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Do Chief Executives' Traits Affect the Financial Performance of Risk-trading Firms? Evidence from the UK Insurance Industry

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We examine the effects of four key dimensions of Chief Executive Officers' (CEOs') traits on six financial performance metrics using panel data for 1999–2012 drawn from the UK's property–casualty insurance industry. We find that CEO insurance experience and CEO financial expertise enhance financial performance, while two other CEO traits – power and age – are generally not significant. Our results thus reinforce the importance of CEO insurance industry expertise and CEO financial expertise in the management and trading of risks. Our results have potential commercial and policy implications.

Introduction

Nowhere are financial performance indicators so central to corporate governance and the realization of strategic activities than in firms engaged in the trading, bearing and management of extreme risks such as those operating in the insurance industry (Landier *et al.*, 2012). Insurance is a highly specialized and technically complex commercial activity (e.g. in terms of risk selection and pricing) that protects the consumers of insurance (the policyholders) from contractually contingent economic losses through the effective diversification of assumed risks and returns on invested assets (Knights and Vurdubakis, 1993). Another distinguishing feature of insurance is that, in contrast to other industries, the management of risk and uncertainty impacts directly on policyholders as the value of their future financial claims is dependent on the strength and condition of the insurance provider (Desai, 2014). As a result, insurers are archetypal risk-bearing/risk-trading enterprises whose financial model involves managing balance sheet assets and liabilities through the matching of cash inflows from written premiums and income from well-diversified investment portfolios with cash outflows on settled claims and business expenses (Starita and Malafronte, 2014).

In developed insurance markets, such as the UK, insurers operate within a stringent statutory and regulatory framework that is designed to maintain financial resilience and protect the fixed contractual claims of policyholders (Gaa and Krinsky, 1988). Additionally, since the 1980s the international insurance industry has been subject to increased product-market competition, increased scrutiny by the public media and heightened financial constraints (Knights and Willmott, 1993). Moreover, board-level financial expertise has become particularly pertinent in insurance firms since the UK's Financial Services and Markets Act (2000) and the greater degree of

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statutory compliance that it imposed, including regulatory approval of senior executive appointments (Dewing and Russell, 2008). Together these institutional factors necessitate that the Chief Executive Officers (CEOs) of insurance firms are proficient in the technical and governance aspects of risk and insurance, and have sufficient firm-related knowledge and financial management acumen to make strategic decisions that maximize firm value within the confines of regulation and market competition. These considerations could increase the need for the CEOs of insurance firms to use their discretion and influence in initiating and directing strategic decisions.

In this study, we used a longitudinal panel data set (1999–2012) drawn from the UK property–casualty insurance industry to test the effects of four key dimensions of CEOs' characteristics – functional autonomy (power), age, insurance industry experience and financial expertise[1] – on six commonly used financial performance metrics: the net profit margin, return on assets, return on equity, solvency (leverage), loss ratio and combined operating ratio.[2] Using an ordinary least squares (OLS) model and a propensity score matching approach, we find that CEO insurance experience and CEO financial expertise enhance financial performance. However, the results for two other CEO traits – power and age – are generally not significant. Our results thus reinforce the importance of a CEO's insurance and financial expertise in the effective management and trading of insurable risks.

We contribute to the literature in at least three main ways. First, potential tensions between the strategic decisions of the CEO and the views of board-level subordinates in insurance firms provide an interesting context within which to examine the financial outcomes associated with CEOs' traits and the moderating influence of board-level and firm-related variables. For example, in idiosyncratic and information asymmetrical insurance firms, professional financial status may not only confer 'expertise' and 'prestige' power on CEOs but concomitantly impose reciprocal ties and obligations on them – such as to share financial information with others who are members of other professional bodies (Greenwood, Suddaby and Hinings, 2002).[3] The 'expertise' and 'prestige' dimensions of a CEO's power profile could ameliorate rather than reinforce the potential abuse of structural power that the CEO has over other board members, and so promote a positive rather than a negative impact on the financial performance of insurance firms. This notion thus provides a new theoretical angle on the optimality of board structure and the nature of strategic leadership in insurance and other industries where the management of extreme risk is a key board-level function.

Second, the observations of many prior studies of the CEO–performance relation in publicly listed companies (e.g. Serfling, 2014) could be confounded by inherent business and economic risk variations due to industry effects and differences in regulation and accounting practices. In contrast, the greater firm-level/time-series variation in our single industry sample of UK insurance firms (e.g. in terms of size, organizational form and ownership structure) helps to reduce cross-sectional and firm selection (Miller and Yang, 2015). Indeed, O'Sullivan and Diacon (2003) consider that the

[1]The concept of power – defined by Combs *et al.* (2007) as the ability of the lead executive to influence and dominate others – is particularly important in analysing firm performance as CEOs tend to have considerable influence over resource allocation decisions, the budgetary process and the approval of published accounting statements.

[2]Superior financial performance is captured by larger values for the net profit margin, return on assets and return on equity, and smaller values for the solvency ratio, loss ratio and combined operating ratio. These accounting ratio based measures are commonly used in studies of the corporate governance–performance relation as they relate the abilities of the CEO and the board to effectively utilize resources (e.g. assets and equity capital) for maximum return. Moreover, our six accounting indicators are more appropriate in the context of the present study than market-based performance measures (e.g. the earnings per share or price–earnings ratio) as most UK insurers are not major public exchange traded entities.

[3]We classify a CEO as a financial expert if he/she has formal and legitimated professional accountancy, actuarial or insurance underwriting qualifications. Professional financial associations define and constitute relevant technical knowledge, devise calculative frames and devices, and signal credibility to users of financial statements and other audiences in the economy and society. Our definition of financial expert is thus more precise than that of the US Sarbanes–Oxley (SOX) Act (2002), which adopts 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. CEOs who are members of other financial bodies (e.g. Chartered Financial Analysts) were not observed from our panel sample of insurance firms.

ability to examine the governance–performance effects not only in publicly listed firms but in entities of different organizational forms and ownership structures is a particular advantage of insurance industry focused research.

Third, our study provides new evidence on the CEO–performance relation in risk-trading enterprises. For example, we find that a CEO's insurance industry experience mitigates performance dilution effects that can arise when such individuals wield too much power over strategic decisions. Signalling the insurance credentials of the CEO through financial metrics can also be critical for an insurer seeking to navigate its way to optimizing its competitive position and complying with increasingly cumbersome regulations and statutory requirements (e.g. in terms of solvency maintenance) (Starita and Malafronte, 2014). This attribute could also have practical benefits in enabling investors, regulators and others (e.g. financial analysts and credit ratings agencies) to better evaluate the rationale for selecting CEOs in financial firms as well as more accurately predict the *ex post* impact of such appointments on future financial performance.

Our paper is organized as follows. The next section gives background information on the UK's property–casualty insurance industry and explains why this sector is a good environment within which to focus our research. Then we develop and put forward our hypotheses, while the following section outlines the research design. We then present our empirical results, and finally we discuss our results and conclude the paper.

Institutional background

The UK's non-life insurance industry is the third largest in the world (after the USA 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 generate approximately £50 billion (US$72 billion) in gross annual premiums (International Underwriting Association, 2013).[4] In addition, 94 active syndicates at the Lloyd's of London insurance market currently underwrite direct non-life premiums of roughly £25.3 billion (US$36 billion) per annum, mainly in property and casualty lines of insurance (Lloyd's of London, 2014). Regulatory and structural changes in the UK insurance market as well as recent high profile corporate failures (e.g. the collapse in 2001 of Independent Insurance plc) have heightened the need for the CEOs of insurance firms to have sufficient firm-specific and business knowledge and expertise (Atkins *et al.*, 2011).

We situate our study within the UK's property–casualty insurance industry for at least three main reasons. First, risks are more unpredictable in the property–casualty insurance industry compared with the life insurance industry due to the relative absence of actuarial technology. This means that the CEOs of property–casualty insurers have greater discretion over decision-making and are less encumbered by actuarial procedures and other corporate controls compared with their counterparts in the life insurance industry (Mayers and Smith, 1981). This enables us potentially to conduct a more direct test of our research hypotheses. Second, in addition to its global importance and recent corporate failures, the UK insurance sector has incurred adverse media publicity with regard to, amongst other things, product mis-selling and disputed claim payments (Webb and Pettigrew, 1999). Therefore, the UK insurance sector provides a context where the performance-effectiveness of CEOs has been called into question by government agencies, the public media and others. The financial viability of UK insurance firms has also taken on a higher public profile following the implementation of the European Union's Solvency II risk-based capital rules in January 2016. Third, whilst exhibiting some similarities with the USA (e.g. an increased tendency towards bigger and more independent boards) the system of corporate governance in the UK is in many ways different. For example, in the UK there is no equivalent to the SOX Act (2002) which mandates, amongst other things, that CEOs certify financial statements and confirm and disclose an opinion on the adequacy of systems of internal control. Such statutory

[4]In 2013 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.

prescriptions and the associated high penalties for non-compliance have increased rates of CEO turnover in US firms over the last decade (Kaplan and Minton, 2012). This situation could therefore reduce the propensity for experiential learning amongst CEOs in the US insurance industry and so reduce their ability to directly influence firm performance. Baranchuk and Dybvig (2009) also argue that sanctions imposed by the SOX Act (2002) on the boards of US companies have encouraged over-precautionary behaviour amongst senior executives and resulted in the passing-up of potentially profitable investment opportunities so reducing value for shareholders. In contrast, the UK corporate sector, including its insurance industry, is not subject to such potentially confounding influences on the CEO−performance relation (Adams and Jiang, 2016). Again, this attribute thus allows us to conduct potentially more powerful tests of our hypotheses.

Literature review and hypotheses development

Agency theory holds that the need for corporate governance arises because of incentive conflicts between owners (principals), managers (agents) and other contracting constituents (e.g. creditors) in firms (Eisenhardt, 1989). In this context, the board of directors being at the apex of the organization is responsible for ensuring that CEOs exercise their decision-making discretion in ways that maximize firm value and, particularly in the highly regulated insurance sector, ensuring future levels of solvency (O'Sullivan and Diacon, 2003). As we noted earlier, such a situation suggests that business informed and industry experienced CEOs will be particularly important in the insurance sector with its plurality of constituents, technical complexities, different risk specialties and overriding fiduciary responsibilities, especially with regard to the fulfilment of policyholders' contractual claims (Gaa and Krinsky, 1988).

Hambrick and Mason's (1984) 'upper echelons' perspective holds that once a dominant leader is appointed the new board structure is constituted endogenously as a result of the influence and bargaining position of the newly elected CEO in self-appointing members of the top management team. Such a hegemonic position is likely to be enhanced if the CEO has a track record of superior financial performance in the firm (or other recently led firms). In such circumstances, a dominant CEO is unlikely to appoint board members who might scrutinize too closely his/her decisions but rather self-structure boards for private gain at the expense of the interests of contracting constituents (Donaldson and Davis, 1991).

Khanna, Jones and Boivie (2014) consider that for board members to effectively fulfil their supervisory, policy ratification and advisory functions it is imperative for them and the CEO to coexist in an environment of mutual trust and respect. The efficacy of such a relationship in insurance firms is likely to be dependent on the characteristics of CEOs, such as their age, knowledge and accumulated business experience as well as the ability to harness such qualities and other resources for the economic benefit of the organization (Simsek, 2007). Gaa and Krinsky (1988) argue that financial performance metrics take on particular importance in the insurance industry given the difficulty of assessing the ability of insurers to meet their contractual expectations to policyholders, investors and other contracting constituents. Accordingly, key financial information (e.g. underwriting measures such as the loss and combined operating ratios) enables investors, policyholders and other stakeholders of insurance firms (e.g. regulators and brokers) to improve their subjective assessments of expected future cash flows on their invested interests in the risk pool. Key components in calculating the financial strength and performance of insurance firms are risk selection and premium rating. These functions rely heavily on technical actuarial and underwriting expertise in classifying, discriminating and pricing risks assumed by the insurance pool. Indeed, the optimal selection and effective diversification of assumed risks enables effective corporate governance and regulatory compliance and promotes the financial performance and market value of insurance firms (Lehtonen and Liukko, 2011). Whilst CEOs in the UK do not have equivalent statutory responsibilities on accounting disclosures as in the USA under the SOX Act (2002), the CEOs of UK insurers nevertheless have to 'sign off' the annual statutory solvency filings sent to the insurance industry regulator.[5] This requirement implies that CEOs should have a high degree of financial competence in order

[5]During the period covered by our study the UK's insurance industry regulator was the Financial Services

to objectively assess and faithfully signal the veracity of the annual statutory accounting returns.

CEO power

Haleblian and Finkelstein (1993) argue that while dominant CEOs can engage in self-interest behaviour, they need not always reduce firm value. For example, powerful CEOs can give force and direction to strategic resource allocation decisions as well as promote risk-taking that help firms secure economic advantages over rivals and earn their shareholders above-average returns (Adams, Almeida and Ferreira, 2005). Additionally, determined and confident board leadership over a sustained period of time can help neutralize contestable leadership claims (i.e. so-called circulatory power effects) and thereby consolidate the structural and legitimacy power profiles of incumbent CEOs (Westphal and Zajac, 1997). Therefore, a board structure whereby the interests of directors are closely aligned with, rather than opposed to, powerful CEOs can lower agency costs, and so directly improve firm performance. This attribute of CEO power is likely to be particularly important in technical and informational obtuse sectors, such as insurance, that are subject to not only increasing competitive pressures but also the constraints of industry regulation (Desai, 2014). In fact, Miller and Yang (2015) find that CEO power is positively related to firm value in the US insurance industry. Moreover, sure-footed decision-making from a powerful CEO is likely to be particularly a matter for the financial performance of many UK insurers given the added risks and uncertainties arising from the international nature of their business operations. Consequently:

> *H1*: *Ceteris paribus*, CEO power is likely to be positively related to superior financial performance in insurance firms.

CEO age

Holmström (1999) argues that a CEO's age can impact on his/her risk preferences and financial decision-making behaviour with younger CEOs being more risk averse than their older counterparts because they are motivated to protect the future value of their human capital against financial mishap and reduced firm value. On the other hand, risk adversity amongst CEOs could be increasing in age because of entrenchment and inertia. In addition, a reducing term of office shortens CEOs' career horizons and motivates them to engage in precautionary strategies in order to preserve their public reputations for business success but at the cost of sub-optimal performance (Krause and Semadeni, 2014). In fact, Cline and Yore (2016) find that the age of CEOs is negatively related to firm value, operating performance and new business trade deals. In contrast, Prendergast and Stole (1996) predict that younger CEOs are more likely than their older counterparts to take upside risks in order to signal an innovative managerial style in the executive job market and the creation of valuable high growth opportunities. Indeed, Matta and Beamish (2008) find that in the US corporate sector potentially high risk/high payoff overseas investments are associated with younger CEOs and the existence of executive stock option plans. However, as noted earlier, the insurance industry is also subject to statutory solvency monitoring and other (e.g. market conduct) regulations, which require the CEOs and boards of insurance firms to exercise strategic prudence and financial control over assumed risks in order to avoid the risk of unexpectedly severe losses (Scordis, 2011). Older CEOs are also expected to be familiar with insurance industry norms and practices, and possess the necessary business acumen to maximize financial outcomes. Indeed, Cohen and Dean (2005, p. 686) contend that older CEOs can enhance a firm's legitimacy and financial viability in the eyes of stakeholders as '… age often implies knowledge, experience, wisdom and established networks'. Again, these attributes are likely to be particularly important in a major global insurance market such as the UK. Therefore:

> *H2*: *Ceteris paribus*, CEO age is likely to be positively related to superior financial performance in insurance firms.

CEO insurance experience

Research from the US corporate sector (e.g. Sundaramurthy, Pukthuanthong and Kor, 2014) suggests that the industry-specific attributes of

Authority (FSA). Since 1 April 2013 the statutory supervision and regulation of UK insurance companies has been conducted by the Prudential Regulation Authority (PRA), whilst matters of insurance market operations are now regulated by the Financial Conduct Authority (FCA). The PRA is part of the Bank of England and the FCA is an independent regulatory body which is accountable to HM Treasury.

CEOs and other board directors are strategically important in ensuring financial sustainability, signalling surety to customers and capital providers, and maximizing firm value. Simsek (2007) adds that, for complex organizations (such as insurance firms) operating in highly competitive and turbulent market conditions, boards can significantly economize on transactional decision-making, and hence improve their financial results by leveraging CEOs' industry-specific knowledge and their links to valuable upstream (e.g. reinsurers) and downstream (e.g. brokers) business contacts. Haynes and Hillman (2010) also consider that a CEO embedded in the industry of the focal firm widens access to key strategic (e.g. accounting) information and so increases confidence amongst other board members that strategic investment and financing decisions will follow industry norms, maximize firm value, reduce uncertainty and ensure the entity remains a 'going concern'. Accordingly:

H3: *Ceteris paribus*, CEO insurance industry experience is likely to be positively related to superior financial performance in insurance firms.

CEO financial expertise

Agrawal and Chadha (2005) argue that board-level financial expertise is critically important in meeting performance targets in technically complex and uncertain business environments, such as the insurance industry. They suggest that, given the role of financial information in promoting effective stewardship and strategic decision-making, professional financial expertise at the head of the organization is likely to be associated with 'quality' public reporting (i.e. 'true and fair' financial statements) and thus highly valued by investors, industry regulators and others (e.g. credit ratings agencies).[6] Armstrong, Guay and Weber (2010) add that board-level financial expertise is necessary because finance not only is a key factor of production in firms but gives rise to a complex nexus of contacting relationships between the providers and users of capital resources who themselves possess differing capabilities in assessing a firm's prospects. Given that insurance firms are subject to annual statutory solvency monitoring and strict regulatory compliance (Dewing and Russell, 2008), financially expert CEOs are likely to be particularly useful in signalling the economic condition of insurance firms to investors, policyholders and others. Moreover, as heads of major institutional investors, insurance industry CEOs are regularly liaising not only with regulators but also with financial analysts and are directly involved with advising new but high growth option firms in whom they invest (Higgins and Gulati, 2006). The position of London as a leading international financial market with large institutional investment (Nachum, 2003) further underpins the importance of financial expertise at the head of the boardrooms of UK insurance firms. Such a role again heightens the importance of financial expertise at the upper echelons of insurance firms. Therefore:

H4: *Ceteris paribus*, CEO financial expertise is likely to be positively related to superior financial performance in insurance firms.

Research design

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

Data

We use 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 financial and other (e.g. demographic) board-level data were available from various sources at the time. We conduct our analysis at the level of the

[6]Professional status binds members to act in the interests of shareholders and other stakeholders – an obligation that is reinforced by the supervision of members, professional standards and ethics, and sanctions for transgression. In other words, professional associations help reduce agency costs (e.g. self-seeking opportunism) associated with the activities of their members in senior executive positions. The norms and sanctions of professional associations can also help ensure that accounting metrics that are ultimately 'signed off' by professionally qualified CEOs are credible signals of past and future performance. Reducing information asymmetries in this way is particularly important in the insurance sector where the long-term financial viability of insurance providers is of absolute importance to internal and external stakeholders. In the insurance industry, the monitoring and control function of professional bodies is further underpinned by external regulations.

Table 1. Variable Definitions

Variable	Definition
Firm performance measures	
MARGIN	Net profit margin – measured as earnings (after interest and 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 (and 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 and management) ÷ total earned premiums
CEO measures	
CEODUAL	Dummy variable equal to 1 if the CEO and Chairman positions are not separate, 0 otherwise
CEOTEN	Number of years the CEO has been in position
CEOOWN	Dummy variable equal to 1 if the CEO is also a major shareholder of the company (i.e. with the ownership level greater than 3%), 0 otherwise
CEOPAY	Annual value of total compensation the CEO received (including salary, cash bonuses and other benefits) divided by the total annual compensation of all directors on the board
CEOBONUS	Dummy variable equal to 1 if the CEO receives performance-related bonus pay and 0 otherwise
CEOAGE	Age of the CEO (years)
CEOINS	Dummy variable equal to 1 if the CEO has an insurance background, 0 otherwise
CEOEXPERT	Dummy variable equal to 1 if the CEO is a professionally qualified accountant, actuary or underwriter
Firm characteristic variables	
OUTS	Percentage of independent outside directors on the board
BSIZE	Board size – the total number of board members
AUD	Dummy variable equal to 1 for an audit committee, 0 otherwise
OFORM	Dummy variable equal to 1 for stock insurer, 0 for mutual insurer
INSIDE	Dummy variable equal to 1 for managerial share scheme, 0 otherwise
REINS	Reinsurance ceded divided by gross written premiums
lnSIZE	The natural logarithm of total assets
FIRMAGE	The number of years since a firm's establishment

Note: Financial variables are measured as annual year-end figures.

UK statutory reporting insurance focal firm, which allows us to relate financial performance and other data to the relevant decision-making unit under the direction of the CEO. The panel dataset consists of (a) insurance company data sourced from the Standard and Poor's SynThesys insurance companies' database, which are compiled from the annual statutory solvency returns submitted by UK insurers to the FSA; and (b) demographic data on boards obtained from published annual reports, industrial companies' databases (e.g. Thomson Reuters Datastream) and other sources (e.g. annual UK insurance company directories). 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 general industrial company ('captive') insurance funds were excluded from our sample selection procedure as such entities do not directly underwrite much, if any, third party insurance. Syndicates at the Lloyd's of London insurance market 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 eliminate 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). Our panel sample of 92 insurance 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. Of the panel sample of insurance firms the vast majority (94%) are non-listed private entities. Furthermore, the composition of our panel sample is restricted to 1999–2012 in that firm-level financial data had to be hand-matched with board demographic information that was not always available for every insurer. Nevertheless, our final sample of insurance firms accounts for approximately

70% of gross written premiums in the non-life sector of the UK's insurance market over the period of analysis.

Model

First, we test our hypotheses based upon the following model using OLS regression:

$$PERF_{it} = (PERF_{it-1}, CEOTRAIT_{it}, CONTROLS_{it},) + u_{it} \quad (1)$$

where the subscript i denotes the ith firm ($i = 1, \ldots, 1168$) and subscript t denotes the tth year ($t = 1999, \ldots, 2012$). PERF_{it} is one of our six dependent (outcome) variables: MARGIN, ROA, ROE, SOR, LR and COR (as defined in Table 1).[7] $CEOTRAIT_{it}$ is one of the measures that capture the characteristics of CEOs: the power indices, CEOAGE, a dummy indicator for CEOs with insurance experience (CEOINS) and a dummy indicator for CEOs who are financial experts (CEOEXPERT). CONTROLS_{it} is a vector of board- and firm-level control variables (again as defined in Table 1), including three board-level independent variables (the proportion of outside (non-executive) directors on the board (OUTS); board size (BSIZE); and the existence of an audit committee (AUD)) and five firm-specific independent variables (organizational form (OFORM), managerial ownership (INSIDE), reinsurance (REINS), firm size (lnSIZE) and firm age (FIRMAGE)). These variables have been shown by prior research to be associated with firms' performance (e.g. Adams and Jiang, 2016; Hardwick *et al.*, 2011) and so moderate the CEO−performance relation.

We perform the Hausman test for endogeneity to confirm that the OLS estimates are consistent with an instrumental variable (IV) approach. To carry out the Hausman test for each CEO characteristic variable, we run two OLS regressions. In the first regression, we regress CEOs' traits on all exogenous variables and instruments. We select CEOINT (a dummy IV capturing whether a CEO was an internal (1) or external (0) appointment) as an instrument for our CEO power proxies. Compared with internal candidates for the top job, CEOs appointed from other firms are likely to be at an information disadvantage and less likely to have established close social ties with incumbent board members (Landier *et al.*, 2012). Following Serfling (2014), we select the natural logarithm of the consumer price (CPI) of the CEO's birth year ($\text{LOG\_CPI(BIRTHYEAR)}_{it}$) as an IV for CEO age. This IV is highly correlated with CEO age as higher values of the CPI correspond to later years. However, the variable is unlikely to be correlated with strategies that affect firms' financial performance, except through its relation with CEO age. We then select the UK location of insurers (London or provincial − LOC) as an IV for CEOINS and CEOEXPERT, as the availability of financial or insurance experienced CEOs is likely to be greater in a major financial centre such as the London insurance market than elsewhere in the UK. Analysis of the first-stage regressions suggests that the selected IV is significantly related to its respective CEO trait (at the 5% level, two-tailed), therefore supporting its use as an instrument. After retrieving residuals from the first regression, we re-estimate model (1) including the residual from the first regression as an additional regressor. In almost all of the second-stage regressions, the coefficient estimate of the residual variable is statistically insignificant, suggesting that our CEO trait-related regressors are unlikely to be subject to endogeneity caused by unobserved firm-specific variables. Therefore, the results produced by the OLS approach are deemed to be reliable.

[7]As suggested by an anonymous referee, enhanced firm performance might be due to higher risk-taking. We therefore test whether our results are robust to risk-adjusted performance using two approaches. Following Bettis and Hall (1982) we first divide each relevant performance measure by its standard deviation over the previous five years and repeat the propensity score matching approach procedure. Second, as in Liebenberg and Sommer (2008), in the OLS regression where performance is the dependent variable we include a risk variable that is calculated as the standard deviation over five previous years of the performance measure as an additional control variable. Our conclusion that CEO insurance experience and CEO financial expertise enhance the performance of insurance firms does not change. In the first approach, we also run the Rosenbaum's (2002) bounds test to evaluate the sensitivity of the results based upon the propensity score matching approach to the presence of potential hidden bias that might arise from unobservable variables. When insurers whose CEOs have insurance experience are our treatment group, we obtain the following critical Γ values: 1.15 (MARGIN), 1.62 (ROA), 1.82 (ROE), 3.07 (SOL), 1.23 (LR) and 1.04 (COR). When insurers with financially expert CEOs are our treatment group, the following critical Γ values are produced: 1.09 (MARGIN), 1.11 (ROA), 1.70 (ROE), 3.16 (SOL), 1.80 (LR) and 1.32 (COR).

Second, we use propensity score matching to control for potential endogeneity as caused by observable differences in firm characteristics with regard to the corporate appointment of CEOs with certain personal attributes. This technique has become increasingly popular for estimating treatment effects in corporate governance studies (Murphy and Sandino, 2010). A key advantage of propensity score matching is that it requires neither a functional form nor specification assumptions in estimating treatment effects. This can be beneficial in situations where the exact relation between the explanatory variables and the outcome variable is not known and/or is non-linear.

The propensity score is the conditional probability of receiving the treatment given observable covariates (Hoitash, Hoitash and Kurt, 2016). The treatment status of interest in this study includes high CEO power indices (i.e. 1 for observations whose CEO power index is greater than the median value of the sample); older CEOs (i.e. 1 for observations whose CEOAGE is greater than the median value of the sample); CEOs with insurance experience; and CEOs who are financial experts. We then model a board's choice for each of these CEO characteristics through a logistic regression, where the control variables in model (1) are included in the logistic regression as covariates. Next, we estimate propensity scores for each insurance firm-year observation using estimated probabilities from the logit model. As in Hoitash *et al.* (2016), matched-pairs are formed by selecting an observation that receives the treatment and selecting another observation with the closest propensity score that does not receive the treatment. We adopt the kernel matching algorithm (with a 0.01 caliper) to examine the covariate balance between the treatment and control samples, and compare differences in the performance measures between the treatment insurance firms and their matched counterparts. The procedure of matching on propensity scores eliminates 'overt bias' amongst observable variables (Hoitash *et al.*, 2016). Finally, we assess the sensitivity of our results to potential hidden bias using Rosenbaum's (2002) bounds test (see the next section).

CEO power indices

CEO power is a complex and multifaceted concept (Combs *et al.*, 2007). Therefore, to construct our CEO power index we combine five normalized potential CEO power-related variables using the data reduction technique, principal components analysis (PCA). The five sources of structural power that are most researched and best supported in previous literature (e.g. Veprauskaite and Adams, 2013) are CEO Chair duality (CEODUAL), CEO tenure (CEOTENURE), CEO ownership (CEOOWN), CEO remuneration (CEOPAY) and CEO bonus pay (CEOBONUS). Integrating the CEO and Chairman positions in a single person (CEODUAL) increases the decision-making autonomy, resource allocation efficiency and performance record of the lead executive – a beneficial attribute in complex, competitive and regulatory uncertain environments, such as insurance markets (Davis, Schoorman and Donaldson, 1997). Long-tenured CEOs could be personally committed to realizing key strategic goals, and will have accumulated sufficient firm-specific knowledge to ensure consistently sound financial performance over time (Hill and Phan, 1991). Furthermore, powerful CEOs are also likely to be more reluctant to abdicate than their less dominant counterparts suggesting a direct link between CEO tenure and the degree of decision-making autonomy (Ridge, Aime and White, 2015). Veprauskaite and Adams (2013) argue that share ownership (CEOOWN) binds the interests of CEOs with those of shareholders and so helps increase firm performance as well as maximizing their power position as residual claimants. The level of CEO compensation (CEOPAY) is likely to be directly correlated with the market value of the CEO's human capital, including his/her performance record as well as bargaining position as the board's lead executive (Shen, 2003).

The five CEO power variables are transformed by the PCA into two dimensions – PINDEX1 and PINDEX2 – that largely capture the principal component weightings (loadings) of interrelated attributes of CEO power from the dataset (Veprauskaite and Adams, 2013).[8] Each of these two PCA-derived CEO power indices is predicated on the notion (reflected in Hypothesis 1) that greater CEO power is associated with superior financial performance. That is, positive values for PINDEX1 and PINDEX2 indicate the existence of

[8]Only the first two components derived from the PCA account for a meaningful amount of variance according to the Kaiser criterion, and so only these components are retained for further analysis.

Table 2. Descriptive statistics on the full sample

Variable	*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	0.41
ROE	1168	0.19	0.20	0.14	−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
CEODUAL	1168	0.13	0.00	0.33	0.00	1.00
CEOTEN	1168	3.75	3.00	2.25	1.00	20.00
CEOOWN	1168	0.35	0.00	0.48	0.00	1.00
CEOPAY	1168	0.34	0.35	0.08	0.15	0.63
CEOBONUS	1168	0.80	1.00	0.40	0.00	1.00
CEOAGE	1168	53.85	54.00	4.72	40.00	65.00
CEOINS	1168	0.65	1.00	0.48	0.00	1.00
CEOEXPERT	1168	0.53	1.00	0.50	0.00	1.00
OUTS	1168	0.59	0.63	0.11	0.00	0.80
BSIZE	1168	7.57	8.00	2.24	3.00	13.00
AUD	1168	0.75	1.00	0.43	0.00	1.00
OFORM	1168	0.89	1.00	0.31	0.00	1.00
INSIDE	1168	0.36	0.00	0.48	0.00	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
FIRMAGE	1168	46.46	33.00	33.07	1.00	133.00

Note: This table presents the descriptive statistics for our dependent and independent variables on the full sample from 1999 to 2012. The definitions for all variables are given in Table 1. 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.

high-power CEOs and negative values low-power CEOs. Reducing the number of explanatory CEO power variables by means of PCA mitigates the problem of multicollinearity when multiple single variables are used. This can be important as including too many conjointly influencing variables of the CEO−performance relation can obscure the causality of results (Duchin, Matsusaka and Ozbas, 2010). PCA also automatically weights each factor relative to its contribution to the development of the CEO power index, thereby avoiding the need to determine theoretically the factor loadings *ex ante* (Veprauskaite and Adams, 2013). The variables that enter our analysis are defined in Table 1.

Empirical results

Summary statistics

Table 2 gives the summary statistics for all our dependent and independent variables during the sample period 1999−2012. It gives the descriptive statistics for our six performance metrics – MARGIN, ROA, ROE, SOL, LR and COR. The first three ratios measure insurers' accounting profitability in relation to revenues, assets and invested equity; SOL reflects the solvency position; and LR and COR capture underwriting results. The means of these accounting 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 although Tables 2 and 3 highlight substantial inter-firm and cross-temporal variation in performance amongst the insurance firms in the panel sample.

Table 2 reports that, 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 different from the US property−casualty insurance industry where a majority of firms (e.g. 74% in the case of Miller, 2011) do not segregate the CEO and Chairman positions. Average CEO tenure (CEO_TENURE) for our sample period is about four years, which is fairly consistent with the average of five years reported in O'Sullivan and Diacon's (2003) analysis of corporate governance practices in the UK's life insurance sector. In

Table 3. Trend analysis for our dependent and independent variables with yearly mean values for these variables

Year	*N*	MARGIN	ROA	ROE	SOL	LR	COR	CEODUAL	CEOTEN	CEOOWN	CEOPAY	CEOBONUS	CEOAGE	CEOINS	CEOEXPERT	OUTS	BSIZE	AUD	OFORM	INSIDE	REINS	lnSIZE	FIRMAGE
1999	92	0.05	0.08	0.14	0.66	0.86	0.95	0.16	3.13	0.32	0.33	0.76	55.3	0.59	0.37	0.52	6.12	0.63	0.9	0.38	0.32	4.22	38.02
2000	92	0.05	0.08	0.15	0.66	0.85	0.94	0.16	4.02	0.34	0.34	0.76	56.18	0.6	0.36	0.51	6.13	0.63	0.9	0.36	0.32	4.29	40.09
2001	92	0.06	0.09	0.17	0.66	0.85	0.94	0.16	4.11	0.34	0.34	0.76	55.66	0.61	0.37	0.53	6.25	0.64	0.9	0.36	0.32	4.36	41.08
2002	90	0.08	0.11	0.19	0.66	0.79	0.87	0.16	3.03	0.33	0.34	0.77	54.14	0.6	0.46	0.55	6.33	0.64	0.9	0.34	0.32	4.42	42.67
2003	89	0.09	0.12	0.2	0.66	0.77	0.86	0.16	2.66	0.35	0.35	0.78	53.13	0.63	0.51	0.58	6.79	0.69	0.9	0.35	0.31	4.49	43.83
2004	89	0.09	0.11	0.22	0.66	0.77	0.86	0.16	3.22	0.35	0.35	0.78	53.35	0.63	0.52	0.59	7.17	0.7	0.9	0.35	0.32	4.52	44.82
2005	84	0.1	0.12	0.21	0.65	0.76	0.85	0.13	3.74	0.36	0.35	0.8	53.67	0.65	0.57	0.61	7.44	0.75	0.89	0.36	0.31	4.64	46.63
2006	83	0.09	0.12	0.21	0.66	0.75	0.84	0.13	3.77	0.36	0.35	0.8	53.24	0.67	0.61	0.61	7.75	0.78	0.89	0.36	0.31	4.69	47.86
2007	79	0.09	0.12	0.21	0.65	0.75	0.84	0.10	3.27	0.37	0.35	0.83	52.3	0.68	0.59	0.63	8.16	0.84	0.89	0.37	0.31	4.76	48.85
2008	78	0.09	0.12	0.21	0.65	0.75	0.84	0.10	3.35	0.37	0.35	0.82	51.94	0.68	0.62	0.64	8.69	0.86	0.88	0.37	0.31	4.78	49.99
2009	78	0.08	0.11	0.19	0.64	0.82	0.91	0.10	3.91	0.37	0.34	0.82	52.71	0.68	0.62	0.64	8.87	0.86	0.88	0.37	0.31	4.73	50.99
2010	77	0.07	0.1	0.19	0.64	0.83	0.91	0.09	4.49	0.36	0.35	0.84	53.12	0.69	0.61	0.65	8.95	0.86	0.9	0.36	0.31	4.73	52.18
2011	73	0.07	0.1	0.17	0.64	0.84	0.92	0.07	5.08	0.37	0.35	0.86	53.78	0.7	0.64	0.66	9.34	0.88	0.89	0.37	0.31	4.77	53.97
2012	72	0.07	0.09	0.16	0.64	0.85	0.93	0.07	5.26	0.38	0.35	0.86	54.49	0.71	0.65	0.66	9.35	0.88	0.89	0.38	0.31	4.81	55.35

Note: For the purpose of trend comparison, this table presents yearly mean values for our dependent and independent variables. The definitions for all variables are given in Table 1.

addition, on average 80% of our firm-year observations have bonus plans for CEOs (BONUS). The mean value for the number of directors on the board (BSIZE) over the panel period is around eight members with nearly 60% comprising outsiders; moreover, a majority (75%) of insurance firms in our dataset have audit committees (AUD). We note that the average board size for our panel sample of insurance firms is about optimal in terms of monitoring and control effectiveness according to Yermack (1996). From Table 2 we also observe that the average age (CEOAGE) of CEOs in our sample is 54 years, while nearly two-thirds of the CEOs come from an insurance or closely related (e.g. reinsurance) industry background (CEOINS), and just over half (53%) of CEOs have a professional financial qualification. These summary statistics therefore reflect the innately financial/risk knowledge intensive and specialist nature of the insurance industry and the context-based skills and experience required of CEOs operating in that sector. Table 3 further indicates that board size and constitution has increased over the panel period from a mean of about six members with about 50% outsiders in 1999 to an average board size of nine seats with two-thirds dominated by outsiders by 2012. These trends reflect the influence of various corporate governance guidelines issued during our sample period (e.g. the Higgs Report, 2003). In terms of our firm-specific control variables, 89% of our panel of sample firms relate to stock insurers (OFORM), and just over a third (36%) have equity ownership schemes as part of executive compensation (INSIDE). The mean panel sample values for reinsurance (REINS) and firm size (lnSIZE) are 0.31 and 4.57, respectively, while the average length of time that our sample of insurance firms have been operating in the UK (FIRMAGE) is approximately 47 years.

Table 4 presents the results of the PCA. Part (a) presents the correlation matrix of the five CEO power variables used to compute PINDEX. The correlation coefficients between each of the CEO power components are not strong but statistically significant (at $p \leq 0.10$, two-tailed), indicating that these variables capture different structural aspects of CEO power amongst our panel sample of insurance firms. Table 4, part (b), reports the rotated principal component weights (loadings) for PINDEX1 and PINDEX2. PINDEX1 is mainly influenced by CEODUAL and CEOBONUS, and PINDEX2 is characterized by CEOOWN and

Table 4. Principal components analysis for CEO power proxies

	CEODUAL	CEOTEN	CEOOWN	CEOPAY	CEOBONUS
(a) Correlation matrix					
CEODUAL	1				
CEOTEN	−0.10∗	1			
CEOOWN	0.06∗	0.08∗	1		
CEOPAY	0.07∗	0.09∗	0.24∗	1	
CEOBONUS	−0.42∗	0.02	0.15∗	0.09∗	1
(b) Index weights					
PINDEX1	−0.58	0.25	0.31	0.24	0.67
PINDEX2	0.46	0.18	0.58	0.62	−0.17
(c) Descriptive statistics for CEO power proxies					
	Mean	Median	Std	Min	Max
PINDEX1	0.00	0.30	1.21	−3.78	2.36
PINDEX2	0.00	−0.11	1.13	−2.32	3.54

Note: This table provides the correlation matrix for the five CEO characteristics that are used to create proxies for CEO power - PINDEX1 and PINDEX2. It also presents the principal component weights and the summary statistics for PINDEX1 and PINDEX2. In (a), *denotes statistical significance at the 10% level (two-tailed).

Table 5. Correlation matrix between firm performance variables and CEO characteristics

	MARGIN	ROA	ROE	SOL	LR	COR	PINDEX1	PINDEX2	CEOAGE	CEOINS	CEOEXPERT
MARGIN	1										
ROA	0.50*	1									
ROE	0.39*	0.55*	1								
SOL	−0.41*	−0.32*	−0.12*	1							
LR	−0.49*	−0.48*	−0.24*	0.49*	1						
COR	−0.51*	−0.50*	−0.27*	0.49*	0.95*	1					
PINDEX1	0.19*	0.10*	0.31*	−0.22*	−0.13*	−0.10*	1				
PINDEX2	0.12*	−0.11*	0.04	0.00	0.08*	0.08*	0.00	1			
CEOAGE	−0.09*	0.01	−0.07*	0.02	0.06*	0.09*	0.01	0.04	1		
CEOINS	0.27*	0.27*	0.11*	−0.32*	−0.25*	−0.24*	0.21*	0.06*	0.04	1	
CEOEXPERT	0.29*	0.18*	0.00	−0.26*	−0.23*	−0.21*	0.08*	−0.01	−0.10*	0.42*	1

Note: Variable definitions are given in Table 1.
*Statistical significance at the 10% level in two-tail tests.

CEOPAY as the absolute values of their loadings in each case exceed 0.50. Except for CEODUAL in the case of PINDEX1, all the signs of the component weights are positive implying greater CEO decision-making power. The negative sign for CEODUAL on PINDEX1 reflects that in line with the Cadbury Report (1992) most UK insurers separate the CEO and Chairman positions, suggesting a reduction in the functional power of CEOs. Table 4, part (c), also gives the relevant descriptive statistics for PINDEX1 and PINDEX2, and reveals that means are low at around 0 but with median values ranging from 0.30 in the case of PINDEX1 to −0.11 for PINDEX2.This suggests that PINDEX1 captures most of the power variation from the variables used in the PCA.

The correlation matrix in Table 5 indicates that our profitability measures MARGIN, ROA and ROE are negatively correlated with the solvency measure SOL and the underwriting performance measures, LR and COR. This is consistent with our intuition that more profitable insurance firms tend to have lower than expected claims and operating costs than less profitable insurers. Table 5 also shows that the correlations between our CEO power index PINDEX1, CEO traits including CEOINS and CEOEXPERTS and the financial performance metrics are generally low but directionally and statistically significant in line with expectations (at $p \leq 0.10$, two-tailed). However, for the other CEO power indices PINDEX2 and CEOAGE, their correlations with the five performance measures do not show a clear pattern. Table 6 presents the Pearson correlation coefficients including our board-level and firm-specific control. Many of the variable associations

Table 6. Correlation matrix between CEO characteristics and other firm characteristics

	PINDEX1	PINDEX2	CEOAGE	CEOINS	CEOEXPERT	OUTS	BSIZE	AUD	OFORM	INSIDE	REINS	LnSIZE	FIRMAGE
PINDEX1	1												
PINDEX2	0	1											
CEOAGE	0.01	0.04	1										
CEOINS	0.21*	0.06*	0.04	1									
CEOEXPERT	0.08*	−0.01	−0.10*	0.42*	1								
OUTS	0.43*	−0.12*	−0.09*	0.29*	0.26*	1							
BSIZE	0.31*	0.16*	−0.17*	0.36*	0.31*	0.50*	1						
AUD	0.33*	0.05	0.03	0.31*	0.24*	0.43*	0.39*	1					
OFORM	0.36*	0.08*	−0.11*	−0.10*	−0.16*	−0.06	−0.13*	−0.04	1				
INSIDE	0.36*	0.67*	−0.07*	0.17*	0.11*	0.12*	0.27*	0.15*	0.19*	1			
REINS	−0.15*	0.08*	−0.09*	−0.11*	−0.15*	−0.24*	−0.10*	−0.19*	−0.06*	−0.13*	1		
lnSIZE	0.28*	0.37*	−0.16*	0.30*	0.32*	0.22*	0.62*	0.28*	−0.14*	0.49*	−0.13*	1	
FIRMAGE	0.18*	−0.02	−0.02	0.08*	0.01	0.12*	0.19*	−0.01	−0.14*	0.18*	−0.20*	0.23*	1

Note: Variable definitions are given in Table 1.
*Statistical significance at the 10% level in two-tail tests.

are significantly correlated with each other, but most bivariate relations are moderate. Further, we derive variance inflation factors for all of our independent variables; all variance inflation factor values are below 10 indicating that bias due to multicollinearity is unlikely to be problematical when interpreting our empirical results (Kennedy, 2003).

In Table 7 we conduct an analysis of variance (ANOVA) to test whether our six accounting performance metrics differ significantly according to the four aspects of CEOs' characteristics captured by our Hypotheses 1−4. We categorize firm-year observations into low and high groups based upon whether the measure of the relevant CEO characteristic is below or above its mean value. Table 7, part (a), shows that a high (above-mean) aggregate level of PINDEX1 has larger MARGIN, ROA and ROE, and lower SOL, LR and COR, compared with low (below-mean) values of PINDEX1. The *F* statistics indicate that differences between the mean values of the high and low categories, with the exception of ROA, are statistically significant (at $p < 0.01$, two-tailed). A similar pattern is also observed for CEOINS (part (d)) and CEOEXPERT (part (e)); however, for PINDEX2 (part (b)) and CEOAGE (part (c)) statistically significant differences across our six accounting performance measures are less consistent.

Multivariate results

We present the OLS regression results in Table 8 where firm performance is captured by MARGIN. Although not reported, the results are robust to the use of five alternative firm performance measures. Table 8 indicates that, contrary to Hypotheses 1 and 2, our CEO power indices (PINDEX1 and PINDEX2) and CEOAGE are not related to firm performance (at the 5% level); yet, consistent with Hypotheses 3 and 4, CEO insurance experience (CEOINS) and CEO financial expertise (CEOEXPERT) are positively linked with the performance of insurance firms.

We report our propensity score analyses in Tables 9–11. Table 9 presents the logit models that we use to estimate our propensity scores. Columns 1 and 2 in Table 9 predict the probability of hiring a powerful CEO as measured by PINDEX1 and PINDEX2 respectively. Columns 3−5 predict the probability of hiring an older CEO, a CEO

Table 7. Performance measures conditional on CEOs' traits

	Observations	MARGIN	ROA	ROE	SOL	LR	COR
(a) By PINDEX1							
Low: PINDEX1 ≤ mean	418	0.07	0.10	0.14	0.68	0.82	0.90
High: PINDEX1 > mean	750	0.08	0.11	0.21	0.64	0.79	0.88
p value (*F* test) for the difference		0	0.24	0	0	0	0
(b) By PINDEX2							
Low: PINDEX2 ≤ mean	634	0.07	0.11	0.18	0.66	0.80	0.89
High: PINDEX2 > mean	534	0.08	0.10	0.20	0.65	0.81	0.89
p value (*F* test) for the difference		0	0	0.04	0.65	0.49	0.15
(c) By CEOAGE							
Low: CEOAGE ≤ mean	558	0.08	0.10	0.19	0.65	0.80	0.89
High: CEOAGE > mean	610	0.07	0.11	0.18	0.66	0.81	0.89
p value (*F* test) for the difference		0.02	0.26	0.21	0.45	0.5	0.16
(d) By CEOINS							
Low: CEOINS < mean	411	0.06	0.08	0.17	0.70	0.84	0.92
High: CEOINS > mean	757	0.09	0.12	0.20	0.63	0.79	0.87
p value (*F* test) for the difference		0	0	0	0	0	0
(e) By CEOEXPERT							
Low: CEOEXPERT < mean	552	0.06	0.09	0.19	0.68	0.83	0.91
High: CEOEXPERT > mean	616	0.09	0.12	0.19	0.63	0.78	0.87
p value (*F* test) for the difference		0	0	0.89	0	0	0

Note: For each year, we group the sample into low and high categories depending on whether the measure for CEOs' trait 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 two-tailed.

with insurance experience or a CEO who is a financial expert.[9] Our analyses suggest that all independent variables included in the logit models have at least some impact on the dependent variables. In particular, a more independent board is positively related to the likelihood of hiring a powerful CEO and a CEO with insurance industry experience and financial expertise. As indicated in prior research (e.g. Sundaramurthy, Pukthuanthong and Kor, 2014), this suggests that insurance and financial expertise could help enhance the autonomy of CEOs and increase their ability and scope to improve performance. To facilitate future strategic control and direction, larger boards tend to hire powerful CEOs (but only when measured by PINDEX2) and CEOs with insurance experience. However, insurers with audit committees are more likely to appoint a CEO with all the personality traits except insurance experience. Compared with mutual insurers, less risk-averse stock insurers are more likely to select a powerful, younger CEO without financial expertise. Managerial ownership is also positively linked with a powerful CEO (but only when measured by PINDEX1). With its ability to provide contingent-capital and so improve solvency, reinsurance motivates an insurance firm to take the risk of hiring a CEO who is younger and has no financial expertise. Thus, and as noted in prior research (e.g. Plantin, 2006), reinsurance can influence the form of corporate governance as well as the financial viability of insurance firms. Larger, and hence potentially more risk-diversified, insurance firms are more likely to appoint a CEO who is younger and with financial expertise. Firm age is positively associated with the probability to appoint a powerful CEO without financial expertise, indicating that a CEO's commercial experience as reflected by his/her age can compensate for other traits such as financial acumen (Cline and Yore, 2016).

We construct propensity scores based upon each of these models, and perform matching to construct the treatment and control groups. Table 10 presents post-matching covariate balance tests, which suggest that our matching results in a

[9]We reduce the covariates in the propensity score logit model when predicting the probability of hiring a CEO with insurance experience as the covariate means are significantly different between the treatment and the control groups. Therefore, a less parsimonious logit specification is needed to provide covariates with balancing properties.

Table 8. OLS regression analysis of CEO traits on firm performance (as measured by MARGIN)

Variables	(1) MARGIN	(2) MARGIN	(3) MARGIN	(4) MARGIN	(5) MARGIN
L.MARGIN	0.85***	0.85***	0.86***	0.86***	0.86***
	(25.11)	(25.02)	(24.57)	(24.31)	(24.55)
PINDEX1	−0.00				
	(−1.04)				
PINDEX2		−0.00			
		(−0.33)			
CEOAGE			−0.00*		
			(−1.78)		
CEOINX				0.01**	
				(1.99)	
CEOEXPERT					0.01***
					(3.25)
OUTS	0.01	0.01	0.01	0.01	0.01
	(0.63)	(0.59)	(1.12)	(0.67)	(0.72)
BSIZE	0.00	0.00	0.00	0.00	0.00
	(1.31)	(1.16)	(1.32)	(1.28)	(1.25)
AUD	0.00*	0.00	0.00**	0.00*	0.00**
	(1.87)	(1.53)	(2.10)	(1.98)	(2.24)
OFORM	0.00	0.00	0.00	−0.00	−0.00
	(0.45)	(0.07)	(0.51)	(−0.13)	(−0.51)
INSIDE	0.00	0.00	0.00	0.00	0.00
	(0.14)	(0.07)	(0.22)	(0.24)	(0.17)
REINS	0.02	0.01	0.01	0.01	0.01
	(1.13)	(1.17)	(1.08)	(1.08)	(0.90)
lnSIZE	−0.00	−0.00	0.00	−0.00	−0.00
	(−0.75)	(−0.19)	(0.03)	(−0.04)	(−0.44)
FIRMAGE	0.00**	0.00	0.00*	0.00	0.00
	(2.04)	(1.60)	(1.69)	(1.46)	(1.50)
Constant	−0.02*	−0.02*	−0.03*	−0.02*	0.00
	(−1.88)	(−1.72)	(−1.87)	(−1.72)	(0.08)
Year dummies	Yes	Yes	Yes	Yes	Yes
Observations	1075	1075	1075	1075	1075
R^2	0.75	0.75	0.75	0.75	0.75

Note: Standard errors are clustered at firm level. Variable definitions are given in Table 1. This table reports the results for OLS regressions of CEO traits on firm performance as measured by *MARGIN*.
***, **, * indicate statistical significance at the 1%, 5% and 10% levels, respectively, in two-tailed tests.

balanced sample as both the treatment and control groups appear similar with respect to various observable covariates (i.e. none of the matching covariates is significantly different at the 5% level between the two groups).

We examine performance differences between treatment and control groups and report the results in Table 11 where the kernel matching algorithm is adopted.[10] In Table 11, parts (a) and (b), insurance firms with powerful CEOs (as measured by PINDEX1 and PINDEX2 respectively) are considered as our treatment sub-sample while the remaining insurance firms are the matched control sub-sample. The results suggest that differences in performance between insurers with powerful CEOs and those without are statistically insignificant for all our performance indicators except SOL. This suggests that powerful CEOs are likely to give strategic priority to solvency maintenance in order to avoid the costs of regulatory intervention and possible restrictions on their autonomy. In Table 11, part (c), insurance firms with older CEOs are considered as our treatment sub-sample, while the matched control sub-sample consists of all remaining firms; however, we do not observe statistically significant differences between the two sub-samples. In Table 11, part (d), insurers whose CEOs have insurance industry experience are classified to be our treatment group,

[10]Our results are also robust to the radius matching algorithm.

Table 9. Logit models to find propensity scores

Variables	(1) Indicator for high PINDEX1	(2) Indicator for high PINDEX2	(3) Indicator for high CEOAGE	(4) Indicator for CEOINS	(5) Indicator for CEOEXPERT
OUTS	6.75***	8.60***	0.11	3.52***	2.43***
	(6.33)	(7.91)	(0.15)	(4.66)	(3.10)
BSIZE	0.02	0.19***	−0.09*	0.43***	0.02
	(0.31)	(2.80)	(−1.92)	(9.73)	(0.46)
AUD	1.24***	1.33***	0.40**		0.33*
	(6.17)	(6.61)	(2.37)		(1.95)
OFORM	3.04***	5.49***	−0.76***		−1.16***
	(7.70)	(12.73)	(−3.41)		(−4.55)
INSIDE	2.08***	0.00	0.15		−0.08
	(9.99)	(0.01)	(0.96)		(−0.48)
REINS	0.97	0.46	−2.26**	−1.77*	−3.65***
	(0.74)	(0.35)	(−2.30)	(−1.78)	(−3.70)
lnSIZE	0.08	0.03	−0.16***		0.39***
	(1.05)	(0.38)	(−2.79)		(5.99)
FIRMAGE	0.01***	0.02***	−0.00	0.00	−0.01***
	(4.83)	(6.62)	(−1.38)	(0.77)	(−4.31)
Constant	−9.99***	−12.87***	3.30***	−4.79***	−0.50
	(−8.85)	(−10.25)	(4.44)	(−6.71)	(−0.67)
Year dummies	Yes	Yes	Yes	Yes	Yes
Observations	1,168	1,168	1,168	1,168	1,168
Pseudo R^2	0.36	0.39	0.08	0.14	0.15

Note: Dependent variables in these regressions are indicators for high CEO power index 1 (1 for observations with PINDEX1 greater than the median, 0 otherwise) in column 1, high CEO power index 2 (1 for observations with PINDEX2 greater than the median, 0 otherwise) in column 2, high CEO age (1 for observations with CEOAGE greater than the median, 0 otherwise) in column 3, CEO insurance experience (1 for observations with CEOINS 1, 0 otherwise) in column 4, and CEO financial expert (1 for observations with CEOEXPERT 1, 0 otherwise) in column 5. Definitions for independent variables are given in Table 1.
***, **, * indicate statistical significance at the 1%, 5% and 10% levels respectively in two-tailed tests.

Table 10. Propensity score matching covariate balance test

	PINDEX1			PINDEX2			CEOAGE			CEOINS			CEOEXPERT		
	High	Low	*t* statistic	High	Low	*t* statistic	High	Low	*t* statistic	High	Low	*t* statistic	High	Low	*t* statistic
OUTS	0.62	0.62	−0.12	0.61	0.61	0.27	0.59	0.58	1.14	0.62	0.62	−1.43	0.62	0.62	−0.37
BSIZE	7.64	7.63	0.07	7.43	7.50	−0.67	7.26	7.14	0.98	7.96	7.78	1.59	8.05	8.09	−0.31
AUD	0.85	0.86	−0.45	0.81	0.82	−0.50	0.75	0.73	0.95				0.84	0.85	−0.58
OFORM	0.98	0.98	0.33	0.98	0.99	−1.38	0.88	0.88	0.23				0.88	0.88	−0.11
INSIDE	0.51	0.50	0.19	0.34	0.30	1.63	0.34	0.32	0.83				0.41	0.39	0.74
REINS	0.31	0.31	0.67	0.31	0.31	1.38	0.31	0.31	−0.42	0.31	0.32	−1.30	0.30	0.31	−0.50
lnSIZE	4.50	4.61	−1.19	4.29	4.33	−0.61	4.36	4.28	0.98				4.83	4.77	0.61
FIRMAGE	41.89	41.42	0.25	39.37	38.39	0.70	44.43	44.23	0.11	46.59	49.68	−1.79	47.64	49.05	−0.69

Note: This table reports means of the propensity score matching model variables for treatment and match observations based upon each CEO trait. The binary treatment variables include indicators for high CEO power index 1 (1 for observations with PINDEX1 greater than the median, 0 otherwise), high CEO power index 2 (1 for observations with PINDEX2 greater than the median, 0 otherwise), high CEO age (1 for observations with CEOAGE greater than the median, 0 otherwise), CEO insurance experience (1 for observations with CEOINS 1, 0 otherwise) and CEO financial expert (1 for observations with CEOEXPERT 1, 0 otherwise). Observations with a dummy indicator equal to 1 are classified as treated, and observations with a dummy indicator equal to 0 are classified as controls. We perform kernel matching with a 0.01 caliper. Variable definitions are given in Table 1.

while the other firms are in our control group. The results suggest that insurers whose CEOs have insurance experience perform better than those that do not, as the former have higher MARGIN, ROA, ROE and lower SOL, LR and COR. Also, the differences between the two sub-samples are statistically significant (at the 5% level, two-tailed) across all performance indicators. In Table 11,

Table 11. Comparison differences between treatment and propensity score matched firms (kernel)

		(1) Treated	(2) Controls	(3) Difference	(4) Predicted sign for difference	(5) SE	(6) *t* statistic
(a) By PINDEX1							
MARGIN	ATT	0.080	0.086	−0.006	+	0.006	−0.940
ROA	ATT	0.107	0.113	−0.005	+	0.009	−0.640
ROE	ATT	0.218	0.220	−0.002	+	0.016	−0.140
SOL	ATT	0.643	0.665	−0.022	−	0.011	−1.950*
LR	ATT	0.801	0.807	−0.006	−	0.010	−0.630
COR	ATT	0.890	0.886	0.004	−	0.010	0.370
(b) By PINDEX2							
MARGIN	ATT	0.076	0.083	−0.007	+	0.008	−0.900
ROA	ATT	0.106	0.116	−0.010	+	0.008	−1.220
ROE	ATT	0.213	0.232	−0.019	+	0.016	−1.230
SOL	ATT	0.649	0.673	−0.024	−	0.011	−2.190**
LR	ATT	0.801	0.805	−0.004	−	0.009	−0.460
COR	ATT	0.889	0.888	0.000	−	0.009	0.050
(c) By CEOAGE							
MARGIN	ATT	0.071	0.076	−0.005	+	0.004	−1.320
ROA	ATT	0.106	0.101	0.005	+	0.005	1.200
ROE	ATT	0.182	0.173	0.009	+	0.009	0.970
SOL	ATT	0.658	0.653	0.005	−	0.007	0.750
LR	ATT	0.811	0.808	0.002	−	0.006	0.360
COR	ATT	0.899	0.892	0.008	−	0.006	1.240
(d) By CEOINS							
MARGIN	ATT	0.087	0.072	0.015	+	0.004	3.420***
ROA	ATT	0.119	0.096	0.023	+	0.006	3.970***
ROE	ATT	0.203	0.171	0.032	+	0.012	2.740***
SOL	ATT	0.635	0.673	−0.038	−	0.007	−5.180***
LR	ATT	0.788	0.827	−0.040	−	0.007	−5.870***
COR	ATT	0.874	0.911	−0.037	−	0.007	−5.400***
(e) By CEOEXPERT							
MARGIN	ATT	0.093	0.078	0.015	+	0.004	3.930***
ROA	ATT	0.120	0.109	0.011	+	0.005	2.220***
ROE	ATT	0.197	0.190	0.007	+	0.010	0.640
SOL	ATT	0.631	0.651	−0.020	−	0.007	−2.810***
LR	ATT	0.784	0.800	−0.017	−	0.006	−2.620***
COR	ATT	0.871	0.885	−0.014	−	0.006	−2.180***

Note: This table reports the average treatment effect (ATT) results for the propensity score matching model based upon the kernel matching algorithm. Insurance firms were matched based on all independent variables as reported in Table 8. The treatment group for each part includes observations whose indicator for that CEO characteristic is 0, while the control group includes all remaining observations. Column 3 shows the difference in the ATT between the treated and the control samples, while our predicted sign for the difference is given in column 4. Column 5 shows the standard errors, and column 6 shows the *t* statistics for the difference.
***, **, * indicate statistical significance at the 1%, 5% and 10% levels, respectively, in two-tailed tests.

part (e), insurers with financially expert CEOs are our treatment group, while those that are not are our control group. We find that the differences of the performance measures between the two groups are positive for MARGIN, ROA and ROE and negative for SOL, LR and COR. Also, the differences are significant for all financial measures except ROE. Taken together, our findings suggest that two CEO traits – insurance experience and financial expertise – are positively related to beneficial financial outcomes, while CEO power and CEO age do not lead to superior financial performance. These observations confirm the importance of insurance CEOs having prerequisite industry knowledge and financial expertise in order to effectively operate in a technically complex, increasingly globally competitive and heavily regulated sector of the economy.

Following Armstrong, Guay and Weber (2010) and Hoitash, Hoitash and Kurt (2016), we test the sensitivity of the above statistically significant results to the presence of potential hidden bias that might arise from an unobserved covariate (i.e. a correlated omitted variable) between the treatment and matched control groups. We relax the assumption that observations in the treatment and matched control groups with the same propensity scores have an identical probability to receive the treatment. Therefore, we do not assume that the Rosenbaum (2002) Γ is equal to one. Instead, this research design allows us to describe the situations in which an insurance firm receiving the treatment is not essentially random, given the variables included in the propensity score models, reflecting the uncertainty surrounding the effect due to potential hidden bias.

We perform Rosenbaum's (2002) bounds tests (using the rbounds module in Stata, set α to 0.95) to assess the sensitivity of differences in each performance measure between the treatment and control groups based upon the bounds for the Hodges–Lehmann (HL) point estimate of the average treatment effect (Rosenbaum, 1993). The HL estimate of the average treatment effect is a single point when Γ is equal to 1. We obtain a critical Γ value (that is greater than 1) when the upper and lower bounds for HL estimates of the average treatment effects bracket 0. The Γ value helps us quantify the amount of hidden bias necessary to invalidate the assumption that the two observations with the same propensity scores would have an equal probability to receive the treatment (Rosenbaum, 2002). When insurers whose CEOs have insurance experience are our treatment group, we find values of Γ ranging from 1.64 to 2.87 across the six firm performance measures. In particular, we obtain the following critical Γ values: 1.98 (MARGIN), 2.30 (ROA), 1.64 (ROE), 2.87 (SOL), 2.07 (LR) and 2.12 (COR). When insurers with financially expert CEOs are our treatment group, the following critical Γ values are produced: 1.85 (MARGIN), 1.40 (ROA), 1.11 (ROE), 1.94 (SOL), 1.33 (LR) and 1.28 (COR). We note that the values of Γ are not large enough to conclude that our results are robust to hidden bias and emphasize that our results should be interpreted with caution.

It is worth stressing that the above values of Γ do not mean that there is no true positive relation between CEOINS/CEOEXPERT and insurance firm performance. Instead, it suggests that the confidence interval for the treatment effect would contain 0 if an omitted variable causes the likelihood of the presence of a binary treatment to differ between the treatment and the control groups by a factor of the value of Γ and the omitted variable has a dominant effect on firm performance such that it perfectly determines performance differences between the treatment and the control groups.

Discussion and conclusion

Using a panel sample of 92 UK property–casualty insurers over the 14 years 1999–2012, we examine the relation between CEOs' traits and six financial performance measures. Our study is predicated on the notion that financial metrics, as both economic calculative devices and financial outcome indicators, can credibly signal and allow stakeholders to effectively interpret the role legitimacy and commercial effectiveness of CEOs. In this regard, financial performance indicators can play an important role in mitigating information asymmetries and assuring the various stakeholders of technically complex and informationally obtuse insurance firms as to the security of their economic interests. Contrary to what was hypothesized, we find that CEO power and CEO age are generally unrelated to the performance of insurance firms. However, as predicted all our financial performance indicators improve when CEOs have insurance experience and financial expertise. This observation reinforces the functional importance of CEO insurance industry expertise in risk-knowledge-intensive and financial-information-sensitive insurance firms. It also suggests that appointing CEOs with insurance industry experience and business acumen is a credible signal of the legitimacy of the insurer's leadership capability and future financial viability in the eyes of stakeholders (Miller and Yang, 2015). Confirmatory evidence that insurance and financial expertise amongst CEOs matters for the performance of insurance firms could be useful to both investors, with an interest in how the personal traits of CEOs could contribute to improved traded value, and to policyholders and their representatives (e.g. regulators) who have an explicit interest in the financial viability of insurance providers. Additionally, the importance of insurance industry expertise could be relevant to both board-level nomination committees and industry

regulators when *ex ante* vetting and approving CEO appointments in insurance firms and evaluating their performance *ex post*. In these regards, the findings of this study could help guide future corporate governance guidelines and institutional regulations for the insurance industry, and the financial services sector more generally.

We acknowledge that our study has limitations. For example, our research does not (due to data unavailability) distinguish between the human and social capital attributes of CEOs. Indeed, these facets can be closely integrated and thus reflective in actual decision-making autonomy wielded by the CEO. For example, the degree of decision-making autonomy held by an incumbent CEO could, at least in part, be inherited from a predecessor CEO with whom he/she had close personal ties and who passed on privileged information on the insurer's prospects. Future research could usefully isolate these effects and evaluate their relative impacts on financial performance more broadly in financial firms where technical appraisal and tacit understanding of the selection, pricing and management of extreme risks are core business competences.

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