The impact of board characteristics and ownership identity on agency costs and firm performance: UK evidence

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Abstract

Purpose – *This paper aims to provide a twofold empirical comparison: first, a comparison between the impact of corporate governance mechanisms on agency costs proxies and firm performance measures, and second, this comparison was used before and after the 2008 financial crisis, capturing two different economic states.*

Design/methodology/approach – *Panel regression methods were applied to two data sets of non-financial firms incorporated in the FTSE ALL-Share index over the period 2005-2011.*

Findings – *The results provide evidence that not all mechanisms lead to lower agency conflicts and/or higher firm performance. Ownership identity has a significant impact and the role of the governance mechanisms changes with the changes in the economic conditions surrounding the firm.*

Research limitations/implications – *The results lend support to the notion that forcing a certain code of practice on firms to follow could compel them to move away from conflict reduction governance structures.*

Originality/value – *To the best of the authors' knowledge, this is the first paper to provide a comparison of empirical evidence for the impact of board characteristics and ownership identity on agency costs and firm performance by using a comprehensive set of corporate governance mechanisms. This comparison challenges the prior studies that use performance as an indirect proxy for lower agency costs. Additionally, it compares the impact of the governance mechanisms during two different economic conditions.*

Keywords *Corporate governance, Agency theory, Resource dependence theory, Stewardship theory, Block holding, Block holder identity, Managerial ownership, Agency costs, Firm performance, Firm value, Financial crisis, Endogeneity*

Paper type *Research paper*

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1. Introduction

The term "corporate governance" always attracts the attention of large investors, practitioners and regulators, especially after accounting scandals and financial crises. Investors blame regulators that they did not enact the proper regulations to protect their wealth from management fraud, and practitioners support these claims. Regulators respond by introducing stricter governance code. After the 2008 financial crisis, The International Corporate Governance Network issued a statement introducing corporate governance as the cause and the solution of the crisis. Strengthening boards was one of the underscored issues that should be improved to avoid any future crises (ICGN, 2008). Likewise, Kirkpatrick (2009) concluded that the Organisation for Economic Co-operation and Development corporate governance principles need to be revised to identify whether there is a need for more guidelines and/or clarifications. However, prior literature and real-life examples provide no evidence that strict regulations would lead to better performance or avoid any future fraud or scandals.

Originally, corporate governance mechanisms are introduced to alleviate the negative consequences – mainly agency conflicts and the costs resulting from these conflicts – of the

JEL classification – G34, G30, G01

Received 15 September 2016
Revised 30 January 2018
29 March 2018
Accepted 21 May 2018

separation between ownership and control. However, most of the prior studies (Ujunwa, 2012; Yang and Zhao, 2014; Arora and Sharma, 2016; Mishra and Kapil, 2017; Bhatt and Bhatt, 2017 among others) were directed to investigate the impact of these mechanisms on enhancing firm performance and value as indirect proxies of lower agency costs. The reported results of this research stream failed in providing systematic and consistent results that can shape an optimal governance structure. Moreover, only a limited number of studies (Ang *et al.*, 2000; Singh and Davidson, 2003; McKnight and Weir, 2009; Belghitar and Clark, 2015; Garanina and Kaikova, 2016), among others) have investigated the role of governance mechanisms on agency costs proxies. Nonetheless, these studies used a limited number of governance mechanisms; most of these studies were applied to other contexts different from the UK context. Even the UK studies used small and old data sets (Belghitar and Clark, 2015) cover the period of 2000-2004 and mainly examine the compensation structure as agency costs mitigating mechanism).

The most common limitations of these studies are their analysis techniques. Renders *et al.* (2010) mention that a common issue with prior studies is that they suffer from econometric problems such as endogeneity and/or the lack of the statistical power. Moreover, each firm could design their governance structure that maximises shareholders' wealth and fits with firm's specific characteristics (Renders *et al.*, 2010). Similarly, Brown *et al.* (2011) mention that prior studies used ordinary least squares (OLS), ignoring the endogeneity problem and that the examined models could suffer from unobserved heterogeneity, which means that the identified relations result from unobserved factors. Thus, this study uses panel data regression models, instead of OLS, to overcome this limitation. Additionally, this study considered the endogeneity problem by identifying the endogenous variables before using instrumental variable regression two-stage least square (2SLS) methods; these points together could provide more accurate and unbiased results.

It is widely argued in the governance literature that the institutional settings and the regulatory framework have a significant impact on the governance structure chosen by the firm. Considering that the UK governance structure is characterised by "comply or explain" feature, all listed firms should disclose their compliance with the governance code. Thus, based on our sample that shows a high compliance with the code recommendations, it is plausible to claim that the UK context is well governed and lower agency costs should be expected. Having said that, Belghitar and Clark (2015) mention that UK studies failed to provide solid evidence that corporate governance mechanisms reduce agency costs.

Van Essen *et al.* (2013) provide evidence that governance mechanisms that are assumed to boost firm performance during the steady state have an adverse impact during the crisis conditions (and vice versa). Thus, this paper investigates the impact of a comprehensive set of corporate governance mechanisms on reducing agency costs, enhancing firm performance and maximising shareholders' wealth in the UK context. Also, it conducts such investigation during two different economic states (before and after the 2008 financial crisis). These analyses add to the current argument about governance mechanisms effectiveness and provide evidence suggesting that not all mechanisms introduced by academics, practitioners and regulators reduce agency costs and/or improve performance; they also provide evidence that their effectiveness is constrained by the country's economic state and how the market perceives such mechanisms.

This paper challenges prior studies (Demsetz and Villalonga, 2001; Brown and Caylor, 2004; De Miguel *et al.*, 2004; Beiner *et al.*, 2006; Brown and Caylor, 2009 among others) that use performance proxies as indirect measures of lower agency conflicts. Nicholson and Kiel (2007) assert that firms can report high level of profit even in the presence of agency costs. Wiwattanakantang (2001) states that accounting and market performance measures do not reflect all agency costs.

However, this paper complements prior studies (McConnell and Servaes, 1990; Bhagat and Black, 1999; Demsetz and Villalonga, 2001; Bhagat and Black, 2002; Haniffa and Hudaib, 2006; Elsayed, 2007; Lehn *et al.*, 2009 among others) in terms of the unfound relationship between corporate governance mechanisms and firm performance . Our results illustrate that although some mechanisms were found to have insignificant impact on firm profitability, the market perceives the presence of such mechanisms in a positive way. Moreover, our evidence shows that some of the insignificant mechanisms have a good impact on reducing agency costs related to both management efficiency and investment decisions. Therefore, we cannot claim that those mechanisms, which are found insignificant, are useless. Indeed, as we did not find them increasing agency costs, we can claim that they could have a supportive role in controlling the managerial behaviour and mitigating agency costs. But, their role is a secondary role, which means they can be optional not compulsory. The issue is with those mechanisms that were found to increase agency conflicts, and this requires the attention of regulators and policy makers.

To sum up, this investigation contributes to the governance literature and the debate about the usefulness of different governance mechanisms in many ways. First, this paper extends the work of these prior studies by including more governance mechanisms from a compliance with the UK governance code perspective. Second, it uses different agency costs proxies and firm performance measures to compare the role of corporate governance mechanisms in reducing agency costs and improving firm performance. This comparison challenges prior studies that use the return on assets (ROA) and Tobin's Q as indirect proxies for lower agency costs and shows the real impact of governance mechanisms on both agency conflicts and firm performance. Third, it compares the impact of the governance mechanisms during two different economic states. Fourth, it provides the most recent analysis in the UK context using a recent and large data set from the UK market – panel regression methods and considering the endogeneity problem.

The remainder of the paper is organised as follows: Section 2 provides the conceptual framework and the hypotheses; Section 3 provides a description of our model, sample and data description. Section 4 provides the empirical evidence. Section 5 provides the summary and conclusion.

2. Conceptual framework and hypotheses development

The separation between ownership and control results in a conflict of interest between the owners and the controllers of the firm. Large corporations require funds that go beyond the ability of a single investor. Hence, resources need to be allocated from numerous investors, and ownership needs to be divided accordingly. Shareholders' primary objective is to maximise their wealth, which is why they invest. Above this, investors might not have the ownership stake that qualifies them to manage their investments, or they lack the required qualifications to take care of their wealth; hence, there is a critical need to hire professional management. This professional management controls the firm's resources and has their own personal interests that might deviate from the shareholders' interests. They could use these resources in a way that serves their personal interests.

The conflict of interests between the management and shareholders could take more than one form, e.g. work shirking, perquisite consumption, over investments and other conflicts. In this paper, we focus on two forms of agency conflicts; first, the managerial efficiency problem (work shirking) and the overinvestment problem. Work shirking refers to the lack of effort from the agent, which means that the agent does not exert the contracted upon effort or the requisite efforts (Eisenhardt, 1989; Romano *et al.*, 2008). As mentioned earlier, there is a conflict of interests between managers and shareholders; the availability of cash flow under the managers' control, which exceeds the available investment opportunities and the required funds to maintain the firm's current asset base, initiates the potential of misusing them in suboptimal investments (Jensen, 1986; Richardson, 2006).

Corporate governance mechanisms are one of the tools that could be used to control the managerial opportunistic behaviour and reduce the conflict of interests between managers and shareholders. In this paper, a comprehensive set of the internal governance mechanisms – which represents the board characteristics and ownership structure – were used.

2.1 Board characteristics

The board of directors is recognised as an essential control mechanism. Bebchuk and Weisbach (2010) describe it as the only elected mechanism. Hence, it should thoroughly represent and work for the best interest of shareholders. The board of directors represents the head of the internal control mechanisms who can curtail the undesired self-interested behaviours, actions and decisions of managers (Donaldson and Davis, 1991; Jensen, 1993). The board of directors holds the responsibility of choosing monitoring, advising, assessing and deciding the compensation of the top management (Jensen, 1993). Also, they are responsible for taking corrective actions in case of deviations. Governance literature shows that there are several characteristics that should be present in the board to perform their roles effectively. These characteristics significantly affect the board performance, (e.g. board size, board composition, the presence of supportive committees and the need of separating the CEO and chairman posts).

2.1.1 Board size. Much research has been conducted to identify the ideal board size that enhances the board's ability to perform its roles (that should lead to maximising shareholders' wealth). Jensen (1993) argues that a board with eight members is the efficient size that enhances and improves firm's performance and curtails CEO's control over the board. Lipton and Lorsch (1992) raise this number to ten members. However, other researchers (Coles *et al.*, 2008; Linck *et al.*, 2008; Lehn *et al.*, 2009 among others) provide empirical evidence that the optimal board size depends on the firm's characteristics and the environment surrounding it.

Prior literature provides three different opinions reflecting that there is no consensus about the optimal or ideal board size. The first stream contends that a large board size is more efficient as it provides the firm with the opportunity of adding more experts with different backgrounds. Florackis (2008) argues that large boards enhance the organisational effectiveness. Large boards curtail the CEO domination over the board (Muth and Donaldson, 1998; Kyereboah-Coleman and Biekpe, 2006; Hussainey and Al-Najjar, 2012). Moreover, performing the monitoring and advising roles are much enhanced with larger boards; such view is consistent with the agency perspective. Also, from a resource dependence view, large boards might reflect more abilities to secure the required and important resources for the firm. Pfeffer and Salancik (1978, p. 172) mention that "The greater the need for effective external linkage, the larger the board should be". Lehn *et al.* (2009) argue that large boards can provide the board with more information about the external environment. Cheng (2008) demonstrates the advantage of large boards by arguing that although large boards suffer from coordination and communication problems, this could result in more effort and discussion to reach consensus, which is reflected into more compromised and less extreme decisions. However, his view neglects the fact that communication and coordination problems might create the free-riding problem.

Contrary to this stream, the second view claims that large boards are inefficient as they suffer from many problems that hinder the board from performing their different roles. Much research (Jensen, 1993; Yermack, 1996 among others) argues that large boards need more coordination and communication among the members, leading to slower decision-making, and there is a possibility for the free-riding problem. Also, large boards are easy to be controlled by the CEO. Moreover, Dalton *et al.* (1999) and Van den Berghe and Levrau (2004), among others, argue that large boards are subject to coalitions and frictions that lead to more conflicts inside the board and hinder its ability to reach a consensus.

Alexander *et al.* (1993) endorse this argument by demonstrating that large boards, which comprise members with different experiences and business backgrounds, can be easily influenced and controlled by the CEO in a situation of disagreement over a certain issue. Yermack (1996) mentions that small boards are more effective in performing their monitoring role, deciding the incentives plans for the CEO and its relation to his performance and dismissing the CEO for poor performance.

The third stream (Pfeffer, 1972; Dalton *et al.*, 1999; Coles *et al.*, 2008) argues that board size is a function of the firm characteristics and business environment. Pfeffer (1972) argues that many factors (e.g. the need outside capital, firm size and the industry) at which the firm is affiliated could affect board size. Ali (2018) find evidence that board size is affected by the firm's size and is positively associated with firm's performance. Coles *et al.* (2008) find that a large board enhances the firm value for large and complex firms. Dalton *et al.* (1999) mention that as the environmental uncertainty increases, a large board becomes more appropriate as it increases the possibility of interlocking and enhances the firms' ability to secure its vital resources. Larmou and Vafeas (2010) find that for small firms with persistently poor performance, increasing the board size enhances their performance and market value – as the market responds positively to size increase – rather than decreasing the board size:

> Based on the resource dependence theory, especially after the financial crisis and the need for more connections with the external environment, large boards are expected to be associated with lower agency costs and better performance.

2.1.2 Board independence. According to agency theory, the board of directors should be independent of the executive management to perform their roles, specially the monitoring and control role. This independence can be achieved by two means: the first is the board composition; boards should comprise a majority of independent non-executive directors, and the second is the board leadership structure; the CEO and chairman posts should not be held by one person.

2.1.2.1 Board composition. Prior literature considers board's composition as a signal of the board's independence from the executive management (Dalton *et al.*, 1999). Outside directors diversify the board's experiences (Pearce and Zahra, 1991; Florackis, 2008), enhance the board's objectivity (Pearce and Zahra, 1991) and minimise managerial entrenchment (Fama and Jensen, 1983a; Eisenhardt, 1989; Krause *et al.*, 2014). Nevertheless, executive directors are familiar with and can provide the board with relevant firm-specific information, whereas non-executive board members can help in providing and securing the required resources (Dalton *et al.*, 1999). Outside directors, also, can recognise the firm's performance in the market, e.g. stock prices, in a different fashion from other board members (Gordon, 2007).

From an agency perspective, independent directors are supposed to be an effective monitoring mechanism over both the board of directors and the top management. Much research (Jensen and Meckling, 1976; Fama and Jensen, 1983a; Dalton *et al.*, 1999; Coles *et al.*, 2008; Krause *et al.*, 2014 among others) supports this claim by arguing that non-executive board members' primary occupation is independent from management. This boosts the board's ability of monitoring the CEO and the executive management effectively, evaluating their performance and deciding the suitable compensation levels that suit their performance. Gordon (2007) mentions that a key advantage of independent board members is that they are not constrained by the management's vision.

From a resources dependence view, independent directors enhance the board's ability in performing supportive roles and the monitoring roles. Increasing the number of outsiders on the board enables the firm to build more connections with the external environment and to secure the essential resources needed. Dalton *et al.* (1999) and Johnson *et al.* (1996), among others, argue that considering that the CEOs of other firms have the relevant and

required experience in dealing with the complex business environment, appointing them as outside directors should enhance the board's ability in providing valuable advice and counsel to the CEO and top management. Nonetheless, advocates of agency theory consider that as a direct threat to the board's independence assuming that interlocked CEOs are neutral monitors (Dalton *et al.*, 2007). This criticism can be overcome by avoiding interlocked CEOs.

For some commenters, institutional investors and regulators consider independent directors as an essential mechanism to monitor the management; good corporate governance practices are the reflection of more monitoring activities of the independent board (Bhagat and Black, 2002; Romano *et al.*, 2008). However, Bhagat and Black (2002) state that this mechanism did not prevent the scandals; the board of Enron had 11 independent members out of a total size of 14 board members.

The empirical evidence provides no firm relationship between board independence and either agency costs or firm performance measures. Post the financial crisis, there is an increasing need for insiders to sit on the board to facilitate the flow of information (because of their firm-specific knowledge). In this study, which is based on the agency theory and the recommendations of the UK corporate governance code in regard to board composition, *a positive association between the compliance with the composition recommendation and lower agency costs and higher performance should be expected*.

2.1.2.2 Duality. Duality is "the practice of a single individual serving as both CEO and board chair" (Krause *et al.*, 2014, p. 256). Dalton *et al.* (2007), among others, consider the separation between the CEO and the chairman as the second component of board independence. From an agency theory perspective, separation between the CEO and chairman posts is required to maintain board independence (Dalton and Dalton, 2011). This separation constrains the CEO's authority (Van Essen *et al.*, 2013) and curtails control over the board. Duality constrains the insiders' ability to monitor the CEO as they work under the patronage of the CEO. They are selected and nominated by the CEO to join the board; above this, they are financially dependent upon the firm. Therefore, duality can compromise the board's ability to monitor the CEO and the executive management (Fama and Jensen, 1983a, 1983b; Donaldson and Davis, 1991). Furthermore, the CEO decides the board meeting agenda and the information provided to other board members (Jensen, 1993); hence, they can easily limit and control the flow of information and manipulate the provided information to control and restrain the ability of the board members to do their monitoring role (Jensen, 1993; Van Essen *et al.*, 2013).

Conversely, stewardship theory argues that duality and working under the patronage of a single leader has its advantages. Dual CEO is more informed about the firm operating environment and its strategy (Weir *et al.*, 2002; Brickley and Zimmerman, 2010). Long-term compensation plans can easily align the CEO's interests with those of the shareholders (Donaldson and Davis, 1991); additionally, reputational concerns can motivate them to be more effective in maximising shareholders' wealth (Brickley and Zimmerman, 2010).

Prior literature provides no evidence of a systematic relationship between board leadership structure and firm performance. Duality is advantageous amidst crisis and uncertainty in terms of enhancing the management's ability to respond quickly. Taking quicker decisions, while working under a single leader and vision, limits the conflict between the CEO and chairman (Van Essen *et al.*, 2013). McKnight and Weir (2009) find no impact of duality on agency cost. Elsayed (2007) reports a dynamic relationship between duality and performance shaped in accordance to firm characteristics and/or industry affiliation:

> According to agency theory, there is a positive association between CEO duality and agency costs and negative association with firm performance, whereas, according to stewardship theory, duality should lead to lower agency costs and better performance.

2.1.3 Board subcommittees. Board subcommittees are one of the control mechanisms over the top management. Such committees can be used to mitigate the agency problem (Chris *et al.*, 2014) and to help the board in performing their responsibilities effectively. Mace (1979) argues that board subcommittees are essential monitoring mechanisms as it withdraws some of the CEO's power and authority. Moreover, these committees are additional layers that cover the deficit of the board in performing their responsibilities (Nordberg, 2010). Klein (1998) provides evidence that the independence of the audit, nomination and remuneration committees is affected by the presence of the CEO as a member of the nomination committee. In addition, the nomination committee's independence affects the board independence as well (Anderson and Reeb, 2004). Shivdasani and Yermack (1999) add that the involvement of the CEO in the nomination committee is detrimental for board independence; outside directors who criticise top management's strategies and performance could be constrained from being re-elected. However, Adams *et al.* (2005) find no evidence that the CEO's involvement in directors' selection has a significant impact on firm's performance.

Generally, the audit committee is responsible for monitoring the financial reporting process, and internal and external audit processes, reducing the conflict between the management and the external auditor to the minimum (Klein, 2002a) and ensuring the external auditor's independence (Carcello and Neal, 2003) and that they are performing their vital role (Carcello and Neal, 2000). Klein (2002b) reports a number of factors that affect the audit committee's independence (i.e. board size, composition and the firm's growth prospects). Carcello and Neal (2003) find that the audit committee's characteristics significantly affect their ability and effectiveness in performing their roles. Carcello and Neal (2000) find that the audit committee's composition is reflected on the independency of the external auditor's report.

The remuneration committee is expected to reduce the agency conflict by offering the executive management with the compensation packages that help in aligning the interests of management with those of shareholders (Klein, 1998). A common argument is that the committees' composition is a basic determinant of the committees' performance. John and Senbet (1998) find evidence that independent committees enhance the monitoring abilities of these committees.

The UK Corporate Governance Code (2016) recommends that each firm should have the nomination, audit and remuneration committees. These board committees are required to ensure that the board of directors is working in line with the shareholders' interests. The code mentions the roles and the structure of these committees. Prior studies have investigated the impact of the characteristics of board subcommittees in different performance measures and earning management. Following Zaman *et al.* (2011), this study applies a composite measure for the characteristics of an effective audit committee and extends this technique to the nomination and remuneration committees. These composite measures are based on the recommendations of the UK Corporate Governance Code for the nomination and remuneration committees and Smith Report for the audit committee. With respect to audit committee, the UK Corporate Governance Code, Smith Report and other reports (published in 2012 and 2016 by the Financial Reporting Council) state that each firm should have a fully independent audit committee with at least three members; at least one member should have recent and relevant financial experience, and the committee meetings should not be less than three meetings per year; likewise, the UK Corporate Governance Code recommends that the nomination and remuneration committees should have at least three members, with a majority of independent members: "Based on the above-mentioned recommendations, compliance with these recommendations should lead to lower agency conflict and better firm performance".

2.2 Ownership structure

Equity ownership confers equity holders with certain rights to the firm's cash flow (Denis and McConnell, 2003), and this grants them the power and the incentives to monitor and control the firm's management. Moreover, the identity of the owners affects the agency problem and its associated costs (Rashid, 2016). Managerial ownership and ownership concentration is a double-edged sword that can work from both sides; they can help in aligning and controlling managerial behaviours to maximise shareholders' wealth in some cases and impairment in other cases.

2.2.1 Managerial ownership. The divergence of interests between managers and shareholders arises because managers do not have ownership stake of the firm they work at; thus, managerial ownership is proposed as one of the tools that can be used to align the management's interests with those of shareholders and stimulate them to take actions and decisions that maximise the firm's value (Jensen, 1993; Weir *et al.*, 2002; Denis and McConnell, 2003; Brickley and Zimmerman, 2010). However, it can also encourage the managers to entrench themselves (Lasfer, 2006).

Grounded in the convergence of interest hypothesis, the increase in the managers' ownership stake should lead to aligning the interests of the managers with shareholders' interests; such alignment should be reflected in better decision and higher firm value. Jensen and Meckling (1976) argue that the more managerial ownership, the less agency costs. Managers, as owners, incur a proportion of the agency costs, which is equivalent to their ownership proportion. The more managerial ownership, the more alignment of interests and the less agency costs. Such argument is consistent with the stewardship theory (Rashid, 2016).

Jensen (1993) endorses this idea as he mentions that directors might free-ride from their monitoring role because they do not have ownership stake on the firms that they work for. He argues that granting directors incremental ownership stake that increases as their tenure increases could align the interests of management and owners. This incremental ownership stake will bind the managers' wealth with the shareholders' wealth, which will affect their decisions. Fleming *et al.* (2005) state that low ownership stakes stimulate the managers to shirk work and exert less effort and sometimes not seek out good investment opportunities.

In contrast, the entrenchment hypothesis argues that managers are expected to use their ownership stakes to entrench themselves and work to the best of their own best interests. Lasfer (2006) argues that the increase in the managerial ownership will make the managers more powerful and will have a negative impact on the other corporate governance mechanisms. Entrenched managers will be able to control the board's composition; this will lead them to appointing a chairman and board directors who are less likely to perform their monitoring roles and increasing the number of board members, which will create and increase the impact of communication problems among the board. Brickley and Zimmerman (2010) argue that a trade-off between the alignment and entrenchment effects is the key determinant of the impact of managerial ownership on the firm's value.

Many studies (Morck *et al.*, 1988; De Miguel *et al.*, 2004; Pergola and Joseph, 2011 among others) show that the managers' interests are aligned with outside shareholders at extremely low and extremely high ownership levels. Between these two extremes, managers become entrenched and act to pursue their goals and extract the private benefits of control. Morck *et al.* (1988) provide evidence that indicates that the relationship between the managerial ownership and firm's value is non-monotonic; they find that managerial ownership within the range of 0-5 per cent and above 25 per cent enhance the firm value. However, managers are more likely to entrench themselves in 5-25 per cent levels of managerial ownership. McConnell and Servaes (1990, 1995), De Miguel *et al.* (2004) provide consistent results for the nonlinear relationship between managerial ownership and

firm value: "In this paper, the associations between managerial ownership and both agency costs and firm performance are examine".

2.2.2 Block holders. Block holding was introduced as a tool to monitor the firm's management and mitigate the agency problems between managers and shareholders. Because of their large ownership stake, block holders are motivated to do the monitoring role over the firm's management; also, they have the resources and capabilities to do that role. However, prior literature provides two arguments regarding the impact of block holding on agency conflicts.

Based on the monitoring hypothesis, (Shleifer and Vishny, 1997; Denis and McConnell, 2003; Romano *et al.*, 2008 among others) block holders have the incentive, the authority and the power to execute their monitoring role and avoid the monitoring free-riding problem that occurs between the small shareholders and to influence management in such cases. Van Essen *et al.* (2013) claim that large block holders are influenced with their significant proportion of their wealth that is invested in one firm. The alternative for not performing such role is to sell their large potions with loss, which is unreasonable (Bathala and Rao, 1995; Crutchley *et al.*, 1999). Perhaps, the benefits from performing their monitoring role exceed the incurred monitoring costs (Nordberg, 2010).

Nevertheless, the empirical evidence shows that this mechanism is a two-edged sword; the block holders have the discretion and the incentives to extract private benefits of control as they bear only a fraction of the costs, but they gain full benefits (Gugler and Yurtoglu, 2003). According to the expropriation hypothesis, block holding causes another form of conflict of interests between the block holders and the minority of shareholders; this problem is known as the principal-principal conflict.

Block holders misuse their controlling power to achieve their own interests and extract private benefits from the firm they control. As soon as they gain close to full control, they start to expropriate the minority's wealth by generating private benefits that are not shared with the minority of shareholders (Shleifer and Vishny, 1997; Brown *et al.*, 2011) such as transferring assets and profits out of the firm for the benefit of those firms they control (tunnelling) and tailoring the management structure that enables them to attain their private goals (Denis and McConnell, 2003). This leads to lower firm value (Brown *et al.*, 2011): "In this paper, the impact of the block holding and the identity of the block holders on both agency costs and firm performance are investigated".

3. Data, variables and empirical models

3.1 Sample and data sources

The initial sample of this paper includes all firms incorporated in the FTSE All-Share Index for every year over the study period. First, all firms that belong to the financial industry (e.g. banks, insurance companies, equity and real estate investments [...] etc.) were excluded from the sample because of their special characteristics; they have their own regulations, corporate governance practices; and they are subject to external inspections from supervisory bodies like the Financial Services Authority. Second, delisted and merged companies during the study period (2005-2011) were also excluded. Firms with missing data, either missing on DataStream or missing annual reports, were also excluded. Furthermore, to comply with the requirements of panel data regression, firms with less than two years of data observations per each sample were excluded (Stock and Waston, 2011); Moreover, as a result of using industry adjusted variables, all industries with less than two observations per industry were excluded. This screening process results in 1,246 non-financial firm-year observations, which meet with our criteria and have all the required data.

As the primary aim of this study is to investigate the influence of corporate governance mechanisms (before and after the financial crisis) on agency costs and firm performance

proxies, two data sets were constituted: the pre-crisis data set, which covers the period 2005-2007 inclusive with 562 firm–year observations, and 684 firm-year observations for the post-crisis period; year 2008 was excluded to avoid any abnormal observations because of the financial crisis.

Board characteristics variables and managerial ownership variables are manually collected from firms' annual reports; likewise, block holding ownership variables are manually collected from Thomson One Banker database. Financial figures used to compute the dependent and other control variables were downloaded from DataStream database.

3.2 Dependent variables

3.2.1 Agency costs proxies

3.2.1.1 Asset utilisation. Asset utilisation (total sales divided by total assets) as a convenient agency costs proxy was first introduced by Ang *et al.* (2000). They argue that this proxy can capture the managerial effectiveness in terms of exerting the required efforts to use a firm's assets to generate sales. Hence, asset utilisation is an inverse measure of agency costs. High asset utilisation ratio reflects low agency costs, while low assets utilisation means that the management has not exerted the adequate effort, and/or their investment decisions are deficient (Ang *et al.*, 2000) or the firm has unproductive assets (Ertugrul, 2005).

Following prior studies, (Singh and Davidson, 2003; Florackis, 2008; McKnight and Weir, 2009; Henry, 2010; Rashid, 2015; Garanina and Kaikova, 2016; ElKelish, 2018 among others), asset utilisation is used as a proxy of agency costs. However, prior studies (Gompers *et al.*, 2003; Coles *et al.*, 2008; McKnight and Weir, 2009; and Van Essen *et al.*, 2013) reported that using the industry adjusted measures provides considerably stronger results, and consistent results are obtained using dummy variables to control for the industries. Thus, considering that our samples include a wide range of industries, and to avoid the impact of industry variation across the sample, our first proxy of agency costs is *TRN*, which is the natural log of industry adjusted assets turnover ratio. Following the previous literature, the industry adjusted variable is computed by subtracting the firm's turnover rate from the industry median for each year of our study period.

3.2.1.2 The interaction of free cash flow with growth prospects (QFCF). The second proxy of agency costs for this study reflects the agency costs related to the free cash flow (FCF) and investment decisions. Jensen (1986) hypostatised that firms that generate cash flow exceed the required funds to maintain the firm's assets, and the profitable investments opportunities are more prone to agency problems than other firms, as managers can waste this money on unprofitable projects. Prior literature provides much evidence that supports this hypothesis (Griffin *et al.*, 2010). Retaining the free cash flow prevents the capital market from assessing the effectiveness of the management's decisions which could lead to more managerial discretion and more agency costs (McKnight and Weir, 2009). Thus, the combination of high free cash flow and low growth prospects indicates that there is a possibility of agency conflicts which result in agency costs. Following prior literature (Doukas *et al.*, 2000; Doukas *et al.*, 2005; Florackis, 2005; McKnight and Weir, 2009; Belghitar and Clark, 2015; and Rashid, 2016), an interaction variable between the free cash flow and growth prospects was developed by multiplying firm's standardised FCF by its growth prospects.

Standardised FCF is calculated as the sum of operating income before depreciation less the sum of total income taxes, interest expenses and dividends paid (Lehn and Poulsen, 1989) divided by firm's total assets (Doukas *et al.*, 2000; Doukas *et al.*, 2005; McKnight and Weir, 2009; Henry, 2010). Growth prospects were measured by the firm's Q ratio. In this study, an approximation of Lindenberg and Ross (1981) Q ratio will be used. Q ratio is the sum of the market value of outstanding common shares plus the value of preferred stocks plus total debt (short-term debt + long-term debt) divided by total assets. McConnell and

Servaes (1995), McKnight and Weir (2009) and Chen *et al.* (2012), among others, have used this formula in estimating the Q ratio. To differentiate between high and low growth firms, a dummy variable was constructed that takes the value of 1 if the firm's growth prospect is less than the industry median and 0 otherwise. Conversely to this calculation, prior studies (Belghitar and Clark, 2015) use the median of the full sample as the cut-off point, ignoring the fact that growth prospects vary across industries. This gives more validity to our calculation compared to these studies.

3.2.2 Firm performance proxies. In this paper, ROA and Q ratio are used as performance proxies. These measures capture the accounting and market performance. Such measures have been used in prior literature (Bhagat and Bolton, 2008; Renders *et al.*, 2010; Andreou *et al.*, 2014; Vithessonthi and Tongurai, 2015; Arora and Sharma, 2016; Malik and Makhdoom, 2016, among others). Given that industry affiliation could have a significant impact on firm performance, such impact was considered by using the industry adjusted values. ROA is the logarithmic transformation of the industry adjusted return on assets ratio. Q ratio is industry adjusted as well.

3.2.3 Independent variables

3.2.3.1 Corporate governance variables. Here, *BRD* is the number of board members; *INDcompl* is a dummy variable that takes the value of 1 if the majority of the board of directors, excluding the chairman, is independent of non-executive directors; ACE is audit committee effectiveness; *REMUcompl*is a dummy variable that takes the value of 1 if the remuneration committee comprises three members at least with a majority of independent members; *NOMINIcompl* is a dummy variable that takes the value of 1 if the nomination committee comprises three members at least with a majority of independent members; and *DUL* is a dummy variable that takes the value of 0 if there is a separation between the CEO and chairman posts, 1 otherwise.

3.2.3.2 Ownership structure variables. Here, *BLK* is the total ownership percentage of block holders holding 5 per cent or more of the firm's outstanding shares; *INSTBLK* is the total ownership percentage of institutions owning 5 per cent or more of the firm's outstanding shares; *INDVBLK* is the square root of total ownership percentage of individuals holding 5 per cent or more of the firm's outstanding shares; *BRDOWN* is the percentage of the board directors' shares to the total outstanding shares; *CEOOWN* is the percentage of CEO's shares to the total outstanding shares; *EXECOWN* is the percentage of the executive directors' shares to the total outstanding shares; and *NEDOWN* is the percentage of the non-executive directors' shares to the total outstanding shares.

3.2.4 Control variables. Here, *ASSTS* is total assets; *DBT* is industry adjusted total debt to total assets ratio; and *DIVD* is natural log of industry adjusted dividend pay-out ratio. In the agency cost analysis, profitability was controlled by using the industry adjusted *ROA*, and likewise, the industry adjusted Tobin's Q is used as a control for a firm's growth prospects.

3.3 Empirical models

The basic empirical models to investigate the impact of corporate governance mechanisms on agency costs and firm performance are as follows:

$$Agency\ costs_{it} = \beta_0 + \sum_{G=1}^{n} \beta_G(Governanace_{it}) + \sum_{C=1}^{n} \beta_C(Control_{it}) + \varepsilon_{it} \quad (1)$$

$$Firm\ Performance_{it} = \beta_0 + \sum_{G=1}^{n} \beta_G(Governanace_{it}) + \sum_{C=1}^{n} \beta_C(Control_{it}) + \varepsilon_{it} \quad (2)$$

Agency costs are measured by *TRN* and *QFCF*; firm performance is proxied by to measure *ROA* and *Q* ratio. Governance mechanisms are the board's characteristics, namely, board

size, compliance with UK governance code in terms of board independence and board subcommittees' composition. Control variables include a number of characteristics that influence firm's governance structure, as well as firm's agency costs and performance.

These basic models are split into the following models:

1. Baseline models:

$$\begin{aligned} Agency\ costs_{it} = {} & \beta_0 + \beta_1 BRD_{it} + \beta_2 INDcompl_{it} + \beta_3 ACE_{it} + \beta_4 DUL_{it} \\ & + \beta_5 REMUcompl_{it} + \beta_6 NOMINIcompl_{it} + \beta_7 BLK_{it} + \beta_8 BRDOWN_{it} \\ & + \beta_9 ASSTS_{it} + \beta_{10} adjROA_{it} + \beta_{11} adjDBT_{it} + \beta_{12} adjQ_{it} \\ & + \beta_{13} adjDIVD_{it} + \varepsilon_{it} \end{aligned}$$

$$\begin{aligned} ROA_{it} = {} & \beta_0 + \beta_1 BRD_{it} + \beta_2 INDcompl_{it} + \beta_3 ACE_{it} + \beta_4 DUL_{it} + \beta_5 REMUcompl_{it} \\ & + \beta_6 NOMINIcompl_{it} + \beta_7 BLK_{it} + \beta_8 BRDOWN_{it} + \beta_9 ASSTS_{it} + \beta_{10} adjDBT_{it} \\ & + \beta_{11} adjQ_{it} + \beta_{12} adjDIVD_{it} + \varepsilon_{it} \end{aligned}$$

$$\begin{aligned} Q_{it} = {} & \beta_0 + \beta_1 BRD_{it} + \beta_2 INDcompl_{it} + \beta_3 ACE_{it} + \beta_4 DUL_{it} + \beta_5 REMUCOM_{it} \\ & + \beta_6 NOMINIcompl_{it} + \beta_7 BLK_{it} + \beta_8 BRDOWN_{it} + \beta_9 ASSTS_{it} + \beta_{10} adjROA_{it} \\ & + \beta_{11} adjDBT_{it} + \beta_{12} adjDIVD_{it} + \varepsilon_{it} \end{aligned}$$

2. Sub-models

In these sub-models, ownership variables are split in a way that reflects the identity of the owner. The block holding ownership ratio is split into institutional and individual block holding ownership ratios; likewise, managerial ownership is split into CEO, executive and non-executive directors' ownership percentages:

$$\begin{aligned} Agency\ costs_{it} = {} & \beta_0 + \beta_1 BDZ_{it} + \beta_2 INDcompl_{it} + \beta_3 ACE_{it} + \beta_4 DUL_{it} \\ & + \beta_5 REMUcompl_{it} + \beta_6 NOMINIcompl_{it} + \beta_5 INSTBLK_{it} + \beta_7 INDBLK_{it} \\ & + \beta_7 CEO\_OWN_{it} + \beta_8 EXEC\_OWN_{it} + \beta_9 NED\_OWN_{it} + \beta_{11} ASSTS_{it} \\ & + \beta_{12} adjROA_{it} + \beta_{13} adjDBT_{it} + \beta_{14} adjQ_{it} + \beta_{15} adjDIVD_{it} + \varepsilon_{it} \end{aligned}$$

$$\begin{aligned} ROA_{it} = {} & \beta_0 + \beta_1 BDZ_{it} + \beta_2 INDcompl_{it} + \beta_3 ACE_{it} + \beta_4 DUL_{it} + \beta_5 REMUcompl_{it} \\ & + \beta_6 NOMINIcompl_{it} + \beta_5 INSTBLK_{it} + \beta_7 INDBLK_{it} + \beta_7 CEO\_OWN_{it} \\ & + \beta_8 EXEC\_OWN_{it} + \beta_9 NED\_OWN_{it} + \beta_{11} ASSTS_{it} + \beta_{12} adjDBT_{it} + \beta_{13} adjQ_{it} \\ & + \beta_{14} adjDIVD_{it} + \varepsilon_{it} \end{aligned}$$

$$\begin{aligned} Q_{it} = {} & \beta_0 + \beta_1 BDZ_{it} + \beta_2 INDcompl_{it} + \beta_3 ACE_{it} + \beta_4 DUL_{it} + \beta_5 REMUcompl_{it} \\ & + \beta_6 NOMINIcompl_{it} + \beta_5 INSTBLK_{it} + \beta_7 INDBLK_{it} + \beta_7 CEO\_OWN_{it} \\ & + \beta_8 EXEC\_OWN_{it} + \beta_9 NED\_OWN_{it} + \beta_{11} ASSTS_{it} + \beta_{12} adjROA_{it} + \beta_{13} adjDBT_{it} \\ & + \beta_{14} adjDIVD_{it} + \varepsilon_{it} \end{aligned}$$

4. Empirical results

4.1 Descriptive analysis

Table I reports the descriptive statistics, particularly mean, median, standard deviation and minimum and maximum of the independent, dependent and control variables used

Table I Descriptive statistics of the study samples. Panel A (pre-crisis period 2005-2007 inclusive); Panel B (post crisis period 2009-2011 inclusive)

	Panel A						Panel B					
	N	*Mean*	*SD*	*Median*	*Minimum*	*Maximum*	*N*	*Mean*	*SD*	*Median*	*Minimum*	*Maximum*
BRD	562	9.354	2.493	9	5	19	684	8.879	2.250	9	5	18
IND	562	0.480	0.107	0.5	0	0.8	684	0.510	0.105	0.5	0.111	0.8461
INDcompl	562	0.767	0.423	1	0	1	684	0.854	0.354	1	0	1
DULT	562	0.036	0.185	0	0	1	684	0.034	0.180	0	0	1
ACE	562	0.786	0.410	1	0	1	684	0.857	0.351	1	0	1
REMUcompl	562	0.945	0.228	1	0	1	684	0.961	0.195	1	0	1
NOMINIcompl	562	0.883	0.322	1	0	1	684	0.912	0.283	1	0	1
BLK	562	0.285	0.206	0.244	0	0.999	684	0.336	0.205	0.314	0	0.941
INST_BLK	562	0.249	0.193	0.214	0	0.999	684	0.285	0.182	0.260	0	0.941
INDV_BLK	562	0.036	0.110	0	0	0.717	684	0.051	0.130	0	0	0.771
BRD_OWN	562	0.034	0.099	0.002	0	0.677	684	0.050	0.127	0.003	0	0.934
CEO_OWN	562	0.013	0.055	0.001	0	0.646	684	0.020	0.078	0.001	0	0.712
EXEC_OWN	562	0.012	0.055	0.000	0	0.548	684	0.018	0.074	0.001	0	0.593
NED_OWN	562	0.010	0.043	0.000	0	0.490	684	0.012	0.062	0.000	0	0.771
DIVD	562	0.366	2.869	0.348	−53.8	31.5	684	0.404	1.725	0.332	−22.962	16.222
DBT	562	0.250	0.191	0.226	0	1.331	684	0.223	0.175	0.200	0	0.854
TRN	562	1.097	0.681	0.955	0.12	4.210	684	1.029	0.655	0.9	0.004	4.22
ROA	562	0.109	0.097	0.087	−0.3203	0.905	684	0.080	0.120	0.067	−0.519	1.341
Q	562	1.851	1.859	1.430	0.2914	25.259	684	1.440	1.734	1.047	0.220	31.470
ASSTS	562	6,238.029	18,400	1,400	20.811	130,000	684	7,988.244	25,400	1,400	40.865	220,000

Notes: *BRD* number of board members; *IND* is the percentage of the independent board members to total board size; *INDcompla* dummy variable that takes the value of 1 if the majority of the board of directors excluding the chairman is independent non-executive directors; *ACE* audit committee effectiveness; *DULT* is a dummy variable that takes the value of 0 if there is a separation between the CEO and chairman posts 1 otherwise; *REMUcompl* a dummy variable that take the value of 1 if remuneration committee comprises three members at least with majority of independent members; *NOMINIcompl* a dummy variable that take the value of 1 if nomination committee comprises three members at least with majority of independent members; *BLK* is the total ownership percentage of block holders owning 5% or more; *INST_BLK* is the total ownership percentage of institutions owning 5% or more; *INDV_BLK* is the square root of total ownership percentage of individuals holding 5% or more; *CEO_OWN* is percentage of CEO's shares to the total outstanding shares; *EXEC_OWN* is percentage of the executive directors' shares to the total outstanding shares; *NED_OWN* is percentage of the non-executive directors' shares to the total outstanding shares; *BRDOWN* is percentage of the board directors' shares to the total outstanding shares; *ASSTS* total assets; *DBT* is the total debt to total assets ratio; *ROA* is the return on assets ratio, *DIVD* dividend pay-out ratio; *Q* Tobin's Q ratio

throughout this study. Panel (A) presents the statistics of the pre-crisis period (2005-2007), while the post-crisis statistics are presented in Panel (B).

The reported descriptive statistics summarise the characteristics of the study samples and highlight the changes that happened to the study sample after the 2008 financial crisis. The average asset utilisation ratio decreased from 1.097 turn for the pre-crisis sample to 1.029 turn for the post-crisis period. Likewise, the average ROA ratio and the average growth opportunities measured by Tobin's Q decreased from 10.9 to 8 per cent and from 1.85 to 1.44 per cent, respectively.

The reported statistics show that the average board size decreased from 9.4 to 8.9 members after the crisis, with an average percentage of independent non-executive directors being 48 per cent for the pre-crisis period and 51 per cent for the post-crisis period. The average firms that are complying with the UK board composition recommendations increased from 77 to 85.4 per cent. Likewise, the average compliance ratio with the remuneration and nomination committees increased from 94.5 to 96.1 per cent and from 88.3 to 91.2 per cent, respectively. About 78.6 per cent of the firms of the pre-crisis sample can be classified as having audit committee reflecting compliance with Smith Report recommendations; this average increased to 85.7 per cent after the crisis. Finally, the incidence of duality was only 3.6 per cent before the crisis declined to 3.4 per cent after the crisis.

These statistics reveal that after the financial crisis, firms are more inclined to decrease their board size and increase the percentage of independent directors sitting on the board; moreover, more firms tend to comply with the UK Corporate Governance Code in terms of having boards with a majority of independent directors, the recommendations for the nomination and remuneration committees and the Smith Report recommendations of an effective audit committee.

In terms of the ownership characteristics, the average block holding ratio increased from 28.5 per cent pre-crisis to 33.6 per cent for the post-crisis; this increase was reflected in an increase in the average institutional block holding ratio as it reached 28.5 per cent in the post-crisis period as compared to an average of almost 25 per cent for the pre-crisis period. Similar increase is reported for the average individual block holding ratio as it increased from 3.6 per cent pre-crisis to 5.1 per cent for the post-crisis period. Likewise, the average percentage board ownership has increased from 3.4 to 5 per cent between the pre-crisis and post-crisis periods; this increase was reflected in the increase in the average percentage of CEO ownership (1.3 per cent for the pre-crisis sample and 2 per cent for the post crisis sample). The average executive board members' ownership ratio increased from 1.2 to 1.8 per cent, and the average non-executive increased from 1 to 1.2 per cent. Regarding the control variables, the dividend pay-out ratio increased from 36.6 to 40.4 per cent, whereas the debt to assets ratio and the average ROA decreased from 25 to 22.3 per cent and from 10.9 to 8 per cent, respectively.

Finally, the descriptive statistics show that some of the utilised variables have extreme values. Such case is common when dealing with financial data collected over time and across companies affiliated to different industries. However, it could affect the results of the regression analysis; thus, following the prior studies, (Larcker *et al.*, 2007; Ertugrul and Hegde, 2008; Guest, 2008; Belghitar and Clark, 2015) all continuous variables are winsorized at the 1st and 99th percentile values to reduce the effect of the extreme outlying values.

As mentioned earlier, the descriptive statistics show a high degree of compliance with the governance code. Consequently, this compliance should be reflected in lower agency costs and higher firm performance. These statistics together show that financial crisis negatively affected firms' profitability (ROA) and growth opportunities on the market (Q ratio). On the other hand, the statistics suggest that firms increased the amount of dividends paid to shareholders after the crisis and became less dependent on debt, or after the crisis, more banks started to apply tougher credit constrains.

4.2 Correlation analysis

Table II reports the Spearman's correlation matrices of the used variables. The reported coefficients provide no evidence of a high correlation between the used variables that could affect the results of the regression analysis. The highest correlation was reported between block holding ratio and institutional block holding ratio; such correlation is logical as the block holders are most likely to be institutions rather than individuals. However, this reported correlation is not expected to affect the results as both variables are used in different empirical models. Variance inflation factor diagnostic test was used to check multicollinearity among the used variables. The highest value among the pre-crisis and post-crisis models period did not exceed 2.47 and 3.17, respectively[1], which indicates that there is no multicollinearity between the independent variables of any of the models.

4.3 Empirical results

Table III reports the results of the pre-crisis period. The results show a positive and significant association between board size and asset utilisation and a negative and significant association between board size and QFCF. Also, the results show that board size

Table II Spearman correlation analysis of both dependent and independent variables 2005:2007 (below) and 2009:2011 (above)

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*
1. *TRN*	1	*0.181*	0.008	0.061	*−0.096*	0.011	−0.041	0.021	−0.011	0.008	−0.034	0.064	−0.052	−0.056	−0.004	−0.039	*−0.237*	*0.100*	*−0.087*
2. *ROA*	*0.196*	1	*0.486*	0.003	*−0.127*	−0.018	−0.048	−0.018	0.028	−0.073	*−0.105*	0.017	0.013	0.011	0.063	−0.065	*−0.174*	*0.168*	*−0.109*
3. *Q*	*0.116*	*0.640*	1	0.001	*−0.080*	0.005	−0.022	−0.030	0.066	−0.058	*−0.110*	0.026	0.054	0.037	0.025	−0.019	−0.073	*0.140*	*−0.240*
4. *BRD*	0.041	−0.054	*−0.092*	1	−0.039	*0.202*	*0.092*	*0.099*	0.024	*−0.318*	*−0.302*	−0.069	*−0.219*	*−0.255*	*−0.096*	*−0.251*	0.002	0.019	*0.331*
5. *INDcompl*	−0.056	*−0.113*	*−0.180*	−0.004	1	*0.256*	*0.256*	*0.150*	*−0.107*	−0.009	*0.081*	*−0.104*	*−0.243*	*−0.121*	*−0.303*	*−0.126*	0.065	−0.063	*0.165*
6. *ACE*	*−0.088*	−0.060	*−0.106*	*0.195*	*0.360*	1	*0.453*	*0.434*	*−0.086*	*−0.262*	*−0.122*	*−0.266*	*−0.298*	*−0.217*	*−0.209*	*−0.266*	−0.005	0.039	*0.188*
7. *REMUcompl*	−0.078	−0.070	*−0.088*	0.074	*0.254*	*0.350*	1	*0.521*	*−0.087*	*−0.083*	−0.061	*−0.141*	*−0.157*	*−0.120*	*−0.107*	*−0.179*	−0.038	−0.030	*0.076*
8. *NOMINIcompl*	0.011	0.004	−0.073	*0.093*	*0.191*	*0.322*	*0.323*	1	−0.057	*−0.124*	*−0.086*	*−0.170*	*−0.122*	*−0.086*	−0.061	*−0.210*	0.004	0.062	*0.061*
9. *DULT*	−0.058	0.049	*0.141*	−0.016	−0.008	−0.041	0.004	−0.019	1	*0.120*	0.033	*0.101*	*0.113*	*0.092*	*0.118*	0.034	0.000	0.017	*−0.111*
10. *BLK*	0.010	*0.097*	*0.118*	*−0.279*	*−0.086*	*−0.128*	−0.010	0.016	*0.152*	1	*0.803*	*0.423*	*0.406*	*0.265*	*0.171*	*0.370*	−0.026	*−0.082*	*−0.327*
11. *INST_BLK*	−0.029	0.021	0.028	*−0.241*	−0.042	−0.082	0.013	0.028	−0.013	*0.858*	1	*−0.094*	*0.142*	*0.179*	0.060	*0.258*	0.006	*−0.111*	*−0.290*
12. *INDV_BLK*	0.059	*0.122*	*0.204*	*−0.099*	*−0.127*	−0.069	*−0.103*	−0.012	*0.227*	*0.305*	*−0.127*	1	*0.491*	*0.245*	*0.253*	*0.304*	−0.020	−0.001	*−0.129*
13. *BRD_OWN*	−0.013	*0.088*	*0.177*	*−0.123*	*−0.298*	*−0.200*	*−0.142*	−0.053	*0.203*	*0.192*	0.006	*0.414*	1	*0.752*	*0.687*	*0.672*	−0.043	0.026	*−0.295*
14. *CEO_OWN*	−0.053	0.081	0.171	*−0.181*	*−0.158*	−0.038	−0.064	0.008	*0.220*	*0.115*	0.029	*0.175*	*0.709*	1	*0.502*	*0.442*	−0.065	−0.018	*−0.254*
15. *EXEC_OWN*	0.017	*0.114*	*0.184*	0.001	*−0.308*	*−0.207*	−0.057	−0.023	*0.226*	*0.088*	−0.023	*0.202*	*0.686*	*0.540*	1	*0.332*	−0.044	0.022	*−0.294*
16. *NED_OWN*	−0.025	0.041	0.080	*−0.105*	*−0.151*	*−0.124*	*−0.122*	−0.067	0.004	*0.109*	0.060	*0.199*	*0.680*	*0.347*	*0.323*	1	0.037	−0.055	*−0.287*
17. *DBT*	*−0.303*	−0.035	−0.038	−0.024	0.081	*0.095*	−0.014	−0.032	0.008	*−0.098*	−0.007	*−0.111*	−0.059	*−0.091*	0.004	0.068	1	0.017	*0.127*
18. *DIVD*	−0.065	0.020	−0.063	−0.013	−0.007	−0.042	−0.049	−0.053	−0.080	0.017	0.049	−0.041	0.063	0.062	0.012	0.067	−0.065	1	−0.006
19. *ASSTS*	*−0.089*	*−0.210*	*−0.406*	*0.540*	*0.321*	*0.263*	*0.101*	*0.132*	*−0.150*	*−0.393*	*−0.292*	*−0.252*	*−0.407*	*−0.327*	*−0.343*	*−0.313*	*0.144*	−0.002	1

Notes: Coefficients in italic represent significance at the 5% or 1% level using a two-tailed test; BRD number of board members; *IND* is the percentage of the independent board members to total board size; *INDcompl* a dummy variable that takes the value of 1 if the majority of the board of directors excluding the chairman are independent non-executive directors *ACE* audit committee effectiveness; *DULT* is a dummy variable that takes the value of 0 if there is a separation between the CEO and chairman posts 1 otherwise; REMU*compl* a dummy variable that take the value of 1 if remuneration committee comprises three members at least with majority of independent members. NOMINI*compl* a dummy variable that take the value of 1 if nomination committee comprises three members at least with majority of independent members; *BLK* is the total ownership percentage of block holders owning 5% or more. *INST_BLK* is the total ownership percentage of institutions owning 5% or more*; INDV_BLK* is the total ownership percentage of individuals holding 5% or more*; CEO_OWN* is percentage of CEO's shares to the total outstanding shares; *EXEC_OWN* is percentage of the executive directors' shares to the total outstanding shares; *NED_OWN* is percentage of the non-executive directors' shares to the total outstanding shares; *BRDOWN* is percentage of the board directors' shares to the total outstanding shares; *ASSTS* total assets; *DBT* is the total debt to total assets ratio; *ROA* is the Return on assets ratio, *DIVD* dividend pay-out ratio; *Q* Tobin's Q ratio

Table III Agency costs, firm performance and firm value proxies regressed against corporate governance mechanisms over the period 2005-2007 inclusive

	(1.a) TRN	*(1.b) TRN*	*(2.a) QFCF*	*(2.b) QFCF*	*(3.a) ROA*	*(3.b) ROA*	*(4.a) Q*	*(4.b) Q*
Intercept	1.916 (3.629)***	1.259 (2.980)**	−0.165 (−0.521)	−0.154 (−0.495)	0.518 (1.682)****	0.548 (1.775)****	3.163 (4.544)***	3.141 (4.453)***
lnBRD	0.0587 (1.191)	0.0721 (1.681)****	−0.0484 (−2.270)*	−0.0489 (−2.300)*	−0.016 (−0.695)	−0.0187 (−0.850)	0.129 (2.266)*	0.121 (2.167)*
IND compl	−0.018 (−1.315)	−0.013 (−0.937)	0.003 (0.309)	0.005 (0.486)	−0.005 (−0.796)	−0.004 (−0.662)	0.045 (2.019)*	0.046 (2.093)*
ACE	0.024 (1.815)****	0.012 (0.842)	−0.011 (−0.958)	−0.013 (−1.185)	0.013 (2.094)*	0.013 (2.060)*	−0.028 (−1.237)	−0.027 (−1.224)
REMUcompl	−0.007 (−0.387)	−0.008 (−0.425)	−0.001 (−0.0306)	−0.002 (−0.130)	−0.01 (−1.012)	−0.01 (−1.028)	−0.079 (−1.468)	−0.078 (−1.451)
NOMINI compl	0.013 (0.718)	0.013 (0.708)	−0.005 (−0.413)	−0.005 (−0.366)	0.025 (1.791)****	0.025 (1.834)****	0.007 (0.232)	0.007 (0.243)
DUL	−0.022 (−0.990)	−0.028 (−1.346)	−0.032 (−1.144)	−0.013 (−0.434)	−0.009 (−1.178)	−0.005 (−0.617)	−0.063 (−2.184)*	−0.06 (−1.996)*
lnBLK	0.1 (1.854)****		0.045 (1.539)		0.032 (1.010)		−0.083 (−1.030)	
lnINST_BLK		0.067 (1.409)		0.057 (1.926)****		0.033 (1.068)		−0.089 (−1.123)
lnINDV_BLK		0.056 (0.583)		−0.167 (−2.163)*		−0.014 (−0.319)		0.174 (0.740)
lnBRDOWN	0.046(0.587)		−0.045 (−0.710)		0.08 (1.333)		−0.052 (−0.318)	
lnCEOOWN		−0.099 (−0.448)		−0.241 (−1.239)		−0.136 (−1.796)****		−0.335 (−1.015)
lnEXECOWN		0.007 (0.039)		0.085 (0.596)		0.164 (1.265)		−0.098 (−0.354)
lnNEDOWN		0.154 (0.556)		0.296 (2.014)*		0.079 (0.877)		0.042 (0.126)
lnadjDBT	−0.241 (−1.641)	−0.323 (−2.704)**	0.029 (0.631)	0.015 (0.323)	−0.029 (−0.470)	−0.026 (−0.420)	0.011 (0.097)	0.001 (0.010)
sqadjDIVD	−0.044 (−0.672)	−0.071 (−1.082)	0.034 (0.615)	0.032 (0.594)	0.047 (1.210)	0.047 (1.200)	−0.018 (−0.225)	−0.017 (−0.205)
lnadjROA	0.151 (1.083)	0.25 (1.848)****	−0.531 (−5.205)***	−0.498 (−4.929)***			0.031 (0.150)	0.029 (0.141)
lnadjQ	0.068 (1.874)****	0.092 (2.752)**			0.004 (0.152)	0.004 (0.144)		
lnASSTS	−0.081 (−2.946)**	−0.027 (−2.027)*	0.017 (4.144)***	0.017 (4.037)***	−0.029 (−2.150)*	−0.031 (−2.240)*	−0.152 (−4.600)***	−0.15 (−4.494)***
Ngroups	562196	562196	562196	562196	562196	562196	562196	562196
Hausman	40.96***	24.77			68.84***	69.47***	145.94***	144.48***
Adj. R^2	19				7	7	14	14
F	4.499***				2.127***	1.643***	3.531***	2.898***
Wald χ^2		64.492***	55.375***	61.849***				

Notes: z/t-statistics in parentheses; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$: ****$p < 0.10$; all variables are winsorized at the 1st and 99th percentile values

is positively and significantly related with the Q ratio. These results suggest that large board is more efficient in reducing agency costs and enhances shareholder wealth.

Board independence (*INDcompl)* as suggested by the UK Corporate Governance Code has no significant impact on either agency costs or firm performance as measured by *ROA*. However, the market perceives this compliance as a positive signal; this is clearly seen in a positive and significant association between *INDcompl* and Tobin's Q. Such result shows that the market rewards firms for their compliance with the UK Corporate Governance Code. The reported results reveal modest evidence that the compliance with the audit committee recommendations (ACE) is positive and significantly associated with higher asset utilisation at the 10 per cent significance level. Likewise, there is a positive association between *ACE* and *ROA* at the 5 per cent significance level. Such results suggest that the compliance with UK Corporate Governance Code for the audit committee enhances firm performance and reduces agency costs.

In terms of nomination committee, the results provide evidence that the compliance with the UK Corporate Governance Code is positively associated with higher ROA at the 10 per cent significance level. Duality (DUL) has no significant impact on either agency costs or ROA. Nonetheless, the results show that the market negatively perceives duality (as shown in the negative association between *DUL* and Tobin's *Q* at the 10 per cent significance level).

Block holding appears to help in reducing the agency conflicts, which is reflected on higher asset utilisation. Likewise, individual block holders help in reducing the agency costs of the cash flow. Conversely, institutional block holding seems to increase the agency costs of cash flow, or in other words, the agency costs of investment decisions. This could imply that institutional block holders significantly affect firm's investment decisions. In terms of managerial ownership, CEO ownership seems to have a negative impact on firm performance (ROA) at the 10 per cent significance level; similarly, the non-executive directors' ownership leads to more investment agency costs.

Finally, the results show that profitable firms can use their asset base more efficiently to generate more sales and suffer less from investment agency conflicts. The results also show that before the financial crisis, firms were able to take advantage of the growth prospects they have and generate more sales using their asset base. As the firm size increases, the agency costs increase, which impedes its ability to generate profits and reduces their market evaluation.

The results of the post-crisis analyses are reported in Table IV. The reported results provide no evidence that board size has a significant impact on either agency costs or firm performance. The compliance with the UK Corporate Governance Code in terms of board independence significantly reduces asset utilisation and has no significant impact on firm performance.

Interestingly, the results reveal a positive and significant association between ACE and asset utilisation, suggesting that ACE has a good impact on controlling the behaviour of the management, but the results also show a significant negative association between ACE and profitability, implying that although ACE helps in reducing the agency conflicts between the management and shareholders, this was not reflected on better financial performance. The results provide evidence that the compliance with the UK code recommendations of the remuneration committee significantly enhances firm performance as measured by *ROA* and *Q*. Conversely, the compliance with the nomination committee recommendations has no significant impact on firm performance, but significantly increases investments agency costs (QFCF). There is modest evidence that duality has a negative and significant impact on firm profitability.

Generally, the increase in block holding increases investments' agency costs. After splitting block holding ratio into institutional and individual block holding, the results clearly show that institutional block holding significantly increases investment agency costs and reduces

Table IV Agency costs, firm performance and firm value proxies regressed against corporate governance mechanisms over the period 2009-2011 inclusive

	(1.a) TRN	*(1.b) TRN*	*(2.a) QFCF*	*(2.b) QFCF*	*(3.a) ROA*	*(3.b) ROA*	*(4.a) Q*	*(4.b) Q*
Intercept	1.091 (7.118)***	1.11 (6.953)***	−0.141 (−1.933)****	−0.153 (−2.072)*	0.463 (7.136)***	0.459 (7.333)***	1.005 (2.873)**	1.052 (3.009)**
lnBRD	0.0642 (1.643)	0.0595 (1.525)	−0.0046 (−0.232)	−0.0048 (−0.241)	−0.0239 (−0.892)	−0.022 (−0.843)	−0.0986 (−0.881)	−0.0973 (−0.857)
IND compl	−0.039 (−1.668)****	−0.039 (−1.677)****	0.005 (0.376)	0.006 (0.450)	−0.009 (−0.993)	−0.009 (−0.980)	0.023 (0.627)	0.017 (0.480)
ACE	0.049 (2.010)*	0.052 (2.046)*	−0.015 (−1.024)	−0.014 (−0.987)	−0.016 (−2.177)*	−0.016 (−2.223)*	0.04 (0.944)	0.037 (0.820)
REMUcompl	−0.024 (−0.488)	−0.021 (−0.413)	−0.005 (−0.182)	−0.005 (−0.178)	0.044 (1.866)****	0.043 (2.203)*	0.267 (1.958)****	0.269 (1.993)*
NOMINIcompl	−0.01 (−0.338)	−0.01 (−0.338)	0.032 (1.791)****	0.031 (1.723)****	−0.001 (−0.114)	0.0004 (−0.0522)	0.028 (0.494)	0.029 (0.510)
DUL	−0.014 (−0.269)	−0.005 (−0.104)	−0.037 (−1.387)	−0.036 (−1.356)	−0.039 (−1.679)****	−0.038 (−1.641)	0.054 (0.551)	0.056 (0.594)
lnBLK	0.011 (0.237)		0.071 (2.776)**		0.02 (0.770)		−0.218 (−1.649)	
lnINST_BLK		−0.009 (−0.136)		0.105 (2.983)**		0.023 (0.670)		−0.331 (−1.828)****
lnINDV_BLK		0.233 (2.023)*		0.04 (0.533)		0.089 (0.787)		−0.276 (−0.549)
lnBRDOWN	0.091 (0.865)		−0.107 (−1.989)*		0.133 (2.904)**		0.908 (1.950)****	
lnCEOOWN		−0.307 (−2.095)*		−0.067 (−0.649)		0.019 (0.192)		−0.023 (−0.0533)
lnEXECOWN		−0.013 (−0.104)		−0.007 (−0.0697)		0.106 (1.257)		0.383 (0.888)
lnNEDOWN		0.131 (0.371)		−0.126 (−1.025)		0.236 (4.803)***		1.734 (2.330)*
lnadjDBT	−0.56 (−5.656)***	−0.568 (−5.756)***	0.047 (1.148)	0.046 (1.143)	−0.097 (−2.638)**	−0.096 (−2.512)*	−0.074 (−0.382)	−0.061 (−0.311)
sqadjDIVD	0.003 (0.372)	0.003 (0.411)	−0.003 (−0.626)	−0.003 (−0.660)	0.001 (0.315)	0.001 (0.319)	0.002 (0.128)	0.002 (0.131)
lnadjROA	0.383 (2.094)*	0.377 (2.022)*	−0.188 (−2.375)*	−0.184 (−2.319)*			1.157 (3.571)***	1.143 (3.540)***
lnadjQ	−0.086 (−2.514)*	−0.089 (−2.545)*			0.053 (4.216)***	0.052 (4.150)***		
lnASSTS	−0.011 (−1.904)****	−0.011 (−1.881)****	0.012 (4.362)***	0.013 (4.458)***	0.0005 (0.281)	0.0004 (0.258)	−0.043 (−3.673)***	−0.043 (−3.705)***
N	684	684	684	684	684	684	684	684
groups	235	235	235	235	235	235	235	235
Hausman	17.37	18.65			24.71*	25.32*	43.02***	45.12***
Adj. $R^{2(\%)}$					12	12	17	17
F					8.459***	14.43***	3.617***	3.374***
Wald χ^2	57.764***	65.882***	41.693***	43.279***				

Notes: z/t-statistics in parentheses; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; ****$p < 0.10$; all variables are winsorized at the 1st and 99th percentile values

firm value, whereas individual block holding significantly increases firm's asset turnover rate. Regarding managerial ownership, the results provide consistent results that board ownership reduces the investment agency costs and enhances firm performance. However, after splitting the managerial ownership percentage, CEO ownership increases agency costs, while the non-executive directors' ownership significantly enhances firm performance in terms of profitability and value.

Finally, with regard to firm characteristics variables, the results reveal that debt increases agency costs and reduces firm profitability. Profitable firms have lower agency costs and higher value. There is a negative and significant association between growth opportunities and asset utilisation. Fleming *et al.* (2005) mentions that such a negative association could be a result of innovating new products and developing new processes. Large firms incur more agency costs and are under-valuated after the financial crisis.

4.4 Further analysis

In this section, further investigations of the endogeneity problem and the nonlinear relationship between ownership structure, agency costs and firm performance are conducted. Following the prior literature, to examine the nonlinear relationship between ownership structure and our dependent variables (agency costs and firm performance), the square of the ownership variables was added to the regression analyses. The results of these analyses are reported in Tables V and VI.

For the pre-crisis period, the reported results show that the association between CEO ownership and investment agency costs is an inverted U-shaped. This implies that below a certain ownership level, CEOs entrench themselves; after their ownership level reaches a certain point, their interest starts should be aligned with the shareholders' interests. Conversely, there is a U-shaped relationship between board ownership and firm value, and executive board members' ownership and firm value; these results imply that the managerial ownership starts to have a positive impact after reaching a certain level; before that, level managerial ownership could be detrimental.

Regarding the post-crisis period, the results are mixed. As shown in Table VI, individual block holding increases investment agency costs till it reaches a certain point. Likewise, CEO ownership is positively associated with profitability after it reaches a certain ownership level. Before that level, it reduces firm profitability. Conversely, the increase in executive managers' ownership enhances firm profitability till it reaches a curtail limit; beyond that, limit executive directors are entrenched.

In this paper, the endogeneity issue was considered by using the Durbin–Wu–Hausman (DWH) endogeneity diagnostic test (Durbin, 1954; Wu, 1973; Hausman, 1978). The reported results, shown in Table VII, reveal that only Model 3.b for the pre-crisis period suffers from the endogeneity problem. To detect the endogenous variables in this model, DWH test was used for the model's variables separately as suggested by Cameron and Trivedi (2009). The results of the DWH test show that individual block holding ratio, the debt ratio, growth prospects and firm size are the endogenous variables in this model; thus, the lagged values of these variables were utilised as instruments, and this model was re-estimated by using the 2SLS method using instrumental variables for these endogenous variables.

Table VIII reports the results of the 2SLS regression by using the lagged values of the individual block holding ratio, the debt ratio, growth prospects and firm size as instruments. The results show that institutional block holding is associated with better firm performance; growth prospects strongly and positively affect firm's performance (p-value < 0.001). Finally, large firms are able to generate more profits at the 10 per cent significance level.

Table V Regression analysis of the nonlinear impact of ownership variables on agency costs and performance proxies for the period (2005-2007)

	(1.a) TRN	*(1.b)* TRN	*(2.a)* QFCF	*(2.b)* QFCF	*(3.a)* ROA	*(3.b)* ROA	*(4.a)* Q	*(4.b)* Q
Intercept	1.896 (3.598)***	1.297 (3.088)**	−0.161 (−0.507)	−0.149 (−0.481)	0.521 (1.695)****	0.563 (1.834) ****	3.19 (4.631)***	3.206 (4.548)***
lnBRD	0.0578 (1.184)	0.0669 (1.603)	−0.0495 (−2.290)*	−0.0457 (−2.129)*	−0.0162 (−0.702)	−0.0201 (−0.959)	0.131 (2.307)*	0.113 (2.053)*
lnINDcompl	−0.019 (−1.318)	−0.01 (−0.718)	0.003 (0.300)	0.008 (0.779)	−0.004 (−0.666)	−0.003 (−0.522)	0.046 (2.021)*	0.048 (2.072)*
ACE	0.023 (1.743) ****	0.01 (0.733)	−0.011 (−0.963)	−0.016 (−1.464)	0.013 (2.068)*	0.015 (2.134)*	−0.021 (−0.978)	−0.015 (−0.747)
REMUcompl	−0.006 (−0.325)	−0.014 (−0.757)	0 (0.001)	−0.003 (−0.179)	−0.011 (−1.082)	−0.012 (−1.138)	−0.083 (−1.600)	−0.085 (−1.607)
NOMINIcompl	0.014 (0.796)	0.013 (0.728)	−0.005 (−0.365)	−0.005 (−0.402)	0.024 (1.780) ****	0.022 (1.734) ****	0.0004 (−0.016)	−0.003 (−0.098)
DUL	−0.023 (−1.060)	−0.031 (−1.460)	−0.031 (−1.114)	−0.018 (−0.591)	−0.008 (−0.987)	−0.006 (−0.681)	−0.056 (−1.693) ****	−0.064 (−1.725) ****
lnBLK	0.113 (1.037)		0.067 (0.792)		−0.007 (−0.122)		−0.119 (−0.649)	
BLK2	−0.022 (−0.121)		−0.04 (−0.263)		0.074 (0.625)		0.053 (0.153)	
lnINST_BLK		−0.025 (−0.223)		0.047 (0.574)		−0.015 (−0.233)		−0.107 (−0.563)
INST_BLK^2		0.192 (0.982)		0.016 (0.104)		0.088 (0.627)		0.008 (0.021)
lnINDV_BLK		−0.225 (−0.758)		−0.135 (−0.757)		−0.23 (−1.625)		−0.041 (−0.099)
INDV_BLK^2		0.724 (1.051)		−0.041 (−0.0876)		0.484 (1.603)		0.449 (0.412)
lnBRDOWN	0.23 (1.045)		0.041 (0.239)		0.035 (0.324)		−1.055 (−2.225)*	
BRDOWN^2	−0.538 (−1.039)		−0.237 (−0.517)		0.124 (0.456)		2.941 (2.696)**	
lnCEOOWN		0.354 (0.746)		1.153 (1.698) ****		−0.209 (−1.060)		−0.466 (−0.527)
CEOOWN^2		−2.58 (−1.039)		−10.989 (−1.933) ****		0.396 (0.415)		1.159 (0.263)
lnEXECOWN		−0.145 (−0.208)		−0.385 (−0.877)		−0.054 (−0.272)		−1.895 (−2.368)*
EXECOWN^2		0.579 (0.281)		1.476 (0.982)		0.857 (1.278)		6.857 (2.600)*
lnNEDOWN		0.523 (0.865)		0.28 (0.642)		−0.166 (−0.792)		−1.034 (−1.273)
NEDOWN^2		−1.912 (−0.610)		0.116 (0.046)		1.369 (0.983)		5.981 (1.835) ****
lnadjDBT	−0.24 (−1.619)	−0.326 (−2.823)**	0.029 (0.622)	0.019 (0.420)	−0.03 (−0.473)	−0.026 (−0.404)	0.002 (0.016)	−0.024 (−0.203)
sqadjDIVD	−0.044 (−0.679)	−0.075 (−1.143)	0.032 (0.576)	0.031 (0.572)	0.047 (1.197)	0.047 (1.217)	−0.014 (−0.181)	−0.014 (−0.178)
lnadjROA	0.153 (1.090)	0.242 (1.845) ****	−0.529 (−5.171)***	−0.515 (−5.039)***			0.021 (0.105)	−0.013 (−0.064)
lnadjQ	0.073 (1.979)*	0.092 (2.724)**			0.003 (0.106)	−0.002 (−0.0635)		
lnASSTS	−0.079 (−2.929)**	−0.026 (−2.016)*	0.017 (4.179)***	0.017 (4.013)***	−0.029 (−2.148)*	−0.031 (−2.245)*	−0.154 (−4.746)***	−0.151 (−4.517)***
N groups	562	562	562	562	562	562	562	562
Hausman	29.02**	30.960			66.88***	76.11***	146.63***	149.76***
Adj. $R^{2(\%)}$	18				6	7	16	16.4
F	4.019				1.855***	1.554***	3.582***	3.264***
χ^2		75.151***	55.626***	61.526***				

Notes: *$p < 0.05$ **$p < 0.01$; ***$p < 0.001$; ****$p < 0.10$

Table VI Regression analysis of the nonlinear impact of ownership variables on agency costs and performance proxies for the period (2009-2011)

	(1.a) TRN	*(1.b) TRN*	*(2.a) QFCF*	*(2.b) QFCF*	*(3.a) ROA*	*(3.b) ROA*	*(4.a) Q*	*(4.b) Q*
Intercept	1.06 (6.733)***	1.064 (6.550)***	−0.145 (−1.905) ****	−0.165 (−2.177)*	0.463 (7.161)***	0.419 (14.71)***	1.01 (2.903)**	1.651 (5.252)***
lnBRD	0.0698 (1.761) ****	0.0654 (1.659) ****	−0.0049 (−0.240)	−0.0055 (−0.275)	−0.0253 (−0.932)	−0.0044 (−0.520)	−0.0932 (−0.809)	−0.117 (−0.959)
lnINDcompl	−0.037 (−1.562)	−0.039 (−1.649) ****	0.005 (0.388)	0.005 (0.408)	−0.008 (−0.925)	−0.006 (−1.001)	0.02 (0.551)	0.008 (0.208)
ACE	0.048 (1.938) ****	0.051 (1.957) ****	−0.015 (−1.032)	−0.017 (−1.174)	−0.016 (−2.121)*	−0.005 (−0.702)	0.041 (0.956)	0.02 (0.379)
REMUcompl	−0.023 (−0.458)	−0.019 (−0.349)	−0.004 (−0.136)	0.004 (0.162)	0.044 (1.837) ****	0.007 (0.537)	0.267 (1.961) ****	0.339 (2.371)*
NOMINIcompl	−0.013 (−0.470)	−0.009 (−0.308)	0.033 (1.821) ****	0.036 (1.960) ****	−0.002 (−0.225)	0.001 (0.207)	0.033 (0.561)	0.028 (0.489)
DUL	−0.015 (−0.286)	−0.00004 (−0.001)	−0.038 (−1.411)	−0.033 (−1.248)	−0.039 (−1.645)	−0.012 (−1.183)	0.054 (0.557)	0.012 (0.119)
lnBLK	0.134 (0.944)		0.072 (0.909)		0.044 (0.698)		−0.37 (−1.143)	
BLK2	−0.158 (−0.942)		−0.001 (−0.0154)		−0.033 (−0.432)		0.203 (0.444)	
lnINST_BLK		0.214 (0.983)		0.118 (1.006)		0.021 (0.384)		−0.232 (−0.462)
INST_BLK^2		−0.416 (−1.098)		−0.027 (−0.128)		−0.061 (−0.583)		−0.213 (−0.192)
lnINDV_BLK		0.515 (1.513)		0.359 (2.003)*		−0.109 (−1.090)		−0.581 (−0.788)
INDV_BLK^2		−0.866 (−1.018)		−0.993 (−1.936) ****		0.257 (1.167)		1.581 (0.529)
lnBRDOWN	−0.017 (−0.0542)		−0.007 (−0.0448)		0.231 (1.302)		0.772 (1.120)	
BRDOWN^2	0.306 (0.448)		−0.269 (−0.650)		−0.241 (−0.652)		0.373 (0.209)	
lnCEOOWN		−0.397 (−0.706)		−0.324 (−1.132)		−0.181 (−1.902) ****		−0.726 (−0.322)
CEOOWN^2		0.469 (0.337)		0.891 (1.128)		0.509 (1.920) ****		1.829 (0.382)
lnEXECOWN		−0.244 (−0.506)		−0.122 (−0.416)		0.354 (2.539)*		1.176 (0.994)
EXECOWN^2		0.746 (0.611)		0.458 (0.573)		−1 (−2.965)**		−2.211 (−0.805)
lnNEDOWN		−0.326 (−0.361)		−0.024 (−0.0554)		0.481 (1.951) ****		0.876 (0.503)
NEDOWN^2		1.768 (0.417)		−0.457 (−0.281)		−1.287 (−1.617)		5.143 (0.715)
lnadjDBT	−0.561 (−5.652)***	−0.571 (−5.778)***	0.046 (1.128)	0.041 (1.011)	−0.097 (−2.632)**	−0.077 (−3.663)***	−0.074 (−0.382)	−0.182 (−0.897)
sqadjDIVD	0.003 (0.392)	0.004 (0.463)	−0.003 (−0.641)	−0.003 (−0.684)	0.001 (0.260)	0 (0.274)	0.002 (0.147)	0.002 (0.176)
lnadjROA	0.383 (2.099)*	0.382 (2.039)*	−0.189 (−2.394)*	−0.179 (−2.234)*			1.159 (3.565)***	
lnadjQ	−0.084 (−2.408)*	−0.085 (−2.372)*			0.053 (4.204)***	0.073 (6.923)***		
lnASSTS	−0.011 (−1.867) ****	−0.011 (−1.818) ****	0.013 (4.390)***	0.013 (4.482)***	0.0004 (0.268)	0.001 (0.626)	−0.043 (−3.686)***	−0.046 (−3.737)***
N groups	684	684	684	684	684	684	684	684
Hausman	17.83	20.42			24.78***	24.89	43.82**	49.36**
Adj. R^2					12%		16.5%	11%
F					8.415***		3.341***	3.163***
χ^2	62.41***	72.808***	41.931***	47.317***		137.577***		

Notes: *$p < 0.05$ **$p < 0.01$; ***$p < 0.001$; ****$p < 0.10$

Table VII Robust DWH endogeneity diagnostic test

	(1.a)	(1.b)	(2.a)	(2.b)	(3.a)	(3.b)	(4.a)	(4.b)
Pre-crisis								
H_o: variables are exogenous								
Durbin (score) χ^2	10.79	12.78	3.91	8.41	4.92	10.37	8.48	12.62
Wu–Hausman F	1.44	1.22	0.48	1.36	0.74	2.11*	1.02	1.57
Post-crisis								
H_0: variables are exogenous								
Durbin (score) χ^2	11.16	10.00	3.93	7.58	3.57	9.60	2.52	5.52
Wu–Hausman F	1.74	1.09	0.48	0.73	0.48	1.03	0.37	1.53

Note: *$p < 0.05$

Table VIII Results of the 2SLS regression with robust standard errors using the lagged values of the endogenous variables over the pre-crisis period

	(3.b) ROA	(3.b 2SLS) ROA
Intercept	0.548 (1.775)****	0.008 (0.052)
lnBRD	−0.0187 (−0.850)	−0.004 (−0.331)
IND compl	−0.004 (−0.662)	0.003 (0.460)
ACE	0.013 (2.060)*	0.007 (0.952)
REMU compl	−0.01 (−1.028)	−0.005 (−0.633)
NOMINIcompl	0.025 (1.834) ****	−0.005 (−0.376)
DUL	−0.005 (−0.617)	−0.018 (−1.556)
lnBLK		
lnINST_BLK	0.033 (1.068)	0.054 (2.624)**
lnINDV_BLK	−0.014 (−0.319)	0.002 (0.048)
lnBRDOWN		
lnCEOOWN	−0.136 (−1.796) ****	0.099 (1.246)
lnEXECOWN	0.164 (1.265)	0.13 (1.238)
lnNEDOWN	0.079 (0.877)	0.052 (0.487)
lnadjDBT	−0.026 (−0.420)	0.033 (1.111)
sqadjDIVD	0.047 (1.200)	0.023 (0.840)
lnadjROA		
lnadjQ	0.004 (0.144)	0.127 (10.56)***
lnASSTS	−0.031 (−2.240)*	0.00426 (1.669) ****
N groups	562	363
Hausman	69.47***	
Adj. R^2	7	34.8
F	1.643***	
Wald χ^2		153***
Instruments	one year lagged value of INDV_BLK, EXECOWN, adjDBT, adjQ ASSTS	

Notes: z/t-statistics in parentheses; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; ****$p < 0.10$; all variables are winsorized at the 1st and 99th percentile values

For Models 2a and 2b, considering that QFCF is a censored variable, Smith and Blundell (1986) test is more appropriate for examining the endogeneity issue. This test examines a null hypothesis that the examined variables are exogenous (Baum, 2007). The results, shown in Table IX, show that only Model 2.b of the pre-crisis sample suffers from the endogeneity problem. After examining for the endogenous variables, the results reveal that individual block holding and ROA are the endogenous variables in this model.

Table X illustrates the results of the Tobit regression after considering the endogenous variables for the pre-crisis period. The reported results lend the support to the earlier results reported in Table III and provide new evidence as well. Large boards are associated with

Table IX Smith–Blundell endogeneity test for QFCF models

	2.a	*2.b*
Pre-crisis		
H_0: variables are exogenous		
P-value	0.855	5.401*
Post-crisis		
H_0: variables are exogenous		
p-value	0.468	1.047

Note: *$p < 0.05$

Table X Results of the IV Tobit regression using the lagged values of the endogenous variables over the pre-crisis period

	(2.b) QFCF	*(2.b IV Tobit) QFCF*
Intercept	−0.154 (−0.495)	−0.087 (−0.199)
lnBRD	−0.0489 (−2.300)*	−0.076 (−2.749)**
IND compl	0.005−0.486	0.008 (0.525)
ACE	−0.013 (−1.185)	0.002 (0.134)
REMU compl	−0.002 (−0.130)	0.009 (0.331)
NOMINIcompl	−0.005 (−0.366)	−0.016 (−0.848)
DUL	−0.013 (−0.434)	−0.065 (−1.707) ****
lnINST_BLK	0.057 (1.926) ****	0.119 (3.031)**
lnINDV_BLK	−0.167 (−2.163)*	0.18 (1.576)
lnCEOOWN	−0.241 (−1.239)	−0.199 (−0.776)
lnEXECOWN	0.085−0.596	−0.139 (−0.798)
lnNEDOWN	0.296 (2.014)*	−0.102 (−0.507)
lnadjDBT	0.015−0.323	0.101 (1.809) ****
sqadjDIVD	0.032−0.594	0.049 (0.647)
lnadjROA	−0.498 (−4.929)***	−1.169 (−5.222)***
lnASSTS	0.017 (4.037)***	0.022 (4.120)***
N		363
Wald χ^2	61.526***	65.613***
Instruments	one year lagged values of INDV_BLK, adjROA	

Notes: z/t-statistics in parentheses; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; ****$p < 0.10$; all variables are winsorized at the 1st and 99th percentile values

lower agency costs, whereas institutional block holding increases agency costs at the 1 per cent significance level. There is new evidence that duality helps in reducing agency costs at the 10 per cent significance level. Also, the reported results provide new evidence that the increase in the debt level after the industry median increases agency costs at the 10 per cent significance level. Finally, the same results were reported for the *ROA* and firm size.

5. Conclusion

The aim of this paper is twofold; this paper contrasts the effectiveness of a comprehensive set of corporate governance mechanisms in mitigating the agency conflicts related to work shirking and investment decisions on one side and firm performance on the other side. This challenges prior studies that have utilised firm performance and/or value as indirect proxies of agency costs. Besides, using a two-period framework, this paper investigates the impact of economic conditions on the effectiveness of corporate governance mechanisms in mitigating the agency conflicts and enhancing firm performance.

This study provides empirical evidence that supports the agency theory and resource dependence theory in terms of board characteristics and that failed to support the

stewardship theory in terms of CEO duality. The results demonstrate that large boards reduce agency costs and enhance firm value, whereas compliance with the recommended board composition by the UK Corporate Governance Code enhances firm value for the post-crisis period but increases the agency costs of the post-crisis period. Interestingly, an effective audit committee reduces agency costs for both samples but decrease firm profitability after the crisis. There is some evidence that the compliance with the recommendations of the remuneration and nomination committees enhances firm performance. There is modest evidence that duality is detrimental to firm performance.

Before the financial crisis, the presence of block holders helped in reducing the agency costs. However, block holders turned to be a source of agency conflicts after the financial crisis. Board ownership seems to have a significant role in reducing the agency costs and enhancing firm performance after the financial crisis. In terms of owner identity, the results show that individual block holders are more effective in performing their monitoring role, and their presence protects dispersed shareholders from the opportunistic behaviour of institutional block holders. The results also provide evidence supporting the entrenchment hypothesis of the managerial ownership and the control and the expropriation hypotheses of the block holding ownership.

The results clearly show that some corporate governance mechanisms can help in reducing the agency conflict and lead to lower agency costs; however, this positive impact is either not reflected in higher returns on assets to the shareholders or the market does not perceive or evaluate this impact correctly. Such evidence challenges and stands against prior studies that used firm profitability and firm value as indirect proxies of agency costs. Moreover, it provides evidence that corporate governance mechanisms do complement each other; some mechanisms could lead to a lower level of agency conflicts, whereas other mechanisms enhance firm performance.

Furthermore, these results raise an important question about the usefulness of some governance mechanisms, especially for those mechanisms that increase the agency conflicts or have a negative impact on firm performance; for those mechanisms, what is the benefit from forcing firm to adopt harmful mechanisms? For example, the suggested board composition by the UK Governance Code requires firms to follow a certain composition ignoring the significant differences between firms; such recommendation is not a problem if this recommendation is neutral, neither harms nor benefits the firm. But, in case if it increases the agency conflicts, regulators should think about a firmer customised governance structure, not impose certain board structure and endorse the notion that one structure does not fit all.

This paper suggests that governance regulations should be more flexible to understand firm's specific needs and the daily changes in the business environment. Enacting stricter rules does not mean that regulators should set one governance structure and force firms to follow such structure. This paper also brings to attention that shareholders should be more active monitors, and the regulators should enact strict regulations that protect minority shareholders from the opportunistic behaviour of block holders. The study results shed light on future research; researchers should consider that using limited number of governance mechanisms or examining these mechanisms in isolation will bring out inconsistent results. This could mislead future researchers and policymakers as well, in addition to the need of applying different theoretical perspectives while studying different governance attributes.

This study has few limitations. First, it uses two agency cost proxies; other agency costs measures (i.e. selling, general and administrative expenses to sales (SG&A) and asset liquidity) can be included in future research. Second, although this study uses a comprehensive set of corporate governance variables, future research can extend this study by incorporating more explanatory variables (e.g. CEO compensation, board diversity

and other ownership identity variables). In addition, using more than six years of data and including more countries with different institutional framework would be a fruitful area for further work.

Note

1. Maximum accepted value is 10 (see. Gujarati, D. N. (2004), *Basic econometrics*, Tata McGraw-HillNew Delhi; London.)

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