting cycles[5]).

The remainder of our paper is structured as follows. We first provide background information on the UK's non-life insurance industry and then develop our hypotheses. The next section outlines the research design, including the description of the data, modelling procedure, and definition of the variables used. We then analyze and discuss the empirical results, while the final section concludes our study.

2 INSTITUTIONAL BACKGROUND

The UK's non-life insurance company market comprises approximately 300 or so active domestically-owned and foreign-owned companies, subsidiaries and branches of

[5] The insurance underwriting cycle reflects temporal changes in premium rates, profits and capital capacity. The cycle begins after periods of large losses when premium rates rise thereby increasing profits, and attracting inflows of capital into the non-life insurance sector. However, in competitive insurance markets, increased capital capacity deflates prices thus reducing profitability. On average, underwriting cycles in developed insurance markets such as the UK and US last between five and ten years (Cummins and Danzon, 1997).

varying size, ownership structure, and product-mix, which currently generates approximately £50 billion (US$84 billion) in gross annual premiums (International Underwriting Association, 2013)[6]. In addition, 91 active syndicates at the Lloyd's of London insurance market currently underwrite direct non-life 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). These objectives serve not only internal constituents such as managers, policyholders and investors, but also external stakeholders, including regulators, policymakers, and credit ratings agencies. However, achieving strategic financial goals in insurance firms depends on the effective use of board-level financial expertise (Hardwick, Adams and Zou, 2011). Regulatory and structural market changes as well as high profile accounting scandals over the last two decades or so have further heightened the increasing need for financial expertise on the boards of firms, especially in the financial services sector (Agrawal and Chadha, 2005)[7].

We consider that the UK's non-life insurance industry is a good institutional environment within which to frame our research. Unlike the US's SOX Act (2002, section 407), there is no legal requirement in the UK for financial experts to be represented on the board (e.g., as members of audit committees). Insurance industry regulations in the US also mandate that the annual audit of non-life insurance claims reserves should be carried out by a professionally qualified actuary, whereas in the UK this practice is not statutorily prescribed. These legal and regulatory differences between the US and UK could influence board composition in subtly different ways. For example, the more prescriptive approach in the US could direct non-life insurers to appoint (more) actuaries to the board (e.g., to facilitate professional dialogue with actuarially-trained auditors). In contrast, the number and type of board-level financial experts in the UK's non-life insurance industry is a discretionary firm-level decision that is relatively unencumbered by external rules. The UK's less prescriptive environment thus enables us to potentially conduct a more direct test of our hypotheses.

[6] In 2012/13 there were 976 non-life 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.

[7] The international insurance industry has not escaped high profile corporate governance failures in recent years - witness the 2001 demise of the UK's Independent Insurance Group plc and the US$182 billion bailout of the American International Group (AIG) by the US Federal government in 2008.

What is more, from 2004/5 UK insurers unlike their counterparts in the US were subject to IFRS 4: Insurance Contracts (International Accounting Standards Board (IASB), 2004). IFRS4 represented a clear-cut regulatory development that affected the accounting and public disclosure practices of UK insurers, and possibly their board structure[8]. The issuance of IFRS 4 thus represents a good opportunity to examine the effects of an exogenous event on the composition of board-level financial expertise and corporate performance.

3 THEORY AND HYPOTHESES DEVELOPEMENT

Board-Level Financial Expertise

Fama and Jensen (1983) argue that the board of directors has ultimate responsibility for the economic, efficient and effective allocation and use of corporate resources. As such, the board is at the apex of the system of governance in the modern corporation. In maximizing value for shareholders, Adams and Ferreira (2007) report that the board provides two key functions: first, the monitoring and control of principal-agent incentive conflicts; and second, providing advice to the CEO and other board-level directors on how to maximize firm value. These two functions are an integral part of the duties of board-level financial experts (Watts and Zimmerman, 1986). However, recent corporate governance research (e.g., Brickley and Zimmerman, 2010) suggests that the monitoring and advisory functions of the board are not mutually exclusive but rather practiced simultaneously. Armstrong et al. (2010) add that board-level monitoring and control includes the ratification of strategic initiatives – an activity that requires sound financial information and professional judgement.

Watts and Zimmerman (1986) argue that accounting and auditing play important roles in the corporate production, reporting, and certification of period results. Indeed, Lara, Osma and Penalva (2009) find prudent accounting practices are closely linked with strong corporate governance. Therefore, financial reporting and monitoring, and the discharge of technical advice at the board-level require a level of financial expertise amongst directors beyond privately acquired firm-specific knowledge. This is particularly important given that a key function of corporate governance is to ensure that firms avoid bankruptcy and remain 'going concerns' (Darrat, Gray, Park and Wu, 2015). This further suggests that board-level financial acumen is critically important in technically complex and highly financially regulated sectors such as the insurance industry (e.g., see Kim et al., 2014). Moreover, sound accounting not

[8] In contrast to mandatory regulations such as IFRS 4, the introduction of voluntary corporate governance codes of conduct, such as the UK's Cadbury Report (1992) leads to staggered rather than immediate rates of adoption over time (Dahya and McConnell, 2007).

only helps promote stewardship but also supplies decision-making information to internal and external users. Accordingly, accounting and finance expertise on the board is expected to be directly associated with 'high-quality' financial reporting and a heightened degree of investor confidence in the firm as a 'going concern' (Agrawal and Chadha, 2005; Defond et al., 2005; Kim et al., 2014). Custódio and Metzger (2014) also argue that as financial sophisticates, senior finance-expert directors are able to communicate more effectively with capital markets than their non-financial counterparts. In this regard, Custódio and Metzger (2014) find that financially expert Chief Executive Officers (CEOs) tend to be associated with positive NPV projects, greater (informed) risk-taking, and a lower dispersion rate in analysts' forecast earnings. We consider that this ability is particularly important in the insurance industry for two main reasons. First, insurers are both recipients of market capital and major institutional investors; and second, the board members of insurance firms need to be cognisant of, and fluent in, the financial regulations that pertain to their industry. This also necessitates that the board-level financial experts of insurance firms will be involved in regular and active communications with regulatory authorities, external auditors, and other (e.g., fiscal) bodies. Professional status can enhance the human capital value of board-level financial experts and so motivate them to perform their duties will care and commitment. Indeed, recent research by Masulis and Mobbs (2014) suggests that private economic incentives for directors to protect their public reputations for prudent management helps ensure effective board-level governance.

Kroszner and Strahan (2001) and Güner et al. (2008), however, suggest that the appointment of board-level financial experts (in their cases, bankers) could produce misaligned incentives and reduce firm value. For example, non-executive (outside) bankers could be incentivized (e.g., by bonus plans) to encourage their colleagues on the board to exceed borrowing targets (over-leverage) and pursue negative NPV investments and/or excessive perquisite consumption. However, we expect such agency incentive conflicts to be less severe in the insurance industry than in other parts of the corporate sector. For example, financial experts on the boards of insurance firms are unlikely to have the same private incentives as non-executive bankers, as insurers are mainly funded by policyholders' premiums rather than bank finance (see also footnote 3)[9]. Armstrong et al. (2010) add that

[9] Class action lawsuits by shareholders could mitigate the risk of excessive borrowing by firms with bankers on their boards. However, in practice proving legal negligence and culpability can be difficult and expensive (Kroszner and Strahan, 2001). In the insurance industry, the risk of opportunistic and aberrant behavior by professionally qualified financial experts is reduced not only by the monitoring activities and sanctions of their respective professional bodies but also by the oversight and statutory powers of industry regulators.

board-level financial expertise is necessary because finance is not only a key, and usually a limiting factor of production in firms, but that it gives rise to a complex nexus of contacting relationships between the providers and users of capital resources who themselves possess different levels of information on the firm's prospects. Raheja (2005) further notes that in complex firms (such as insurers), board-level financial experts help reduce the verification costs of corporate financial information thereby promoting the efficiency and reliability of the external audit function[10]. Therefore, through the lens of agency theory the supervisory and advisory functions of professionally qualified financial experts on the board serve the interests of capital providers – for example, through improved stewardship and the alleviation of market information asymmetries.

Financial Experts in Insurance

In developed countries such as the UK and US, financial experts, particularly professionally qualified accountants, are all-pervasive on the boards of companies across all industrial sectors including financial services (Defond et al., 2005; Güner et al., 2008; Anderson et al., 2011). Edwards, Anderson and Chandler (2007) attribute the functional prevalence of accountants in corporate governance not just to their professional education and training but also to their historical prominence in the development of the modern firm and associated business legislation and regulation since at least the mid-nineteenth century. Edwards et al. (2007) report that other professional groups, such as actuaries, also emerged in the UK around the mid-nineteenth century[11]. Hardwick et al. (2011) report that professionally qualified actuaries perform important board-level governance functions in insurance firms across a range of financial activities, including pricing, liability reserving, asset management, and promoting the efficient allocation and use of resources. Scordis (2011) adds that in recent years accounting has become increasingly important for the international insurance industry given the advent of new accounting rules (e.g., the introduction of IFRS 4)

[10] Approximately 90% of the non-life insurance firms in our panel data set were audited by one of the Big-4 international (brand-name) audit firms - Deloitte, Ernst & Young (EY), KPMG or PriceWaterhouseCoopers (PWC). The use of 'brand-name' auditors is a common feature in developed insurance markets such as the UK and US and reflects the technically complex nature of insurance and plurality of constituents (e.g., investors, policyholders, and industry regulators) that insurance company financial reporting has to satisfy (Gaver and Paterson, 2001). However, the lack of firm-level and temporal variation in insurers' choice of audit firm precludes us from investigating auditor-effects in the corporate governance-performance relation.

[11] The UK accounting profession dates from 1854 with the foundation of the institute of Chartered Accountants of Scotland (ICAS) and 1880 with the creation of the Institute of Chartered Accountants in England and Wales (ICAEW). The Institute of Actuaries was founded in England in 1848 and its counterpart - the Scottish Faculty - was established in 1856.

and solvency regulations (e.g., the European Union's (EU) 2016 Solvency II capital maintenance standards). The 2007/9 global financial crisis has also raised the profile of corporate accounting, particularly in the financial services sector (e.g., see Faleye, Hoitash and Hoitash, 2011). Serafeim (2011) further argues that such institutional (e.g., regulatory) changes have resulted in a closer fusion of accounting and actuarial systems in insurance firms. This implies the need for greater board-level financial expertise in insurance firms than hitherto was the case.

The greater unpredictability of the risk exposures in non-life insurance (Froot and O'Connell, 2008) heightens the functional role of the professional underwriter in selecting and pricing of risks, and setting coverage levels and deductibles. Such functions are critical to ensuring the future financial strength and condition of non-life insurance firms (Browne and Kamiya, 2012). This implies that professional underwriting expertise at the board-level is likely to be of strategic importance for non-life insurance firms[12].

To sum up, financial experts on the boards of non-life insurance firms provide specialist advice and supervisory control that protects and promotes the economic interests of policyholders, shareholders, and other contracting constituents. In fact, recent corporate governance research (e.g., Faleye et al., 2011) suggests that technically complex firms (such as insurers) have particular need for the 'intense' monitoring and 'deep' advice from strategically-minded board-level financial experts. Moreover, as in Hardwick et al. (2011), we reason that in the technically complex insurance industry, the higher the proportion of board-level financial experts the relatively less severe the information problem, and therefore the better strategic decision-making is likely to be, all else equal. Therefore:

> H1*: Ceteris paribus*, the proportion of board-level financial experts is likely to be positively related to earnings-related indicators, superior solvency, and profitable underwriting.

Performance by Type of Financial Expert

The professional education and training of accountants, actuaries, and underwriters differs in some key regards. For example, the commercial training of accountants stresses the analysis and reporting of financial information that is of primary interest to creditors, shareholders and prospective investors (Watts and Zimmerman, 1986). This implies that the

[12] The UK's professional insurance underwriting body - the Chartered Insurance Institute - was established in 1912 from a consolidation of several London-based and provincial underwriting associations.

realization of accounting earnings-based measures of performance such as the net profit margin, return on assets, and return on equity are likely to be emphasized when professionally qualified accountants predominate on the board. This is particularly the case as such indicators are important in the valuation of insurance firms (Nissim, 2013). Custódio and Metzger (2014) add that financial experts, such as accountants, are likely to be more exposed to concepts that espouse the primacy of earnings-related measures of performance and the maintenance of the firm as a 'going concern'. Accountants on the board can also have positive impacts on the underwriting function of non-life insurers - for example, by ensuring that underwriters have good financial information (e.g., on the loss experiences) and that they comply with budgetary targets on period costs and profits. Consequently:

> H2: *Ceteris paribus*, the proportion of board-level accountants is likely to be positively related to earnings-related indicators, superior solvency, and profitable underwriting performance.

The traditional focus of the professional actuary emphasizes the custodianship of policyholders' fixed claims and solvency maintenance - goals that are shared with insurance industry regulators and other stakeholders such as reinsurers and credit ratings agencies (Sherris, 1987). The ability of insurers to meet statutory levels of solvency is also likely to be a top priority for insurance industry regulators (Adiel, 1996). Therefore, we expect board-level actuaries to stress the importance of solvency-based measures of performance such as low leverage. Additionally, in fulfilling their stewardship function board-level actuaries can also directly influence profit-based measures of financial performance - for example, in order to increase reserves, lower future costs of capital and/or meet policyholders' financial expectations, including future solvency maintenance and the settlement of claims. Through their design and risk pricing of insurance products actuaries can also influence underwriting results. The financial and risk management board role of actuaries has also been given added impetus by the FSMA (2000) and the 'realistic reporting' regime advocated by the FSA's (2004) prudential standards. Therefore:

> H3: *Ceteris paribus*, the proportion of board-level actuaries is likely to be positively related to earnings-related indicators, superior solvency, and profitable underwriting performance.

Insurance underwriters measure and evaluate operational performance in terms of annual premiums earned in relation to incurred annual claims and operating expenditures

(Cummins and Danzon, 1997). Eckles, Hoyt and Miller (2014) contend that in the insurance industry underwriting risks are often assessed and managed in a segmental rather than holistic manner. This could make insurance underwriters focus primarily on underwriting results at the individual case-level rather than enterprise-wide financial performance. As a result:

> H4: *Ceteris paribus*, the proportion of board-level underwriters is likely to be positively related with profitable underwriting performance.

4 RESEARCH DESIGN

Data

Our data set covers an unbalanced panel of 92 non-life insurance firms (representing 1,168 firm/year observations) that were operating and actively writing primary non-life insurance business in the UK for the 14 years from 1999 to 2012. Our analysis is conducted at the level of the UK statutory reporting insurance entity, which enables us to relate financial performance and other data to the relevant decision-making unit directly managed by UK board members. Our data set comprises: (a) insurance company data sourced from the *Standard & Poor's Synthesys* insurance companies' database, which were compiled from the regulatory returns submitted annually by UK insurance companies to the industry regulator - the FSA[13]; and (b) biographical and other data on board composition and financial expertise which were obtained from published annual reports, industrial companies' databases (e.g., *FAME* and *Thomson Reuters Datastream*), and other sources (e.g., annual UK insurance company directories). All financial variables are audited end-of-accounting year figures. Data relating to trust funds, and small protection and indemnity pools 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 the data collection process 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 timeframe covered by our study represents the earliest and latest years when complete data were available to us at the time the study was carried out. The period of

[13] From 1 April 2013 the statutory supervision and regulation of UK insurance companies is conducted by the new Prudential Regulation Authority (PRA), whilst matters of insurance market operations are regulated by the Financial Conduct Authority (FCA). Both regulatory bodies are subsidiaries of the Bank of England.

analysis straddles a period of variable macroeconomic conditions 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., as a result of market exits and takeovers). Employing an unbalanced panel can nevertheless help mitigate sample survivorship bias. Our unbalanced panel sample of 92 non-life insurance firms constitutes roughly 30% of non-life 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 majority (90%) of the non-life insurers in our data set are stock forms of organization of which roughly a quarter are mono-line insurers that specialize in niche segments of the market (e.g., personal lines). Furthermore, most (82%) of the stock non-life insurers in the data set are non-listed private companies. Such variability in the sample panel data helps to enhance the robustness of the tests conducted and hence improves the reliability of the derived results.

Model

The primary econometric model that we employ to examine the empirical linkage between board-level financial experts and the performance of UK non-life insurance firms is 2SLS estimation. The firm-level percentage of board-level financial experts (including type) can be affected by the percentage (type) of financial expert director in the insurance industry. Therefore, in a similar manner to Liu, Wei and Xie (2014) we use as an instrument variable (IV) the total number of financial expert directors in our sample minus the number of financial expert directors in each firm as a fraction of the total number of directors in our sample minus the aggregate number of directors in each firm. Similarly, we choose the percentage of each type of board-level financial expert in our sample as an IV for each specialty. We argue that these IVs take account of the availability of financial expertise in the UK insurance market and so will affect our measures of board-level financial expert and its three types; however, these IV measures are unlikely to directly influence an insurance firm's performance, other than through of our measures of financial expertise[14]. The 2SLS model that we use is:

$$PERF_{it} = (PERF_{it-1}, EXPERTS_{it}, CONTROLS_{it,}) + u_{it},$$

[14] As in Liu et al., 2014) our choice of the instruments is also motivated by econometric considerations. We find using joint-F tests of association that our financial expert measures are significantly related to our IVs in the first-stage of the 2SLS analysis (at p≤0.10, or better) thereby satisfying the relevance restriction. Also the Hansen *J* over-identification test indicated that statistically our IVs are uncorrelated with the regression error terms (at p≤0.10, or better) thereby supporting the exogeneity criterion.

where subscript *i* denotes i^{th} firm (*i* = 1, … , 1,168), subscript *t* denotes the t^{th} year (*t* = 1999, … ,2012). $PERF_{it}$ is one of our six dependent variables – *MARGIN*, *ROA, ROE, SOL, LR,* and *COR* (as defined in Table 1 below). $EXPERTS_{it,}$ is either total financial experts or each of our selected three types of specialty, and $CONTROLS_{it}$ is a vector of board composition and firm-level control variables (again as defined in Table 1). The disturbance term is specified as a two-way error component model ($u_{it} = \mu_i + \lambda_t + v_{it}$) comprising unobservable firm-specific effects (μ_i), time-effects (λ_t), and a random disturbance term (v_{it}).

Boards-level Controls

Other governance considerations can affect the financial performance of insurance firms (Hardwick et al., 2011). Therefore, we control for five board-level variables, namely: the proportion of outside (non-executive) directors on the board (*OUTS*); the separation of the Chairman/CEO positions (*SEP*); board size (*BSIZE*); the existence of an audit committee (*AUD*); and gender diversity (*FEM*).

Duchin, Matsusaka and Ozbas (2010), Cornelli, Kominek and Ljunqvist (2014), and others, argue that increasing outside directors to boards improves the effectiveness of monitoring and so reduces agency problems in firms. They add that the effectiveness of outside directors (*OUTS*) in reducing agency problems and maximizing value for shareholders will be influenced by a combination of personal attributes (e.g., their business acumen) and private incentives (e.g., the protection/promotion of their human capital value). Such factors are also likely to motivate outside directors to improve financial performance of the firms that they supervise and advise. On the other hand, Adams and Ferreira (2007) and Kumar and Sivaramakrishnan (2008) argue that if outside directors monitor CEOs and other executive directors too intensely then they risk alienation and thus losing access to key strategic information. Therefore, outsiders can face an 'informational moral hazard' problem, and so become ineffectual monitors of board activities. This situation could lead to outside directors being associated with inferior rather than superior financial performance. However, in the insurance industry, professional support systems and sanctions together with regulatory monitoring and control mitigates the risk of financial professionals subrogating their responsibilities to act as custodians of policyholders' and shareholders' interests (see also footnote 8).

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. 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. 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. Such a role can help mitigate agency costs arising from the separation of ownership from control, and so promote public confidence in the reported financial performance of firms (e.g., see Defond et al., 2005). Audit committees also have a wider monitoring and risk control function than other board committees, like remuneration and nomination committees, and so they are more likely to have a first-order effect on financial performance (Hoitash et al., 2009). This aspect is likely to be particularly important in technically complex and idiosyncratic industries such as insurance (Hardwick et al., 2011). Adams and Ferreira (2009) argue that female directors tend to have better attendance records at board meetings, be less obligated to the patronage of a dominant CEO, and allocate more effort to monitoring and controlling agency incentive conflicts than their male colleagues. As a result, we expect that, other things being equal, the greater the proportion of female board members the better the financial performance of non-life insurance firms.

Firm-Specific Controls

The corporate governance-performance relation could also be influenced by firms' characteristics. Therefore, we control 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*).

Mayers and Smith's (1981) analysis implies that policyholder-owned mutual forms of insurance organization are likely to perform financially less well than stock insurance firms because of their inherent difficulties in controlling managerial opportunism and associated agency costs. Also, unlike their counterparts in stock insurers, the managers of mutual insurers are not subject to the disciplining effects of the market for corporate control. Therefore, we predict that all else equal, mutual insurers will perform financially less well than stock insurers. Grossman and Hart (1980) contend that concentrated ownership (*CONC*) can

reduce agency problems and so improve firms' performance as a result of more effective monitoring and control of board-level decisions by dominant investors. Cornelli et al. (2014) add that firms with dominant shareholders will expect the board of directors, particularly outsiders, to actively monitor and regularly question the decisions of CEOs. Accordingly, we predict that concentrated ownership will be positively related to firms' financial performance.

Saunders, Strock and Travlos (1990) posit that insider ownership (*INSIDE*) motivates managers to act like shareholders and so reduces agency problems (costs) thus boosting financial performance. We also expect that manager-owners are likely to directly appoint and utilize specialist financial knowledge and expertise at the board-level in order to maximize their economic interest in the firm. This is particularly likely to be the case in technically complex and highly specialized sectors such as insurance. Insurance firms listed on major bourses (*LIST*), such as the London Stock Exchange, could also be motivated to perform better than other insurers in order to attract inflows of global investment (Miller, 2011). We enter CEO incentive-based compensation (*BONUS*) into our analysis as the existence of a performance-related bonus system can motivate CEOs to maximize reported financial performance (Jiang, Adams and Jia-Upreti, 2012). A diversified mix of products (*P-MIX*) can further produce economies of scale and scope for insurers, enabling them to realize input efficiencies in their management of risk pools and asset portfolios, and so boost reported period performance (Huberman, Mayers and Smith, 1983).

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 (Abdul Kader, Adams and Mouritidis, 2010). 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, all else equal, we predict a positive link between reinsurance and financial performance. Financial strength and performance are likely to improve as firms grow 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 (e.g., through better resource allocation and usage) (Hardwick et al., 2011). Therefore, other things being equal, we anticipate firm size (*lnSIZE*) to be positively related to financial performance. What is more, well-established insurance firms 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 a non-life insurance firm is likely to be increasing in the length of time it has been operating in its respective product-markets. As such, we control for firm age (*AGE*) in our analysis.

Interaction Terms

Prior studies (e.g., Hardwick et al., 2011; Masulis et al., 2012; Kim et al., 2014) acknowledge that corporate governance mechanisms can interact with each other. Failure to control for the possible interaction among governance mechanisms could thus result in misleading conclusions. However, including too many interaction terms in regression models raises concerns about multicollinearity. Therefore, in the interest of parsimony we only introduce two-way multiplicative interactions between our three primary independent variables representing each functional specialty and board size. Our reasoning is that performance-related synergies could arise from a combined set of financial skills at the board-level. An insurer's information environment and the overall effectiveness of financial expertise on the board could also be enhanced in conjunction with the knowledge and experience of other non-financial board members (Andersson et al., 2011). This implies a positive interactive-effect between financial expertise on the board and the size of that board. Moreover, 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 (e.g., see Jaccard, Turrisi and Wan, 1990).

Variables

The dependent and independent variables that enter our analysis are defined in Table 1.

[Insert Table 1 here]

5 EMPIRICAL RESULTS

Summary Statistics

Table 2 (panels A to C) gives the descriptive statistics for our dependent and independent variables. Table 2, panel A indicates generally sound mean rates of performance for our panel sample of insurance firms for each of the six financial indicators examined. Panel A of Table 2 also shows that for the whole sample period (1999-2012), on average, 41% of board directors are members of professional financial bodies, with 19% being accountants

(*ACCOUNS*), 17% underwriters (*UWS*), and 5% actuaries (*ACTS*). Panels B and C indicate that the proportion of total financial experts on board increased from 38% in 1999 to 44% in 2012. This increase was particularly noticeable with regard to accounting representation on the board where the proportion grew from 16% to 21% over the period of analysis. In contrast, the proportion of actuaries and underwriters remained constant over time. This hints at a growing demand for board-level accounting expertise in line with recent developments in corporate reporting and accounting (e.g., IFRS 4). In addition, the overall mean percentage of board-level actuaries is (at 5%) lower than mean of 16% reported by Hardwick et al. (2011) for the UK life insurance industry between the mid-1990s and mid-2000s. This difference reflects the less prevalent actuarial presence in the non-life insurance compared with the life insurance sector that has been identified by prior studies such as Froot and O'Connell (2008). The average board size of approximately 8 members reported in Panel A of Table 2 is nonetheless consistent with Hardwick et al.'s (2011) UK life insurance industry study.

In line with the UK's 1992 Cadbury and 2003 Higgs reports on corporate governance, outsiders represent a majority of board members (at 60% on average per panel A). This reflects an increasing trend over our period of analysis (from 52% in 1999 to 66% of board members in 2012). Again consistent with established UK corporate governance guidelines, most non-life insurers in our sample separate the CEO and Chairman functions and have audit committees. Roughly 90% of firm/year observations in our panel data set relate to stock forms of organization with approximately two-thirds of these cases having dominant (block) shareholders. Just over a third (36%) of non-life insurers on average specifically have equity ownership schemes as part of a senior management compensation package, with a mean majority (80%) having broader (e.g., cash-based) board-level incentive bonus plans. Interestingly, the presence of females at the board-level is low at 3% on average over the panel of sample insurance firms. However, panels B and C in Table 2 indicate a small increase in female representation between 1999 and 2012 from 1% to 8% of total board membership across firm/year observations. This pattern of female board representation in the UK non-life insurance industry is nonetheless consistent with that reported by Gregory-Smith, Main and O'Reilly (2014) for UK FTSE 350 companies over roughly the same timeframe. Table 2, panel A also shows that the average age of non-life insurance firms in our panel data set is 46 years (with a SD = 33 years) indicating that though there is age variation in the distribution of the sample, most of our firms are established insurance providers.

[Insert Table 2 here]

In Table 3, we conduct an analysis of variance (ANOVA) test to determine whether statistically significant differences exist across our six financial performance measures according to the levels of total board-level financial expertise and by the levels of functional specialty. For each year, we group firm/year observations into low and high categories based on whether the measure of financial performance is below or above its mean value. Panel A of Table 3 shows that a high (above-mean) aggregate level of financial expertise on the board has larger *MARGIN*, *ROA,* and *ROE*, and lower *SOL*, *LR* and *COR*, relative to board-rooms with low (below-mean) amounts of financial expertise. The F-statistics indicate that differences between the two categories are significant (at p≤0.01, 2-tail). A similar pattern is also observed when we conducted ANOVA tests by specialty, particularly in the case of *ACCOUNS* and to a lesser extent, *ACTS*. However, when comparing between the low and high levels of *UWS*, the differences for *MARGIN*, *ROA*, *ROE,* and *COR* are not statistically significant. This tentatively suggests that underwriters at the board-level do not significantly influence earnings-based measures of performance.

[Insert Table 3 here]

Table 4 presents the correlation coefficient matrix for the variables used in the study. Panel A reveals statistically significant inverse associations (at p≤0.10 or better, 2-tail) between our earnings-based measures - *MARGIN, ROA* and *ROE* - and the solvency (leverage) and underwriting performance indicators – *SOL*, *LR* and *COR*. These results accord with our expectations as profitability in the non-life insurance industry is usually associated with low leverage (hence less default risk for policyholders) and lower than expected claims and operating costs (Browne and Kamiya, 2012). We also observe statistically significant correlations (at p≤0.10 or better, 2-tail) between our performance variables and *EXPERTS* and *ACCOUNS* that are in line with what we predict – i.e., the observed association between *EXPERTS/ACCOUNS* and *MARGIN*, *ROA*, and *ROE* is positive and the association between *EXPERTS/ACCOUNS* and *SOL, LR* and *COR* is negative. Correlations between our performance variables and *ACTS*/*UWS* are also in our expected direction, but the magnitudes are generally not as strong as those for *ACCOUNS*; in fact, some correlation coefficients are insignificant. This suggests that accountants on the board could be playing a predominant role in the strategic decision-making process of our sample of insurance firms. Consistent with prior studies (e.g., Hoitash, et al., 2009), we also observe that *EXPERTS* is positively and significantly correlated with other governance variables such as *OUTS* and *AUD* (at p≤0.10 or better, 2-tail). This indicates that board-level financial expertise is an integral part of the overall

governance systems of non-life insurance firms. Aside from the expected positive and statistically significant correlations between size-related variables (e.g., *BSIZE* and *lnSIZE*), most associations are moderate suggesting that multicollinearity is unlikely to be problematical. However, to test further for multicollinearity, we follow Kennedy (2003) and derive variance inflation factors (VIFs) for the independent variables. We find that all VIF values are below 10 suggesting that multicollinearity is unlikely to be a major issue when interpreting our empirical results.

[Insert Table 4 here]

Multivariate Results

Financial Expertise and Performance

Table 5 gives the 2SLS results for the effect of *EXPERTS* on each of our six financial performance indicators. Our results indicate that collectively, financially qualified directors have, as expected (H1), a positive and statistically significant impact on all of the three earnings-based measures *MARGIN, ROA* and *ROE* (at p≤0.05, 2-tail). In practical terms, a 1% change in board-level financial expertise can increase net profit margin by 0.04%, returns on assets by 0.05% and returns on equity by 0.06%. Also consistent with what we hypothesized (H1), the coefficient estimate for *EXPERTS* is negatively related to *LR* and *COR* (at p≤0.01, 2-tail). Therefore, increasing the fraction of board-level financial expertise by 1% has a positive impact on underwriting performance by respectively reducing the loss ratio by 0.10% and combined ratio by 0.12%. The coefficient estimate for *EXPERTS* is also statistically negatively significant with regard to leverage. In particular, a 1% change in board-level financial expertise can improve the solvency (*SOL*) position (lower leverage) by about 4%. These observations suggest that overall professionally qualified financial experts have a beneficial impact on financial performance in the UK's non-life insurance sector.

[Insert Table 5 here]

The proportion of outsiders on the board (*OUTS*) is related to superior solvency (lower leverage) and sound underwriting performance (at p≤0.10 or better, 2-tail). However, contrary to our predictions, the size of the board (*BSIZE*) is inversely related to profit margin (*MARGIN*) and is associated with poor underwriting performance (high loss ratios (*LR*) and combined ratios (*COR*)) (at p≤005 or better, 2-tail). These findings accord with some prior studies (e.g., Yermack, 1996) that argue that limit board membership can be more performance-effective than large boards because they economize on the costs of information provision and coordination, and are more likely to make decisive strategic judgements.

Therefore, smaller boards could actually be better suited to technically complex businesses such as non-life insurance. Table 5 also shows that the coefficient estimates for *lnSIZE* are inversely related to *ROA* and *ROE* (at p≤0.01, 2-tail). This suggests that 'natural' economic benefits arising from increased firm size - for example, scale and scope economies - could be blunted as a result of market changes in new technology applications and increased competition from smaller niche operators. As Custódio and Metzger (2014) point out, changing business environments necessitate that board-level financial experts will need to be 'sophisticates' in their field of specialty in order to contribute positively to strategic innovation, and improved and sustainable corporate performance. The only other notable features gleaned from Table 5 that are generally consistent with what we expected, are that the coefficient estimate for audit committee (*AUD*) is positively related with *MARGIN* (at p≤0.10, 2-tail), and the estimated coefficient for managerial ownership (*INSIDE*) is associated with superior profitability and better solvency (lower leverage) (at p≤0.10 or better, 2-tail). However, the coefficient estimates for audit committee (*AUD*) are insignificant for our other performance measures. The mixed results with regard to *AUD* could, as reported in Bryan, Liu, Tiras and Zhuang (2013), indicate that the presence of financial experts on audit committees may not necessarily be an essential prerequisite for effective governance and the realization of sound corporate performance.

Table 6 gives our multivariate results for each of the three types of financial expert examined in this study. As we hypothesized (H2 and H3), Table 6 reports statistically significant and correctly signed coefficient estimates for *ACCOUNS* and *ACTS* (at p≤0.10 or better, 2-tail). This observation suggests that board-level accountants and actuaries play an affirmative role in setting commercially appropriate premiums, controlling claims and operating costs, and monitoring statutory solvency levels. As we expected (H4), insurance underwriters are significantly related to underwriting outcomes (at p≤0.01 or better, 2-tail). Insurance underwriters are also found to be significantly related to sound solvency (at p≤0.01 or better, 2-tail) but are not related to the earnings-based performance measures despite such measures being used by analysts and insurance company investors (Nissim, 2013).

[Insert Table 6 here]

To test for conjoint-effects amongst board-level financial experts, we also incorporate in our analysis interaction terms between each of the specialties and collectively with board size. The results are reported in Table 7. Panel A of Table 7 shows that the interaction of *EXPERTS* and *BSIZE* is not statistically significant for any of our six measures of financial

performance. This suggest that at least to some degree, the contribution of financial experts to period performance could be blunted by large boards with too many non-financial members with conflicting strategic views. Table 7 (panel B) further reveals that interaction terms between financial specialties are insignificant, suggesting that liaisons between different board-level financial experts does not appear to have tangible synergistic benefits for the financial performance of non-life insurance firms.

[Insert Table 7 here]

Robustness Tests

In addition to 2SLS, we follow prior research (e.g., Masulis et al., 2012; Marsulis and Mobbs, 2012; Liu et al., 2014) and employ alternative estimations to address potential endogeneity between board-level financial experts and the performance of insurance firms. First, we re-estimate our regression analysis using firm fixed-effects that control for time-invariant firm-specific factors that relate to both board-level financial expertise and corporate performance. Second, we use one-year lagged financial expert measures and one-year lagged board and firm characteristic variables in our models to replace the contemporary ones since board-level financial experts are likely to need time to influence corporate performance. This procedure is estimated using both the fixed-effects and 2SLS approaches. We find that our results are robust to these alternative approaches.

We also investigated whether or not the promulgation of the insurance accounting standard IFRS 4 (2005) impacted on the financial expert-performance relation amongst our sample of insurance firms. IFRS 4 was issued in March 2004 and became effective from January 2005 for all insurers (and reinsurers) operating in the UK, Europe, and elsewhere (except for the US). IFRS 4 has the force of external audit and covers the recognition and treatment of accounting items (e.g., reserves) and greater public disclosure (e.g., of risk management policies). The impact of the introduction of IFRS 4 is potentially important as it could lower information and agency costs and enhance financial performance by improving the effectiveness of board-level monitoring, control, and advice. Additionally, the introduction of IFRS 4 could directly influence the degree of board-level financial expertise in UK-based insurance firms as it becomes a benchmark for the conduct and attestation of the annual external audit. On the other hand, IFRS 4 could have a negative impact on reported period performance by increasing the costs of board-level governance (e.g., financial experts) and external auditing. The adoption of IFRS 4 could also reduce the scope for using earnings

management techniques (e.g., reserve accruals) that maximize payoffs under executive bonus plans (e.g., see Gaver and Paterson, 2001).

To visualize the effect of IFRS 4 on our main variables of interest, we developed four trend figures. Figures 1 and 2 give the year-by-year average trends in financial performance, while figures 3 and 4 illustrates the percentage trend in board-level financial experts (and type of financial expert) and audit committees over our period of analysis (1999-2012).

[Insert Figures 1 to 4 here]

Figures 1 and 2 indicate a generally declining trend across the six financial performance indicators after 2005/6 - a phenomenon largely due to macroeconomic effects such as falling investment returns, increased competitive pressure on premium rates, and from 2007/8, the effects of the global financial crisis (Swiss Re, 2010). On the other hand, Figure 3 shows a modest gradual increase in the percentage of board-level accountants and actuaries; however, Figure 4 presents a more dramatic rise in the use of audit committees since 2004/5. Therefore, IFRS 4 appears to be associated with a greater presence of financial experts but declining average rates of financial performance across our sample of panel insurance firms. Tentatively, this observation could support the view of recent research (e.g., Bryan et al., 2013; Custódio and Metzger, 2014) that sustainable corporate performance may be conditional on other (e.g., sales and marketing) board-level skill-sets other than just financial expertise. To test further the impact of IFRS 4 on our results, we constructed a dummy variable equal to 0 for the years 1999-2003 and 1 for the years 2005-2012 to capture the performance-effect of IFRS 4 on the financial performance of our panel of insurance firms. We then interact the IFRS 4 dummy with financial experts (*EXPERTS x IFRS4*) and audit committee (*AUD x IFRS4*) to ascertain whether IFRS 4 had a mediating effect between board-level financial expertise and audit committees and their link with financial performance. The regression results are reported in Panel C of Table 7. Panel C of Table 7 reveals that the introduction of IFRS 4 had a statistically negative impact on our earnings-based measures of performance (at $p \leq 0.10$ or better, 2-tail), suggesting the accounting standard could have reduced managerial scope for earnings enhancement. We also find that the coefficient estimates for the interaction terms *EXPERTS x IFRS4* and *AUD x IFRS4* are insignificant for all our performance measures except for *EXPERTS x IFRS4* in the case of *LR*. This result implies that in general, board-level financial experts do not use the provisions of IFRS 4 to help guide decisions that impact directly on various aspects of financial performance. Overall, our results

with regard to the introduction of IFRS 4 suggest that board composition is largely an endogenous choice decision in UK non-life insurance firms.

6 CONCLUSION

Using unbalanced panel data (1999 to 2012) from the UK's non-life insurance industry we examine the collective and individual impact on six performance indicators of three types of professionally qualified board-level financial expert - accountants, actuaries and underwriters. We find that collectively, financial experts have a beneficial influence on the performance outcomes of insurers. We also observe that board-level qualified accountants and actuaries are linked with superior performance in all six of our selected financial outcome measures. Professional insurance underwriters are associated with sound solvency levels (low leverage) and underwriting results, but not with positive earnings-based measures. This suggests that underwriters may not be as adept at group-level earnings enhancement as accountants and actuaries. Additionally, we find that the introduction of IFRS 4 in 2004/5 did not have a significant impact on board composition and financial outcomes.

We consider that our research contributes to the growing literature that examines the corporate governance-financial performance relation in terms of the personal characteristics and functional expertise of board directors. Our results suggest that in the insurance sector professional accounting and actuarial expertise at the board-level is likely to be relatively more important than underwriting expertise for ensuring positive group-level financial outcomes. This insight could usefully inform insurance-specific regulations and shape future corporate governance guidelines for the international insurance industry, and indeed, other parts of the financial services sector (e.g., banking). For the underwriting profession our results, at least tentatively, point to a need to reassess and develop standards of professional training and education to more closely reflect the requirements of securing group-level financial performance targets. Our study also indicates that the introduction of IFRS 4 did not have a positive effect on financial outcomes, and that the standard had only a minor and statistically insignificant effect on the composition of financial experts on the boards of insurance firms. Therefore, board-level financial expertise may not be the sole panacea for realizing sound and sustainable corporate performance. Overall, our analysis implies that the way boards are constituted in insurance firms is largely an endogenous process.

Finally, we believe that the key conclusion of our study - that professionally qualified financial expertise at the board-level matters for performance - has implications for other parts of the financial services sector (e.g., banking) where corporate governance is a

strategically important commercial and policy issue. In addition, the importance of financial professionals on the board is further relevant for emerging insurance markets (e.g., China) that are in the process of developing their regulatory and corporate governance systems. Therefore, our study could stimulate further research on the role of board-level financial experts on accounting and financial decisions in non-life insurance firms - such as their impact on the incidence and extent on reported loss reserving errors.

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Table 1: Variable Definitions

Variables	Definition
Dependent Variables	
MARGIN	Net profit margin - measured as post-tax ÷ interest earnings to 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 ratio - measured as total incurred (paid + reserved) claims + expenses (acquisition & management)/ total earned premiums
Independent Variables	
EXPERTS	the number of total financial experts divided by board size (the definition of board size can be found below)
ACCOUNS	the number of professionally qualified accountants on the board divided by board size
ACTS	the number of professionally qualified actuaries on the board divided by board size
UWS	the professionally qualified underwriters on the board divided by board size
Boards-Level Controls	
OUTS	% outsiders (non-executive directors) on the board

SEP	Dummy variable equal to 1 for separate Chairman/CEO, 0 otherwise
BSIZE	Board size - the total number of board members
AUD	Dummy variable equal to 1 for an audit committee, 0 otherwise
FEM	Gender diversity - % females on the board
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 natural logarithm of total assets
AGE	The number of years since a firm's establishment

Note: Financial variables are measured as annual figures.

Table 2: Descriptive Statistics

Panel A: 1999-2012						
	N	Mean	Median	St. dev.	Min	Max
MARGIN	1168	0.08	0.08	0.06	-0.30	0.46
ROA	1168	0.10	0.09	0.07	-0.50	0.42
ROE	1168	0.22	0.20	0.14	-0.62	0.76
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	0.10	0.61	1.30
EXPERTS	1168	0.41	0.40	0.14	0.00	0.75
ACCOUNS	1168	0.19	0.20	0.10	0.00	0.43
ACTS	1168	0.05	0.00	0.08	0.00	0.40
UWS	1168	0.17	0.17	0.09	0.00	0.50
OUTS	1168	0.60	0.63	0.11	0.00	0.80
SEP	1168	0.87	1.00	0.34	0.00	1.00
BSIZE	1168	7.85	8.00	2.29	3.00	14.00
AUD	1168	0.75	1.00	0.43	0.00	1.00
FEM	1168	0.03	0.00	0.08	0.00	0.43
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
BONUS	1168	0.80	1.00	0.40	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	46.44	33.00	33.01	1.00	133.00
Panel B: Year 1999						
	N	Mean	Median	St. dev.	Min	Max
MARGIN	92	0.05	0.05	0.07	-0.12	0.40
ROA	92	0.08	0.10	0.10	-0.50	0.26
ROE	92	0.17	0.20	0.18	-0.62	0.50
SOL	92	0.66	0.65	0.11	0.43	0.90
LR	92	0.86	0.86	0.06	0.70	0.98
COR	92	0.95	0.95	0.06	0.79	1.20
EXPERTS	92	0.38	0.40	0.17	0.00	0.75
ACCOUNS	92	0.16	0.17	0.12	0.00	0.43
ACTS	92	0.04	0.00	0.08	0.00	0.40
UWS	92	0.18	0.20	0.11	0.00	0.50
OUTS	92	0.52	0.50	0.13	0.00	0.70
SEP	92	0.84	1.00	0.37	0.00	1.00
BSIZE	92	6.19	6.00	1.77	3.00	11.00
AUD	92	0.63	1.00	0.49	0.00	1.00
FEM	92	0.01	0.00	0.05	0.00	0.43
OFORM	92	0.90	1.00	0.30	0.00	1.00
CONC	92	0.68	0.70	0.30	0.00	1.00
INSIDE	92	0.38	0.00	0.49	0.00	1.00
LIST	92	0.17	0.00	0.38	0.00	1.00
BONUS	92	0.76	1.00	0.43	0.00	1.00
P-MIX	92	0.57	0.55	0.22	0.13	1.00
REINS	92	0.32	0.32	0.08	0.18	0.75
lnSIZE	92	4.22	3.69	1.64	2.30	10.00
AGE	92	39.44	26.50	31.26	2.00	122.00
Panel C: Year 2012						
	N	Mean	Median	St. dev.	Min	Max
MARGIN	72	0.07	0.07	0.03	0.01	0.15
ROA	72	0.10	0.09	0.05	0.01	0.30
ROE	72	0.19	0.19	0.13	0.00	0.60
SOL	72	0.65	0.65	0.09	0.45	0.85
LR	72	0.84	0.86	0.07	0.63	0.96
COR	72	0.93	0.95	0.07	0.70	1.04
EXPERTS	72	0.44	0.41	0.10	0.17	0.67
ACCOUNS	72	0.21	0.24	0.07	0.00	0.33
ACTS	72	0.05	0.00	0.07	0.00	0.30
UWS	72	0.17	0.17	0.07	0.00	0.38
OUTS	72	0.66	0.67	0.06	0.50	0.75
SEP	72	0.93	1.00	0.26	0.00	1.00
BSIZE	72	9.94	10.00	1.72	6.00	14.00
AUD	72	0.88	1.00	0.33	0.00	1.00

FEM	72	0.08	0.00	0.10	0.00	0.34
OFORM	72	0.89	1.00	0.32	0.00	1.00
CONC	72	0.64	0.67	0.30	0.00	1.00
INSIDE	72	0.38	0.00	0.49	0.00	1.00
LIST	72	0.21	0.00	0.41	0.00	1.00
BONUS	72	0.86	1.00	0.35	0.00	1.00
P-MIX	72	0.58	0.60	0.21	0.13	1.00
REINS	72	0.31	0.30	0.07	0.22	0.75
lnSIZE	72	4.81	4.06	1.79	2.89	9.44
AGE	72	57.13	41.50	33.60	15.00	121.00

Note: This table presents the mean, median, standard deviation, minimum and maximum values for our dependent and independent variables. Panel A presents statistics for all available sample years from 1999 to 2012. For the purpose of trend comparison panel B presents statistics for 1999 and panel C for 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 £700million. Variable definitions are given in Table 1.

Table 3: Performance Measures Conditional on the Type of Financial Expertise

	Obs.	*MARGIN*	*ROA*	*ROE*	*SOL*	*LR*	*COR*
Panel A: By EXPERTS							
Low: *EXPERTS* < Mean	595	0.06	0.09	0.19	0.70	0.84	0.93
High: *EXPERTS* > Mean	573	0.10	0.13	0.25	0.61	0.76	0.85
P-Value (F-test) for the difference		0.00	0.00	0.00	0.00	0.00	0.00
Panel B: By ACCOUNS							
Low: *ACCOUNS* < Mean	496	0.07	0.09	0.18	0.68	0.83	0.91
High: *ACCOUNS* > Mean	672	0.09	0.12	0.24	0.63	0.78	0.87
P-Value (F-test) for the difference		0.00	0.00	0.00	0.00	0.00	0.00
Panel C: By ACTS							
Low: *ACTS* < Mean	806	0.07	0.10	0.22	0.68	0.82	0.90
High: *ACTS*> Mean	362	0.11	0.12	0.22	0.60	0.76	0.85
P-Value (F-test) for the difference		0.00	0.00	0.84	0.00	0.00	0.00
Panel D: By UWS							
Low: *UWS* < Mean	563	0.08	0.11	0.22	0.67	0.81	0.89
High: *UWS* > Mean	605	0.08	0.11	0.22	0.64	0.80	0.88
P-Value (F-test) for the difference		0.64	0.28	0.60	0.00	0.01	0.11

Note: For each year, we group the sample into low and high categories depending on whether the measure for financial expertise (or each type of financial expert - accountants, actuaries, and underwriters) 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. Better financial performance is captured by larger values for *MARGIN, ROA* and *ROE*, and smaller values for *SOL, LR* and *COR*. Variable definitions are given in Table 1.

Table 4: Panel A: Correlation Matrix between Dependent Variables and Financial Experts

	MARGIN	*ROA*	*ROE*	*SOL*	*LR*	*COR*
MARGIN						
ROA	0.48*					
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*	
EXPERTS	0.43*	0.38*	0.31*	-0.59*	-0.54*	-0.50*
ACCOUNS	0.34*	0.36*	0.31*	-0.29*	-0.32*	-0.31*
ACTS	0.31*	0.05*	0.02	-0.36*	-0.33*	-0.29*
UWS	0.02	0.14*	0.12*	-0.29*	-0.19*	-0.18*

Panel B: Correlation Matrix between Independent Variables and Financial Experts

	EXPERTS	*ACCOUNS*	*ACTS*	*UWS*	*OUTS*	*SEP*	*BSIZE*	*AUD*	*FEM*	*OFORM*	*CONC*	*INSIDE*	*LIST*	*BONUS*	*P-MIX*	*REINS*	*lnSIZE*
EXPERTS	1.00																
ACCOUNS	0.57*	1.00															
ACTS	0.54*	0.00	1.00														
UWS	0.45*	-0.24*	-0.01	1.00													
OUTS	0.38*	0.28*	0.14*	0.14*	1.00												
SEP	0.26*	0.07*	0.11*	0.23*	0.35*	1.00											
BSIZE	0.39*	0.28*	0.40*	-0.07*	0.54*	0.21*	1.00										
AUD	0.30*	0.23*	0.27*	-0.08*	0.38*	0.29*	0.45*	1.00									
FEM	0.14*	0.13*	0.17*	-0.08*	0.13*	0.04	0.38*	0.20*	1.00								
OFORM	-0.12*	-0.11*	-0.12*	0.03	-0.07*	-0.04	-0.12*	-0.04	-0.12*	1.00							
CONC	-0.15*	-0.15*	-0.04	-0.03	-0.18*	-0.37*	-0.09*	-0.16*	-0.01	0.62*	1.00						
INSIDE	0.25*	0.18*	0.37*	-0.18*	0.08*	-0.07*	0.34*	0.15*	0.09*	0.19*	0.18*	1.00					
LIST	0.28*	0.22*	0.51*	-0.29*	0.19*	0.01	0.47*	0.28*	0.25*	0.06*	0.10*	0.55*	1.00				

BONUS	0.14*	0.12*	0.00	0.11*	0.16*	0.42*	0.13*	0.19*	-0.02	0.58*	0.11*	0.14*	0.02	1.00			
P-MIX	-0.15*	0.05*	-0.25*	-0.08*	-0.19*	-0.24*	-0.30*	-0.20*	-0.10*	-0.18*	0.03	-0.19*	-0.21*	-0.33*	1.00		
REINS	-0.21*	-0.04	-0.20*	-0.11*	-0.24*	-0.13*	-0.17*	-0.29*	0.09*	-0.06*	0.08*	-0.32*	-0.26*	-0.27*	0.36*	1.00	
lnSIZE	0.32*	0.20*	0.53*	-0.18*	0.23*	0.05	0.61*	0.22*	0.34*	-0.14*	-0.05*	0.40*	0.61*	0.04	-0.34*	-0.13*	1.00
AGE	0.21*	0.12*	0.17*	0.04*	0.13*	0.22*	0.20*	0.02	0.21*	-0.12*	-0.22*	0.17*	0.11*	0.01	-0.29*	-0.19*	0.21*

Note: Table 4 presents correlation coefficients for the independent variables in panel A and dependent variables in Panel B. Pearson correlation coefficients are reported for metric pairs, and Spearman correlation coefficients are reported for correlations involving 1 or 2 non-metric variables. *indicates that coefficients are statistically significant at the 10% level or better, 2-tail. Variable definitions are given in Table 1.

Table 5: Total Financial Experts and Insurance Firm Performance

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	*MARGIN*	*ROA*	*ROE*	*SOL*	*LR*	*COR*
INTERCEPT	-0.043***	-0.006	-0.024	0.101***	0.180***	0.327***
	(-2.701)	(-0.400)	(-0.843)	(4.755)	(6.615)	(3.079)
L.DEP	0.753***	0.756***	0.852***	0.866***	0.813***	0.698***
	(9.708)	(16.960)	(31.749)	(48.552)	(40.470)	(7.254)
EXPERTS	0.036***	0.046***	0.058**	-0.044***	-0.096***	-0.119***
	(3.314)	(2.847)	(2.176)	(-3.179)	(-6.811)	(-3.704)
OUTS	0.020	0.026	0.029	-0.029*	-0.030*	-0.051**
	(1.487)	(1.195)	(0.768)	(-1.855)	(-1.791)	(-2.406)
SEP	0.000	-0.002	-0.008	0.003	0.002	0.003
	(0.071)	(-0.542)	(-1.053)	(0.735)	(0.477)	(0.753)
BSIZE	-0.002**	0.001	0.002	0.000	0.003***	0.003**
	(2.050)	(0.958)	(1.208)	(0.295)	(2.694)	(2.011)
AUD	0.004*	0.002	-0.002	0.000	-0.001	-0.001
	(1.728)	(0.699)	(-0.321)	(0.064)	(-0.168)	(-0.363)
FEM	0.011	0.005	0.035	-0.006	0.006	0.000
	(1.072)	(0.421)	(1.483)	(-0.408)	(0.290)	(0.020)
OFORM	0.005	-0.006	0.001	0.004	0.011	0.015
	(1.003)	(-0.948)	(0.110)	(0.615)	(1.463)	(1.487)
CONC	-0.000	-0.002	0.001	0.008	-0.005	-0.006
	(-0.058)	(-0.516)	(0.103)	(1.394)	(-0.856)	(-0.822)
INSIDE	0.006**	0.007**	0.008	-0.005*	-0.004	-0.005
	(1.991)	(2.199)	(1.470)	(-1.658)	(-1.218)	(-1.193)
LIST	-0.007**	-0.005	0.003	0.001	-0.003	-0.002
	(-2.024)	(-1.140)	(0.451)	(0.155)	(-0.564)	(-0.280)
BONUS	-0.005	-0.003	-0.001	0.000	0.000	-0.000
	(-1.009)	(-0.482)	(-0.146)	(0.087)	(0.045)	(-0.003)
P-MIX	0.004	-0.002	0.006	0.006	0.008	0.004
	(0.896)	(-0.354)	(0.497)	(0.953)	(1.161)	(0.561)
REINS	0.016	0.017	0.024	0.025	0.015	0.020
	(1.240)	(1.010)	(0.968)	(1.395)	(0.805)	(1.014)
lnSIZE	0.000	-0.004***	-0.007***	0.001	0.001	0.001
	(0.017)	(-3.802)	(-4.124)	(0.617)	(0.454)	(0.460)
AGE	0.000	0.000	0.000	0.000	0.000	-0.000
	(0.904)	(0.847)	(0.662)	(0.201)	(0.230)	(-0.830)
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,076	1,076	1,076	1,076	1,076	1,076
R-squared	0.747	0.747	0.816	0.875	0.830	0.719

Note: This table reports the results of the 2SLS estimations with the percentage of financial expert directors in the insurance industry as an instrument for *EXPERTS*. The t-statistics are reported in parentheses, while ***, **,* indicate statistical significance at the 1%, 5% and10% levels respectively in 2-tail tests. *L.DEP* is the lagged dependent variables (*MARGIN, ROA, ROE, SOL, LR* and *COR*). Variable definitions are given in Table 1. Better financial performance is captured by larger values for *MARGIN, ROA* and *ROE*, and smaller values for *SOL, LR* and *COR*.

Table 6: Individual Type of Financial Experts and Insurance Firm Performance

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	*MARGIN*	*ROA*	*ROE*	*SOL*	*LR*	*COR*
INTERCEPT	-0.033***	0.002	0.001	0.091***	0.168***	0.312***
	(-2.967)	(0.123)	(0.056)	(4.810)	(7.143)	(9.868)
L.DEP	0.748***	0.753***	0.851***	0.866***	0.815***	0.699***
	(38.745)	(41.005)	(55.133)	(57.644)	(44.768)	(31.222)
ACCOUNS	0.042***	0.064***	0.083***	-0.038**	-0.108***	-0.126***
	(3.720)	(4.400)	(3.284)	(-2.502)	(-6.270)	(-5.706)
ACTS	0.059***	0.056***	0.086***	-0.034*	-0.093***	-0.134***
	(3.934)	(3.003)	(2.606)	(-1.666)	(-4.082)	(-4.583)
UWS	0.015	-0.027*	0.026	-0.054***	-0.082***	-0.098***
	(1.310)	(1.784)	(0.986)	(-3.288)	(-4.571)	(-4.246)
OUTS	0.026**	0.029**	0.034	-0.027*	-0.031*	-0.055**
	(2.231)	(1.970)	(1.342)	(-1.742)	(-1.854)	(-2.520)
SEP	0.001	-0.000	-0.005	0.003	0.001	0.002
	(0.348)	(-0.091)	(-0.631)	(0.744)	(0.134)	(0.321)
BSIZE	0.002**	0.001	0.002	0.000	0.003**	0.003**
	(2.246)	(0.864)	(1.126)	(0.239)	(2.487)	(2.101)
AUD	0.003	0.000	-0.004	-0.000	0.000	-0.000
	(1.351)	(0.141)	(-0.765)	(-0.152)	(0.090)	(-0.080)
FEM	0.010	0.004	0.034	-0.006	0.007	0.001
	(0.803)	(0.255)	(1.190)	(-0.362)	(0.351)	(0.044)
OFORM	0.007	-0.004	0.005	0.005	0.010	0.014
	(1.284)	(-0.588)	(0.411)	(0.735)	(1.277)	(1.333)
CONC	0.000	-0.002	0.002	0.008	-0.006	-0.007
	(0.019)	(-0.292)	(0.198)	(1.471)	(-0.952)	(-0.846)
INSIDE	0.005**	0.007**	0.007	-0.005	-0.004	-0.004
	(2.194)	(2.136)	(1.268)	(-1.605)	(-1.180)	(-0.918)
LIST	-0.010**	-0.007	-0.001	-0.001	-0.002	0.000
	(-2.466)	(-1.387)	(-0.088)	(-0.117)	(-0.355)	(0.053)
BONUS	-0.006	-0.005	-0.004	-0.000	0.002	0.001
	(-1.621)	(-0.990)	(-0.518)	(-0.103)	(0.296)	(0.164)
P-MIX	0.004	-0.004	0.003	0.006	0.010	0.005
	(0.701)	(-0.646)	(0.312)	(0.894)	(1.317)	(0.548)
REINS	0.018	0.016	0.024	0.025	0.017	0.020
	(1.317)	(0.930)	(0.786)	(1.433)	(0.855)	(0.763)
lnSIZE	-0.000	-0.004***	-0.007***	0.001	0.001	0.001
	(-0.169)	(-3.069)	(-3.233)	(0.414)	(0.403)	(0.465)
AGE	0.000	0.000	0.000	0.000	0.000	-0.000
	(0.594)	(0.561)	(0.479)	(0.169)	(0.291)	(-0.626)
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,076	1,076	1,076	1,076	1,076	1,076
R-squared	0.749	0.747	0.816	0.875	0.830	0.719

Note: This table reports the results of the 2SLS estimations with the percentage of each type of financial experts in the insurance industry as an instrument for *ACCOUNS, ACTS* and *UWS* respectively. The t-statistics are reported in parentheses, while ***, **,* indicate statistical significance at the 1%, 5% and10% levels respectively in 2-tail tests. *L.DEP* is the lagged dependent variables (*MARGIN, ROA, ROE, SOL, LR* and *COR*). Variable definitions are given in Table 1. Better financial performance is captured by larger values for *MARGIN, ROA* and *ROE*, and smaller values for *SOL, LR* and *COR*.

Table 7: The Interaction Effects of Financial Experts on Insurance Firm Performance

	(1) *MARGIN*	(2) *ROA*	(3) *ROE*	(4) *SOL*	(5) *LR*	(6) *COR*
Panel A: $PERF_{it}$ = ($PERF_{it-1}$, $EXPERTS_{it}$, $EXPERTS_{it}$×$BSIZE_{it}$, $CONTROLS_{it}$) + u_{it}						
EXPERTS	0.036***	0.046***	0.058**	-0.046***	-0.098***	-0.120***
	(3.319)	(2.801)	(2.156)	(-3.425)	(-7.108)	(-3.735)
EXPERTS×BSIZE	-0.001	-0.000	0.002	0.005	0.005	0.004
	(-0.366)	(-0.030)	(0.236)	(1.305)	(1.098)	(0.724)
Observations	1,076	1,076	1,076	1,076	1,076	1,076
R-squared	0.747	0.747	0.816	0.875	0.830	0.719
Panel B: $PERF_{it}$ = ($PERF_{it-1}$, $ACCOUNS_{it}$, $ACTS_{it}$, UWS_{it}, $ACCOUNS_{it}$×$ACTS_{it}$, $ACCOUNS_{it}$×UWS_{it}, $ACTS_{it}$×UWS_{it}, $CONTROLS_{it}$) + u_{it}						
ACCOUNS	0.043***	0.066***	0.085***	-0.033**	-0.109***	-0.128***
	(3.562)	(4.270)	(3.162)	(-2.056)	(-5.996)	(-5.498)
ACTS	0.058***	0.062***	0.089**	-0.032	-0.085***	-0.122***
	(3.486)	(2.970)	(2.412)	(-1.441)	(-3.388)	(-3.816)
UWS	0.015	0.025	0.017	-0.058***	-0.082***	-0.096***
	(1.180)	(1.543)	(0.600)	(-3.327)	(-4.306)	(-3.943)
ACCOUNS×ACTS	0.017	0.046	-0.194	0.267	0.095	0.090
	(0.115)	(0.248)	(-0.589)	(1.392)	(0.438)	(0.321)
ACCOUNS×UWS	-0.021	-0.087	-0.322	-0.100	0.030	0.076
	(-0.231)	(-0.762)	(-1.608)	(-0.854)	(0.228)	(0.448)
ACTS×UWS	0.048	-0.150	-0.402	0.225	-0.182	-0.278
	(0.312)	(-0.770)	(-1.175)	(1.133)	(-0.809)	(-0.954)
Observations	1,076	1,076	1,076	1,076	1,076	1,076
R-squared	0.749	0.748	0.817	0.875	0.831	0.720
Panel C: $PERF_{it}$ = ($PERF_{it-1}$, $EXPERTS_{it}$, $IFRS_{it}$, $EXPERTS_{it}$×$IFRS_{it}$, $CONTROLS_{it}$) + u_{it}						
EXPERTS	0.045***	0.045**	0.077*	-0.042**	-0.119***	-0.128***
	(3.039)	(2.117)	(1.937)	(-2.057)	(-6.744)	(-5.625)
IFRS4	-0.017*	-0.027***	-0.032**	0.005	0.012	0.035
	(-1.861)	(-2.887)	(-2.177)	(0.483)	(1.179)	(1.602)
EXPERTS×IFRS4	-0.016	0.001	-0.033	-0.004	0.044**	0.017
	(-1.102)	(0.065)	(-0.853)	(-0.225)	(2.233)	(0.443)
AUDxIFRS4	0.005	0.002	0.006	0.001	-0.008	-0.007
	(0.929)	(0.293)	(0.411)	(0.180)	(-1.246)	(-0.890)
Observations	1,076	1,076	1,076	1,076	1,076	1,076
R-squared	0.748	0.747	0.816	0.875	0.831	0.719

Note: This table reports the results of the 2SLS estimation. In Panels A and C, the percentage of each type of financial experts in the insurance industry is used as an instrument for *EXPERTS*. In Panel B, the percent of financial expert directors in the insurance industry is used as an instrument for *ACCOUNS ACTS* and *UWS* respectively. The t-statistics are reported in parentheses, while ***, **,* indicate statistical significance at the 1%, 5% and10% levels respectively. The significance levels for the independent variables are 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). Coefficient estimates for the *INTERCERPT*, lagged dependent variables, and control variables are suppressed for expositional convenience. In Panel C, *IFRS4* is a dummy variable equal to 0 for the years 1999-2003 and 1 for the years 2004-2012. Definitions for the other variables are given in Table 1. Better financial performance is captured by larger values for *MARGIN, ROA* and *ROE*, and smaller values for *SOL, LR* and *COR*.

Figure 1: The Trend of Earnings-Based Performance Measures

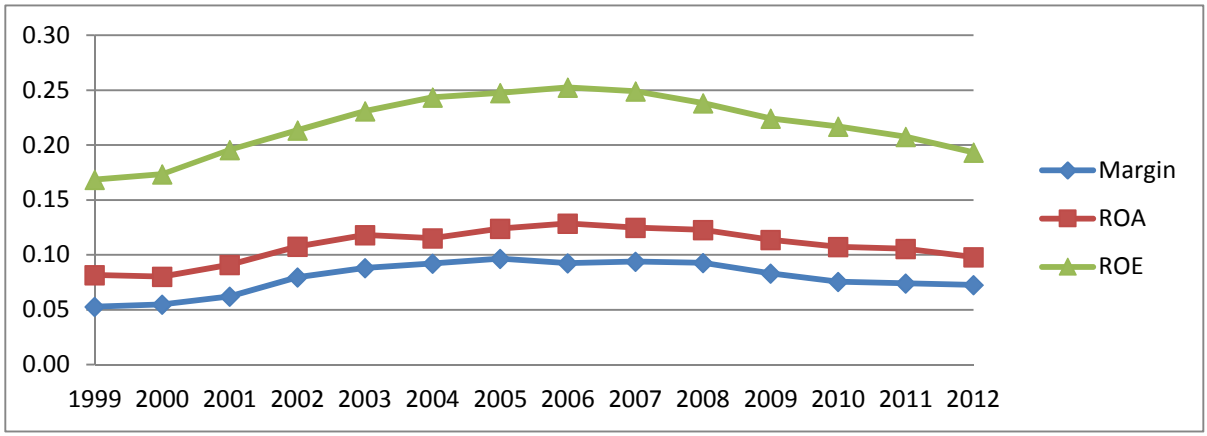

Figure 2: The Trend of Solvency-Based and Underwriting Performance Measures

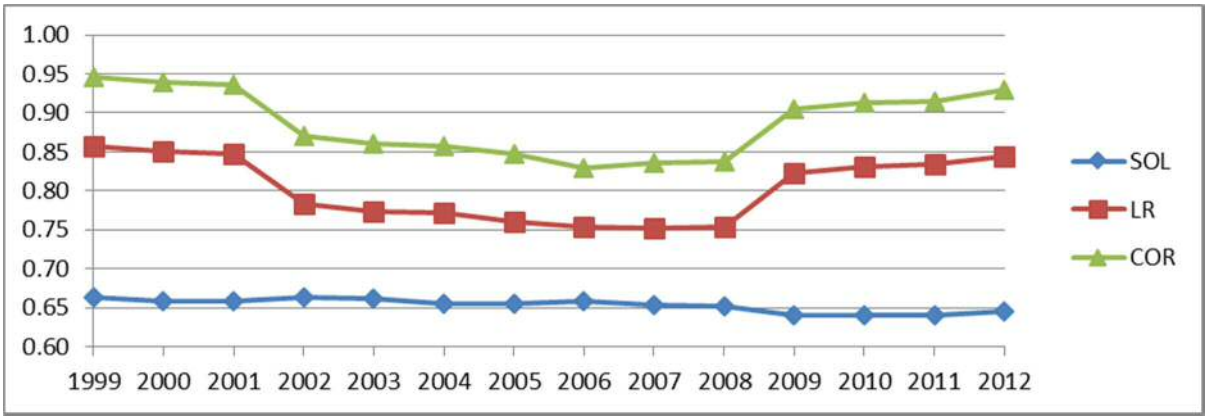

Figure 3: The Trend of Total and Type of Finance Experts

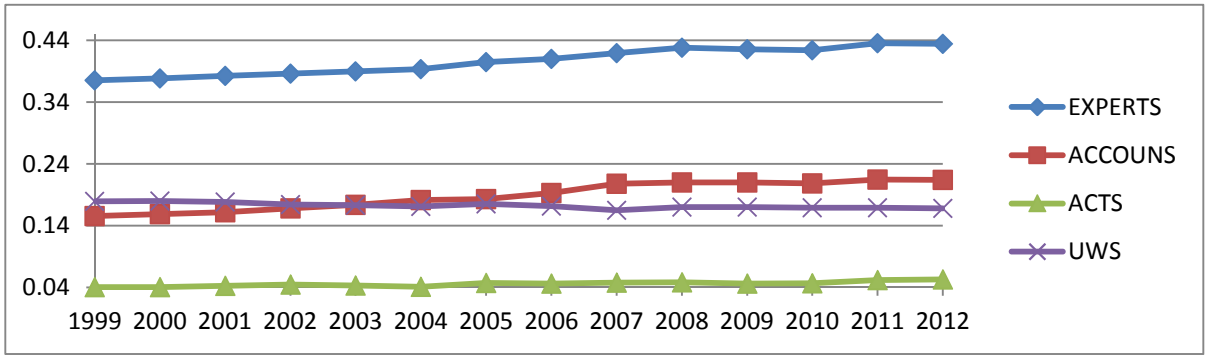

Figure 4: The Trend for % Insurers with Audit Committees