Interlocking directorships and firm performance in the highly regulated sectors: The moderating impact of board diversity[1]

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ABSTRACT

Interlocking directorships are a pervasive element of the corporate landscape. Academic literature documents many examples of spreading business practices and strategic outcomes through this form of inter-organizational connectedness. Yet, the findings on the long debated relationship between interlocking ties and firm performance remain mixed. In this study, we provide an analysis of this relationship on the basis of a sample of UK-listed financial and utility companies across a ten year period. Our findings provide support to the busyness hypothesis of interlocking and indicate that when used in excess, interlocking is likely to compromise the attention of directors on the focal company board. Moreover, in reconciliation of the competing views of the resource-dependence and agency theory, we propose a contingency-based model of interlocking with board diversity as a moderator of the baseline interlocking-firm performance relationship. Our results render support to the assertion that the potential for dissemination of ideas and innovations resides in the interlocking ties. However, boards need to be receptive to that knowledge exchange for this transfer to take place and this process may be facilitated by the level of and changes in board diversity. This study contributes to research into the consequences and implications of interlocking directorships and demonstrates that the search for the moderating and mediating variables represents a step in the right direction.

217 words

Key words: *Agency Theory, Board Diversity, Firm Performance, Interlocking Directorships, Resource-Dependence Theory.*

1. Introduction

Board interlocking directorships have been widely researched throughout the last thirty years and identified as conduits for dissemination of innovations and business practices (e.g., Davis, 1991; Galaskiewicz and Wasserman, 1989; Haunschild, 1993; Pfeffer, 1972; Westphal, Seidel and Stewart, 2001). In addition, a review of corporate governance architecture and mechanisms commissioned by the UK Department of Trade and Industry in 2007, indicated 'the number of network ties to other firms and external constituencies' as one of 18 key factors contributing to good corporate governance, subsumed under the heading of 'the diversity, human and social capital within the board' (Filatotchev, Jackson, Gospel, and Allcock, 2007, p. 84). Similarly, Jonnergård and Stafsudd (2011) demonstrated that board interlocks generally favour board activities and engagement.

However, multiple directorships typically attract the attention of regulators, more as a potential concern rather than source of benefits for companies (e.g., UK Combined Code, 2008; UK Corporate Governance Code 2010; Walker Review, 2009). This concern is commonly based on the busyness hypothesis, which proposes that many external board appointments are likely to compromise the quality of work of the focal company board. Indeed, following the recent financial crisis, the Walker Review (2009) of the governance of UK banks and other financial institutions[2] (BOFIs), recommended that more time (30-36 days per annum) is formally required from non-executive directors (NEDs) and chairmen on BOFI boards.

The idea that interlocking directorships may be 'a double-edged' sword, *i.e.* apparently beneficial, yet having negative implications when used excessively, is reflected in the mixed findings in research on the long debated interlocking- firm performance relationship: positive,

[2] We use the abbreviation of BOFI (Banking and Other Financial Institutions) to describe all types of financial institutions.

negative or no association between the two variables (e.g., Geletkanycz and Boyd, 2011; Kiel and Nicholson, 2006; Loderer and Peyer, 2002; Yeo, Pochet and Alcouffe, 2003). Our study adds to this by providing evidence from analysing a sample of large UK-listed financial and utility companies across a period of ten years. Therefore, an important strength of our study is its substantial longitudinal dimension through which we can detect effects of changes in board composition.

Both the financial and utility sectors are highly regulated, because their constituents make decisions and effectively control strategic resources for the economy, such as capital or telecommunication services (Minichilli, Zattoni and Zona, 2009). The level of interlocking ties in these companies is found to be overall higher than in companies from other sectors (Ong, Wan and Ong, 2003). This is in line with bank-control and bank-hegemony theories (Mariolis, 1975; Mintz and Schwartz, 1983, 1985) which assume that BOFIs are dominant over other classes of institutions, through making financing decisions. Because the majority of companies are dependent on external funding, they effectively allow financial suppliers to influence and coordinate their activities. This argument implies the centrality of financial institutions in interlocking networks, whereby major corporations strive for bank board representation in order to participate in decisions about capital allocation. Conversely, BOFIs gain important information about industry conditions and investment opportunities by appointing directors from a range of industries. Representatives of BOFIs also frequently expect board appointments at their corporate partners to conduct more effective corporate control and monitoring over those companies (Mintz and Schwartz, 1985; Mizruchi, 1996; Ong, Wan and Ong, 2003). For example, Mizruchi and Stearns (1988) found that firms create new interlocks with financial companies when faced with declining solvency and profit rates, whereas Stearns and Mizruchi (1993a, 1993b) reported that there is a positive relationship between bank representation on a non-financial firm's board and

the amount of external financing that the firm employed. Therefore, by concentrating on these two crucial industries for the economy, we are able to isolate the industry effects and examine the relationship between interlocking and firm performance, where interlocking is relatively more intense compared to other sectors.

We provide evidence in support of the negative association between interlocking directorships and firm performance. This finding suggests that it is the busyness hypothesis of interlocking based on agency theory (Eisenhardt, 1989; Fama and Jensen, 1983) rather than benefits of resource-dependence flows (Pfeffer, 1972; Pfeffer and Salancik, 1978) that governs this relationship. Our results provide support to the diffusion model of interlocking (Shropshire, 2010), demonstrating that the impact of interlocking directorships on firm performance is likely to turn positive in the presence of board diversity.

The contribution of our study to corporate governance research is fourfold. First, we provide a longitudinal analysis (over a period of 10 years) of the longdebated, baseline interlocking-performance relationship in the financial and utility sectors, where the phenomenon of interlocking is relatively more intense compared to other industries. (Mizruchi, 1996; Ong, Wan and Ong, 2003). This creates an opportunity to contribute a statistically robust result to the repository of findings on this baseline relationship. Second, this evidence renders support to the busyness hypothesis of interlocking, which suggests that the concerns of regulators are well-founded and that companies should carefully screen external directors' appointments. Third, we identify board diversity and changes in board diversity as factors which have positive impact on the relationship between interlocking and firm financial performance. These findings provide corroborative evidence to the contingency-based model of interlocking, in which the board's internal (social) context effectively moderates the baseline interlocking- firm performance relationship. Finally, the managerial implications of our study indicate that both the increased

time commitment of directors and board diversity represent important pre-requisites of constructing a well-functioning and value-creating board, which justifies the fact that they are actively promoted by contemporary regulation.

The paper begins with an outline of the theoretical basis for this research, followed by an elaboration of our hypotheses. Following sections on methods and measures, analysis and results, we then turn to a discussion in which we reflect on the implications of our findings, both for theory and practice, and identify areas for future research. In the final section we draw concluding remarks to this work.

2. Theory: Interlocking directorships

An interlocking board directorate occurs when "a person affiliated with one organisation sits on the board of directors of another organisation" (Mizruchi, 1996, p. 271). Bazerman and Schoorman (1983, p. 206) described interlocking directorates as "the most widely used environmental management strategy", and Hallock (1997) contended that the occurrence of interlocks is too high to be random, and thus reflects meaningful organizational mechanisms.

The causes and consequences of interlocking directorates have been a topic of academic debate since the Pujo Committee identified them as a problem in the early 20th Century. This research stream flourished throughout the 1970s and 1980s in the US and UK, particularly from a resource-dependency perspective (Aldrich, 1979; Allen,1974; Burt, 1983; Mizruchi, 1996; Mizruchi and Stearns, 1988; Pfeffer, 1972; Pfeffer and Salancik, 1978; and Stiglitz, 1985) and has continued to attract important contributions, with interesting international findings including Jackling and Johl (2009) for India; Geletkanycz and Boyd (2011), Kang (2008) and Kang and Tan (2008) for the U.S.; Khanna and Thomas (2009) for Chile; Kiel and Nicholson (2006) for Australia; Ong, Wan and Ong (2003) and Phan, Lee and Lau (2003) for Singapore; Yeo, Pochet and Alcouffe (2003) for France.

The resource-dependence model of interlocking (Pfeffer, 1972; Pfeffer and Salancik, 1978) is built on the rationale that all organizations are restricted in their autonomy by their dependence on other companies for resources and cooperation. This puts financial and utility companies, which are instrumental for the allocation of resources that are essential to the economy such as finance or telecommunication services, centre stage. While the relationship between interlocking and organizational outcomes has been studied extensively (e.g., Davis, 1991; Haunschild, 1993; Palmer, Jennings and Zhou, 1993; Westphal, Seidel and Stewart, 2001) there is a dearth of studies that focus specifically on financial and utility companies. For this reason, we have concentrated on these industries.

Since resources needed by a focal corporation are controlled by other large organizations, this dependency leads to complex structural relationships among corporations. In this setting, there are strong incentives for forming interlocking ties with financial and utility companies, through which the required resources may be co-opted or favourable policies negotiated to reduce dependency on a particular resource. Alternatively, as the control of resources confers power on an organization over the dependent firm, board representatives of an organization in control of a given resource, such as finance or telecommunication services, present on the board of the dependent firm can exercise influence and perform their monitoring function. Hence co-optation and monitoring reasons for interlock formation are probably the most popular compared to collusion, legitimacy, career advancement and social cohesion reasons as quoted in the literature (Mizruchi, 1996).

Co-optation is defined as the absorption of potentially disruptive elements into a firm's decision-making structure, such as granting a board seat to a representative of a bank, to which a focal firm is indebted (Selznick, 1949). The argument on the monitoring rationale for the occurrence of interlocks, in turn, suggests that they provide means of monitoring a given

company, and thus serve as instruments of corporate control (Eisenhardt, 1989; Stiglitz, 1985). Academics remark that in practice both monitoring and co-optation interlocks are indiscernible, because they are underpinned by the resource-dependence flows. Therefore, they suggested that co-optation and monitoring occur simultaneously in any interlock based on resource-dependence flows (Mizruchi and Stearns, 1988; Pfeffer, 1972; Pfeffer and Salancik, 1978).

3. Hypotheses

3.1. Interlocking directorships and firm performance

Resource-dependence theory stipulates the benefits of interlocking in terms of serving to coordinate inter-organisational exchange of resources (capital, information, and market access) and buffering the effects of environmental uncertainty (Pfeffer, 1972; Pfeffer and Salancik, 1978). For instance, organisations that grapple with uncertainty arising from technological shifts, deregulation, globalization of capital and product markets, and political reform, can more efficiently avail themselves of resources by coordinating their efforts through the board of directors (Mizruchi, 1983). Moreover, boards in general as well as their interlocked directors in particular play an important role in securing external resources through their linkages to the external environment (e.g., Boyd, 1990; Filatotchev and Toms, 2003; Hillman, Cannella and Paetzold, 2000; Johnson, Daily and Ellstrand, 1996; Pearce and Zahra, 1992), in counteracting environmental uncertainty (Pfeffer, 1972), and in reducing transaction costs associated with environmental interdependence (Williamson, 1984). Hence compared with other industries, we are likely to observe a greater number of interlocked directors on boards of financial and utility companies as the benefits of interlocking can be even more pronounced.

Interlocked companies can also obtain more information through their external networks and are therefore better positioned to formulate and implement stable strategies (Pfeffer and

Salancik, 1978; Useem, 1982; Stiles, 2001). Finally, interlocks help reduce incentives for opportunism by increasing mutual flow of information between exchange partners. Overall, as a form of inter-organisational connectedness, interlocking directorates can greatly facilitate the performance of the board tasks of service and strategy (Zahra and Pearce, 1989), of resource provision (Hillman and Dalziel, 2003), and of resource-dependency/boundary-spanning (Johnson, Daily and Ellstrand, 1996).

Other theoretical lenses provide complementary insights on the potential benefits of interlocks. Multiple external board appointments can be a source of organisational learning, innovation and obtaining insights into the policies and practices of other organisations (e.g., Haunschild, 1993; Beckman and Haunschild, 2002; Barringer and Harrison, 2000; Pye, 2000). Executive directors (EDs) serving as NEDs on boards of other firms have the opportunity to learn about new strategic alternatives and approaches without exposing their focal firm to the costs of experimentation (Burt, 1987; Geletkanycz and Hambrick, 1997).

Haunschild (1993) noted that interlocks are a credible and low-cost channel of information and communication across firms, and Galaskiewicz and Wasserman (1989, p. 456) contended that they serve "as a conduit to disseminate ideas and innovations". An array of studies also document the beneficial impact of interlocking directorates in terms of the diffusion of firm strategic outcomes and business practices, such as adopting a poison pill takeover defence (Davis, 1991), the multidivisional form (Palmer, Jennings and Zhou, 1993), achieving external financing (Stearns and Mizruchi, 1993a, 1993b; Mizruchi and Stearns, 1994) or acquisition behaviour (Haunschild, 1993).

Therefore, based on resource-dependence theory we propose that multiple board appointments in financial and utility companies can be assumed to facilitate the performance of board tasks of service, strategy, or resource provision and to be a source of organizational

learning, as well as a low-cost transmission channel for business practices and innovation. Accordingly, we hypothesise:

H_1: The average number of interlocking directorates on the board of financial and utility companies will be positively associated with firm performance.

There are important drawbacks of the interlocking phenomenon. First, Mills (1956) and Mace (1971) expressed the view that interlocks constitute social ties among members of the upper class and represent capitalist class integration. In line with the management control theory, interlocks may be therefore a means of managerial inter-corporate control serving the interest of the upper class inhibiting change and innovation (e.g., Useem, 1984; Zeitlin, 1974), which is particularly relevant for financial and utility companies.

More importantly, in accordance with agency theory (Eisenhardt, 1989; Fama and Jensen, 1989), when used in excess, interlocking is also likely to expose directors to a number of cues which they are unable to reconcile and hence their scant managerial attention becomes compromised. As a result, they are likely not to be able to devote sufficient time and energy to monitoring and control of EDs on the focal company board. In other words, when directors hold many external board appointments, they may become too busy to conduct effective monitoring of the focal company board, which is especially the case in financial and utility companies, where the incidence of interlocking is higher than in the other industries. This is duly noted by UK regulation which recommends a limit for the number of additional board mandates for EDs and ensuring sufficient time commitment and inputs by NEDs (UK Corporate Governance Code, 2010; Walker Review, 2009). Therefore, interlocking is unlikely to be unequivocally beneficial.

Busyness of directors represents a condition in which directors try to reconcile too many external board seats, the phenomenon which is known as 'overboarded directors' (Harris and Shimizu, 2004). Interestingly, the literature on board busyness demonstrates that these detrimental effects do not take place when average busyness of particular directors is considered (Ferris, Jagannathan and Pritchard, 2003; Harris and Shimizu, 2004). However, when busy directors represent at least half of the board, considerable negative performance effects are reported. At issue here is the distribution of board seats held by NEDs, in particular, who typically have many more external directorships than EDs. Therefore, the condition of the busy board, where the majority of directors are busy, rests on the assumption of the critical mass required for the phenomenon of busyness to be challenging for the board as a whole (Fich and Shivdasani, 2006). Accordingly, in this study we account for the negative effects of interlocking by testing the busyness hypothesis based on the agency theory and the notion of a busy board, when busy NEDs constitute at least half of the board, and hypothesise that this condition will be related with the performance discount in financial and utility companies.

H_2: The condition of a busy board in financial and utility companies will be negatively associated with firm performance.

3.2 Effects of interlocking in the presence of board diversity

The research question on the relationship between interlocking and firm performance is long debated in the management literature, and the empirical evidence about this relationship, following the competing views of the resource-dependence and agency theory, is mixed. Early studies by Burt (1979), Pennings (1980), and Richardson (1987) reported that interlocked companies tend to perform better than firms without this kind of tie. Fligstein and Brantley

(1992) reported a negative association between interlocks and profitability for a large sample of US companies, and Loderer and Peyer (2002) generate similar findings for listed Swiss companies. More recent accounts of the beneficial impact of interlocks on firm performance are provided by Ong, Wan and Ong (2003), Phan, Lee and Lau (2003), and Yeo, Pochet and Alcouffe (2003). In contrast, Kiel and Nicholson (2006) and Geletkanycz and Boyd (2011) found no direct relationship between interlocking directorates and firm performance.

In view of this evidence and to reconcile the competing views of the resource-dependence and agency theory, we consider the context for this baseline proposition and propose a contingency-based view to build a more fine-grained investigation of the relationship in question in financial and utility companies. Ong, Wan and Ong (2003) recognised that extant literature has generally focused on macro system relationships between main variables, whereas the micro system has been largely ignored. Inter-organisational cooperation aspects tend to overshadow real network processes, potential conflicts and their resolutions, and consequently the nature and types of interactions are not effectively captured. They therefore call for inclusion of micro-level variables in analysing the board interlocking- performance relationship which measure board characteristics (e.g., demographics) and board processes (e.g., cohesiveness, decision-making processes, conflict and power dynamics).

In the spirit of this call, Shropshire (2010) proposed a multi-level model of the diffusion of practices through the interlocking channel. Whilst academics tend to agree that interlocks can serve the purpose of conveying information regarding innovation and strategy (Bazerman and Schoorman, 1983; Haunschild, 1993; Mizruchi, 1996), there is little, if any, research on mechanisms underlying that exchange. Shropshire (2010) attempted to fill this gap and introduced a holistic theoretical perspective. This model considers factors and characteristics of interlocked directors that underpin their motivation and ability to transmit knowledge across

firms as well as factors that influence the board receptivity to the diffusion of practices through interlocks. In so doing, she identified board diversity as one of the factors that is likely to enhance a board's ability to assimilate knowledge and ideas that an interlocked director can offer (other factors include board power, focal firm centrality, interlocked/ focal firm status and age).

Geletkanycz and Boyd (2011) provided evidence that the impact of interlocking on firm performance is likely to be highly contextual and concentrated on the firm's external context, such as industry growth, concentration, and firm diversification. In line with Shropshire's (2010) diffusion model of interlocking, we propose a contingency-based model which suggests board diversity as an internal contextual variable that effectively moderates the baseline interlocking-firm performance relationship in financial and utility companies in order to reconcile the competing views of the resource-dependence and agency theory.

There is a recognition in the group effectiveness literature that diversity allows group members to gain access to information and perspectives drawn from outside the group (Ancona and Caldwell, 1992). In turn this may also bring about cognitive conflict (Forbes and Milliken, 1999) which may enhance the team's analytical ability (Dahlin, Weingart and Hinds, 2005). This goes in line with the proposition of 'value-in-diversity', which accentuates diversity as a human capital asset (e.g., Cox, Lobel and McLeod, 1991; Watson, Kumar and Michaelsen, 1993). According to this perspective, diversity in a team increases the amount of information available for problem-solving, and thus enhances its ability to generate correct and creative solutions (Williams and O'Reilly, 1998). In a similar vein, the information presented to a board by an interlocked director is more likely to influence the ultimate decision outcomes if the board has experience of receiving information from diverse inputs. When boards are relatively homogenous or comprise token minorities, they tend to concentrate on social categorization aspects of the communication rather than the message. In contrast, diverse groups have been shown to establish

more collaborative and cooperative norms for positive interaction, which over-shadow the social categorization processes due to demographic differences (Martins, Milliken, Wiesenfeld and Salgado, 2003; Shropshire, 2010). Therefore, we propose that the level of board diversity is likely to create favourable conditions for the reception of ideas available through the interlocking ties and positively impacts on the interlocking- firm performance relationship in financial and utility companies.

H_3: The relationship between interlocking directorates and firm performance in financial and utility companies will be positively moderated by the level of board diversity.

Jonnergård and Stafsudd (2011) suggested that changes to board composition are related to the range of board activities and level of board involvement, enhancing the quality of board's work. This opens up a possibility for a dynamic account of the proposition on the beneficial impact of board diversity on the uptake of ideas flowing through the interlocking channel. Changes in board composition that lead to higher levels of diversity are likely to increase its information-processing and decision-making capacity and enhance the number of potential solutions as well as the creativity of the team's work (Dahlin, Weingart and Hinds, 2005; Watson, Kumar and Michaelsen, 1993; Williams and O'Reilly, 1998). At the same time, they are likely to foster more collaborative and cooperative norms on the board and decrease the potential for negative social categorization processes (Martins, Milliken, Wiesenfeld and Salgado, 2003). As a result, the board's capacity for accommodating ideas and innovations that an interlocked director has to offer will increase. Accordingly, we propose that changes in board diversity are likely to have beneficial impact on the relationship between interlocking ties and firm performance in financial

and utility companies. The relationships proposed in hypotheses 3 and 4 are illustrated in Figure 1.

H_4: The relationship between interlocking directorates and firm performance in financial and utility companies will be positively moderated by changes in board diversity.

Insert Figure 1 about here
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4. Methods

4.1 Sample and Data Collection

The sample for this study consists of an unbalanced panel dataset of UK listed financial (Standard Industry Classification (SIC), edition 87: 60-64 and 67) and utility companies (SIC, 87: 48-49) from the Financial Times and London Stock Exchange (FTSE) 350 Index as of the financial year-end 2008 analysed for the period of 1999-2008. We selected the sample of FTSE 350 companies from these regulated sectors, because concentrating on two industries allows us to reduce the aggregation bias resulting from industry effects and draw better comparisons, as these companies are likely to face similar environmental pressures, which impact on their performance (Tihanyi, Ellstrand, Daily and Dalton, 2000). Moreover, Ferris, Jagannathan and Pritchard (2003) demonstrated that the phenomenon of multiple interlocking directorates is predominantly occurring in large firms, therefore we are more likely to capture the patterns and relationships related to interlocking than it would be the case if we were to analyse small- and medium-size (SME) enterprises.

Our database is developed from multiple sources. Information on interlocking directorates and corporate governance data were collected from BoardEx. Firm financial performance and characteristics were derived from Thompson One Banker, World Scope, and Fame UK.

Individual director information is aggregated to the company level to match firm performance variables as a unit of our analysis. Since our models are specified with a one-period lag in regressors, we restrict the basic sample to companies for which we observe interlocking directorates and corporate governance characteristics for at least two consecutive years. These criteria yield an unbalanced panel data set that comprises from 110 to 605 firm-year observations, representing a sample of 18 to105 firms, according to model specifications.

4.2 Measures

4.2.1 Dependent Variable

Firm performance. In order to test hypotheses derived in the theoretical section, we use a market-based measure of firm performance, Tobin's q, which has been frequently applied in extant corporate governance literature (Bhagat and Bolton, 2008; Demsetz and Lehn, 1985; Guest, 2009). Stock-based measures of performance are relatively forward-looking, reflect both the company's current position and its potential to be successful in the future (*cf.* Devers et al, 2007), and are more resistant to manipulation by management (Decktop, 1987; Hambrick and Finkelstein, 1995). Boards confront the task of eliciting true information about managerial performance. Therefore, board composition and proceedings signal the firm's reputation in financial markets and have been demonstrated to have more impact for stock-based than for accounting-based measures of firm performance (Haslam, Ryan, Kulich, Trojanowski and Atkins, 2010; *cf.* Oxelheim and Randøy, 2003).

Tobin's q is defined as the ratio of the firm's market value to its book value. The firm's market value is calculated as the book value of assets minus the book value of equity plus the market value of an equity (De Andres and Vallelado, 2008). This way, Tobin's q compares the market value of company with the replacement value of its assets, and therefore represents an

estimate of the efficiency of a company's use of its assets in the perception of investors (Haslam et al., 2010). Tobin's q has a quality of reflecting the value of investments in technology and human capital, and its positive value can be ascribed to the intangible value of intellectual capital which is not captured by traditional accounting systems. In that sense, together with the market-to-book ratio (MTB), it belongs to the market capitalization methods of measuring the value of intangible assets (Stewart, 1997; Sveiby, 1997). Therefore, both Tobin's q and MTB appear as relatively strong measures of the quality of work and contributions of boards of directors out of all other measures of firm performance. As a robustness check, we validate our results for the MTB as a measure of firm performance, which is defined as the market valuation of a company (market capitalisation) divided by its book value, *i.e.* the equity portion of the balance sheet (Brigham, 1995).

At the same time, we acknowledge the limitation of applying firm valuation as a dependent variable in this study and gave consideration to the use of other indices, such as board task effectiveness (e.g., Huse, 2005; Minichilli, Zattoni and Zona, 2009). However, accounting for board task effectiveness typically results from self-reported responses to a survey instrument. Such a research instrument frequently leads to the common problem of a low response rate, hence reduced sample size. Finally, the main obstacle to using a survey-based dependent variable in our longitudinal analysis is that with data dating from 1999, it would be either impractical or impossible to obtain reliable retrospective answers on board task effectiveness.

In order to adjust for inflation, all monetary values are converted to real terms (according to 2005 prices) using industry level (SIC, edition 1992) output deflators. Performance measures and deflators were excerpted from Thompson One Banker and the Office for National Statistics (ONS), respectively.

4.2.2 Independent Variables

Interlocking directorships. Our measure of board external appointments is based on director-to-company connections and is defined as the total of directors' interlocks minus board size divided by board size (Kiel and Nicholson, 2006). Geletkanycz and Hambrick (1997) used director-to-company ties to calculate the intra-industry interlocks of directors. Geletkanycz and Boyd (2011) applied this way of measurement to CEO ties as one component of their four-item measure of interlocking. Filatotchev (2006) also normalized by board size. Use of measures based on director-to-company relationships was advocated by Nicholson, Alexander and Kiel (2004) as well as Ong, Wan and Ong (2003). We concentrate on ties to other listed and non-listed companies and exclude any director services in charitable institutions and non-profit organizations, because while they may be a source of social capital, they also represent a qualitatively different type of director engagement. Such a measure reflects directors' social capital on average and embeddedness in elite networks through which a focal company can gain access to resources.

Busy board. Ferris, Jagannathan and Pritchard (2003) and Harris and Shimizu applied similar ways of measurement of busyness based on the ratio measure and included both EDs and NEDs in the calculation. Both studies reported that busyness of directors is not necessarily a negative phenomenon for firm financial performance. This is because this type of measurement does not differ much from the measure of average interlocking activity, which makes the isolation of the effects of the busyness phenomenon difficult. In contrast, Fich and Shivdasani (2006) argued that for busyness to be problematic, it must reach a critical mass of directors, and especially NEDs, who are busy. Accordingly, they captured this phenomenon by classifying boards as busy with the dummy coding of 1, if NEDs holding 3 external board directorships or more constitute at least half of the board, and 0 otherwise. Although the drawback of this measure is that it exogenously determines the condition of the busy board, it remains a better

solution than the measure of busyness that is indistinguishable from the average incidence of interlocking. Thus, we account for the condition of a busy board with the Fich and Shivdasani (2006) measure.

4.2.3 Moderating Variables

Board diversity. Similar to Shropshire's (2010) diffusion model of interlocking, in which board diversity is one of the factors enhancing board receptivity to ideas available through the interlocking ties, we use board diversity as a proxy for board openness to ideas and innovations that may flow through interlocks and measure it as the mean of the diversity scores as set out below.

We consider the following directors' characteristics as giving rise to the overall heterogeneity on the board: (1) age, (2) gender, (3) nationality, (4) education, (5) board tenure and (6) financial background. We account for directors' age by subtracting the birth year from a given year in the analysed period of 1999-2008. Gender is coded as a binary dummy variable (female vs. male). Nationality is a multi-categorical qualitative variable coded as reported by companies. We apply the following coding principle for the education variable to reflect the scale of educational achievements: 1- School/Vocational, and 2- Bachelor, 3- Master, 4- MBA, and 5- Doctoral degrees. Board tenure is accounted for as the length of time that each member has served on the board in a given company. Financial background of board members is a binary dummy variable coded as 1 if members hold financial qualifications from higher educational institutions or professional bodies (e.g. chartered accountant), and as 0 otherwise.

To measure the diversity index of categorical variables, *i.e.* gender, nationality, education, and financial background, we apply the Blau's index (1977): $(1-\sum p_i^2)$, where p_i stands for the fraction of board members that belong to a given category. To capture the heterogeneity of the

interval variables, *i.e.* age and board tenure, we use the coefficient of variation defined as the standard deviation divided by the mean (SD/μ). This is a preferable measure among the inequality indicators, when interval-level data such as age or time are analysed (Allison, 1978).

Changes in board diversity. Changes in board composition in terms of the analysed directors' characteristics of age, gender, nationality, education, board tenure, and financial background, lead to different diversity scores. Potential increases or decreases in the level of heterogeneity on the board allow us to provide a more dynamic account of the moderating impact of board diversity underpinning its receptivity to knowledge exchange through interlocks on the interlocking-performance relationship. To construct this measure, we transform the level of diversity values using the first difference function expressed as the series of changes from one period to the next.

4.2.4 Control Variables

Corporate governance variables. We control for the following corporate governance dimensions: board size, NED ratio, number of board committees, CEO tenure, CEO/Chairman separation, and CEO ownership.

In their meta-analytical study, Dalton, Daily, Johnson and Ellstrand (1999) demonstrate that there is systematic evidence of non-zero, positive, true population estimates of board size-firm performance relationships. This suggests that it is not representation of one or another board member type (e.g., outsiders *versus* insiders) that is key, but more the ability of a board to leverage these roles. This is because larger boards can accommodate inside directors (providing local expertise, training, and succession), affiliated directors (resource dependence links), and other outside and/or independent/interdependent directors (independence). So, a board should ideally be of sufficient size to be composed of all these different types of members who together

fulfil these different provisions. We measure *board size* as a count of all board members (Guest, 2009; Larmou and Vafeas, 2010).

NED ratio is a traditionally used proxy for board independence and is defined as the proportion of NEDs to the total board size. NEDs are generally considered to be independent from management, therefore their higher representation on the board is considered beneficial for boards' ability to enact effective monitoring of management (e.g., Dalton, Daily, Ellstrand and Johnson, 1998; Dey, 2008).

Number of board committees is construed as an indicator of quality of board task performance and we measure it as a count of the number of board sub-committees (Peterson and Philpot, 2007). Delegating particular board functions into sub-committees enhances the quality with which boards can perform their roles (Ruigrok, Peck, Tacheva, Greve and Hu, 2006): for example, nominating directors and top managers (nomination committee), monitoring internal control and audit processes (audit committee), and providing properly incentivising, executive director pay packages (remuneration committee).

The extant literature indicates that the CEO role, tenure and type of board leadership can influence firm performance. Accordingly, we construct the measure of *CEO tenure* as the number of years during which the current CEO served in this role in a given firm (e.g., Westphal and Zajac, 1995). *CEO/Chairman separation* is coded as a dummy variable, taking the value of 1 if the CEO and chairman roles are separated, and 0 if both roles are performed by the same individual (e.g., Datta, Musteen and Herrmann, 2009). *CEO ownership* is operationalised as the value of equity held by the CEO in absolute values. The amount of equity held by the CEO represents a proxy for a mechanism of aligning managerial incentives with the performance targets expected by shareholders (Fich and White, 2005; Rutherford, Buchholtz and Brown, 2007).

Firm characteristics. We account for the following firm characteristics: firm size, firm age, and firm diversification. *Firm size* is measured as total sales (Fich and Shivdasani, 2006). *Firm age* is captured as the number of years since the firm was established as an economic entity (Guest, 2009). Finally, we account for *firm diversification* as the number of business segments in which the firm is active classified according to the two-digit SIC codes (Linck, Netter and Yang, 2008; Martin and Sayrak, 2003).

Year effects. We also include in our specification the year dummy variable which is to capture any macro-shocks (e.g., financial crisis, changes in the regulatory framework, changes in accounting standards [3]) over time that are common to all firms.

4.3 Analysis

Corporate governance literature (e.g., De Andres and Vallelado, 2008; McKnight and Weir, 2009) frequently points out a potential endogeneity problem in the relationship between the corporate governance variables and firm performance. The systematic approach to deal with this problem is to use instrumental variables (IV) or generalised method of moment (GMM) regressions. Prior to econometric estimation, we therefore perform the Durbin-Wu-Hausman (DWH) specification test to detect the problem. The result of the DWH χ^2 test does not reject a null hypothesis of exogeneity, thereby indicating that the variables under investigation can be assumed to be pre-determined. This suggests that methods such as IV or GMM may yield estimators that are consistent but not efficient in our analysis.

Given that our baseline model contains a time-invariant variable of the number of business segments, we estimate our baseline equation using random effects regressions to control for unobserved heterogeneity of firms and director specific effects (*i.e.* personality of directors,

[3] The Chow test statistic does not reject the null hypothesis of no structural break in the firm performance function due to the 2005 change in the accounting standards in the UK before and after year 2005 (F(13,2162)=0.95, p=0.49).

leadership style, management quality, business strategy and so forth). Instead of using contemporaneous specification, we estimate board interlocks, busy board and corporate governance variables with one period lag to minimise endogenous relations (if any) and to better distinguish cause and effect. This helps us discern possible inertia in the relationship between the level of firm performance and multiple directorships, busy board and governance characteristics, especially given that firm performance is not likely to reflect instantly any changes in the corporate governance characteristics (e.g., Brown, Beekes and Verhoeven, 2011).

In models with an augmented specification, we test whether board diversity and changes in diversity, as outlined above, have a moderating effect on the relationship between interlocking and firm performance. Such a model specification enables the stipulation of conditions in terms of moderating variables (board diversity/ change in board diversity) for the main effect of the independent variable (interlocking directorships) to arise (Aiken and West 1991; Aguinis 2004).

5. Results

The means, standard deviations and the correlation matrix of all variables that we use in the analysis are presented in Table 1. The average number of external board appointments among the financial and utility companies from the FTSE 350 index across the time period of 1999-2008 amounted to 3.16. This suggests that interlocking represents not only a non-negligible phenomenon in the UK financial and utility sectors, but also that an average director on a board of those companies is considered as busy, based on Ferris, Jagannathan and Pritchard's (2003) definition which uses 3 or more directorships to determine busyness. However, only 26 per cent of the sampled companies can be classified as having a busy board in accordance with the definition of a condition of a busy board by Fich and Shivdasani (2006), *i.e.* NEDs holding 3 or more directorships constituting more than a half of the board.

Insert Table 1 about here

In Table 2 we present the results of the regression models testing hypotheses 1 and 2. Contrary to our predictions, the coefficient of board interlocks is significant but negative (β = -0.10, p < 0.01), which suggests a negative relationship between interlocking and firm performance in financial and utility companies. This result remains unchanged, when we apply a MTB ratio as a firm performance measure. Hypothesis 1 is therefore not supported. In the model testing hypothesis 2, we obtained a significant and negative coefficient of a condition of a busy board, as expected (β = -0.06, p < 0.05). This result was not significant for a MTB measure of firm performance, and therefore, hypothesis 2 is partially supported.

Insert Table 2 about here

In Table 3 we present the statistical estimates of the regression models testing hypotheses 3 and 4. We did not find significant results for a full sample of companies, when testing hypothesis 3. However, when we split the sample into financial and utility companies separately, we obtained significant results. The two-way interaction term between interlocking and board diversity is positive and significantly different from zero both for a sub-sample of financial companies (β = 1.34, p < 0.10) and utility companies (β = 4.84, p < 0.05). This suggests that there may be some idiosyncrasies as to how this moderation effect unfolds in each of these two industries separately. We obtained similar results in models with a MTB ratio as a measure of firm performance. Therefore, hypothesis 3 is partially supported. In the model testing hypothesis 4, the two-way interaction term between interlocking and changes in board diversity is positive

and significantly different from zero in line with our predictions (β = 1.45, $p < 0.10$). The result is consistent with the one from the MTB model, hence, hypothesis 4 is supported (see Figure 1).

Insert Table 3 about here
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6. Discussion

The counter-veiling evidence generated for hypothesis 1 suggests that higher than the average incidence of interlocking ties in financial and utility companies is likely to lead to the busyness problem which cancels out the potential benefits of interlocks. When the level of interlocking is high, the need to reconcile a number of board appointments compromises directors' ability to contribute sufficient time and attention to the monitoring and service roles of the focal company board (Fich and Shivdasani, 2006; Perry and Peyer, 2005). This finding is in line with the agency theory-based view of interlocking (Eisenhardt, 1989; Fama and Jensen, 1983), which points to the problem of busyness, rather than the resource-dependence view (Pfeffer, 1972; Pfeffer and Salancik, 1978) which suggests the benefits of interlocking in terms of improved inter-organisational coordination and uncertainty reduction.

It is also conceivable that in the interlocks involving financial and utility companies there is not much room for inter-organizational learning and diffusion of innovation and business practices that would be beneficial *per se* for financial and utility companies. These interlocking ties are more likely to serve the purpose of ingratiation by companies from other sectors in their quest for influence on the allocation of resources that are strategic to the economy, such as capital or telecommunication services (*cf.* Ong, Wan and Ong, 2003).

Partial support for hypothesis 2 in which we explicitly tested the busyness hypothesis (more than a half of directors holding 3 or more directorships) provides corroborative evidence to

the agency theory- based view that when used in excess the interlocking ties in financial and utility companies are likely to be more related with performance discounts than benefits. This is due to compromised time commitment and attention that directors of those companies are able to devote to boards of the focal companies which cancels out the potential benefits of improved inter-organizational co-ordination and uncertainty reduction as predicted by the resource-dependence theory.

Partial support to hypothesis 3 and support to hypothesis 4 suggest that the contingency-based model, in which board diversity creates an internal board context for the baseline interlocking- firm performance relationship, represents a viable way of reconciling the competing views of the agency theory and resource-dependence theory. This corresponds with Shropshire's (2010) model, in which board diversity is assumed to be a proxy for board receptivity to innovations and sharing of business practices through the interlocking channel and which has a potential to explain the mechanisms governing that knowledge exchange through the interlocks. Our analysis shows that the overall impact of interlocking can turn positive in the presence of board diversity and when changes to board diversity are taking place. Therefore, interlocks involving financial and utility companies can be beneficial for those companies, provided that there is a sufficient level of diversity on the board.

The ideas, innovations and the potential for sharing business practices reside in interlocking ties. However, a board must be receptive to such inputs in order to make good use of them, and this may be facilitated by board diversity. Experience, receiving information from diverse inputs, ability to generate a high number of good quality, creative, solutions are all positive accompaniments of diversity on the board, which enable the uptake of innovations and strategies through interlocks (Martins, Milliken, Wiesenfeld and Salgado, 2003; Shropshire,

2010). In this way, changes to board composition that lead to higher board diversity enhance this capacity for accommodation of new ideas and solutions.

Overall, our results confirm Geletkanycz and Boyd's (2011) main thesis that the relationship between interlocking and firm performance is contextual. They detected the conditioning impact of a firm's external environment on this relationship, whereas we found evidence in support of the contingency-based model with the moderating influence of the board social context in the form of diversity. This way our study sheds new light on the long debated interlocking-firm performance relationship and contributes to the management literature in general, and corporate governance research in particular. More specifically, it provides evidence that studying interlocking in particular industries may yield more granular findings, which can enhance our understanding of the phenomenon of interlocking. Finally, our findings correspond with the diffusion model of interlocking (Shropshire, 2010), which is based on the assumption that interlocks serve as a conduit to transmit ideas, information and innovation (Galaskiewicz and Wasserman, 1989; Haunschild, 1993) and that this knowledge exchange does not take place in a social vacuum (Ong, Wan and Ong, 2003). Therefore, the board social context strongly matters for the ultimate cost-benefit appraisal of this form of inter-organizational connectedness. Overall, this study and its implications are compatible with recent calls in the corporate governance literature for greater theoretical pluralism and giving attention to micro-variables in board research (Hambrick, Werder and Zajac, 2008; Huse, Hoskisson, Zattoni and Viganò, 2011).

6.1 Managerial implications

Our research offers some interesting managerial implications for the UK context. Boards of financial and utility companies should be mindful that although the demand for their directors may be high, these additional board appointments may eventually lead to a busyness problem. Their directors will find it difficult to reconcile their duties across all their boards and in

consequence the quality of boards' work in the focal companies will be compromised. In that sense our study provides arguments in support of the Walker Review's (2009) recommendations for BOFIs, which require greater time commitment from both chairmen and NEDs on those boards. This also points to the importance of studying the complex role of NEDs in listed companies in general (Petrovic, 2008) and not only with reference to the interlocking appointments that they hold.

However, to activate the potential for an uptake of ideas, information and innovation residing in these interlocking ties, boards should consider whether they have enough diversity and possibly increase the level of diversity among their members. Our study provides evidence that variety of backgrounds and skills in the boardroom can serve the purpose of enhancing board openness to potential knowledge exchange through the interlocking channels. Board interlocks do not constitute a conduit to disseminate ideas and innovations *per se*. There must be an environment which facilitates board receptivity to such ideas and innovations so that this dissemination can be effective, and ultimately beneficial for companies. In that sense, our work provides evidence in support of the recent UK corporate regulations, such as UK Corporate Governance Code (2010) and FRC Guidance on Board Effectiveness (2011), which accentuate the benefits of board diversity more strongly than their predecessors.

6.2 Limitations and future research directions

Hallock (1997) demonstrated that CEOs who lead interlocked firms are able to appropriate higher rents as compared to those in charge of non-interlocked firms, which may have negative value-creating implications. Therefore, one fruitful avenue of future research would be to examine the relationship between the board interlocking and average compensation of EDs and NEDs as well as firm performance, where the remuneration variable would serve as a mediator of the baseline interlocking- firm performance relationship.

There are several different ways in which to build on these findings. Our sample consists of the financial and utility companies that were and some of them still are a part of the FTSE 350 index. There are opportunities to test the proposed relationships for the sample of companies from other sectors as well as smaller firms, such as young, more entrepreneurial Initial Public Offerings (IPOs) in search of resources and legitimacy (Filatotchev, Toms and Wright, 2006). For example, O'Sullivan (2000) reported a considerably higher incidence of external directorships among NEDs and CEOs in entrepreneurial IPOs than in FTSE 200 firms. The analysis could also be refined to develop a more nuanced understanding of change over time and in relation to the stages in a firm's life cycle or indeed, board life cycles although access to robust data is potentially problematic.

There is also scope for qualitative investigation to add insight from directors about the effects of board composition and interlocking ties on board process and performance in practice to amplify some of our own and/ or Shropshire's (2010) hypotheses. It would also be possible to widen the scope of interlocks beyond the corporate focus of our analysis, to include social networks beyond the immediate work environment and which would probably also require qualitative investigation to ensure reliability of data (*cf.* Tosi, 2008). Finally, it would be interesting to test our hypotheses in other, non Anglo-Saxon countries, which have different legal systems and cultural norms, such as found in continental Europe, Africa and Asia (Aguilera, 2005; Aguilera and Jackson, 2003). Such analysis of the impact and effects of interlocks could help further our understanding of the mechanisms that govern knowledge exchange through interlocks.

7. Conclusion

Paradoxically, despite regular calls to open up the gene pool such that NEDs are appointed from a wider selection of candidates, the recent economic downturn has potentially

turned the tables such that fewer people are sufficiently well-qualified or able to fulfil the new regulatory requirements (Walker Review, 2009) of directors in financial service firms. This leads to the situation where directors occupy seats on many boards, the phenomenon which is referred to as interlocking directorships. In this study, we scrutinized the relationship, long debated in the corporate governance literature, between interlocking ties and firm performance for a sample of UK-listed financial and utility companies across the period of ten years.

In the juxtaposition of the competing views of the resource-dependence and agency theory, our findings point to the plausibility of the latter and suggest a negative relationship between interlocking and firm performance, which provides support to the busyness hypothesis of interlocking. Akin to the diffusion model of interlocking (Shropshire, 2010), we also find evidence that interlocks may indeed serve as conduits to disseminate ideas and knowledge. There is a potential for knowledge exchange through interlocks, however, boards must be receptive enough to that transfer for this beneficial dissemination to occur. Boardroom diversity and changes in board composition leading to higher diversity represent ways to ensure necessary board openness to ideas and innovations flowing through the interlocking channel. This evidence sheds additional light on the benefits of diversity in the boardroom (UK Corporate Governance Code, 2010; FRC Guidance on Board Effectiveness, 2011) and demonstrates that the impact of interlocking on firm performance is likely to turn positive in the presence of board diversity.

Overall, our research provides evidence that despite extensive research on the subject matter there is still much to be learnt about interlocking ties by close investigation across time. We believe our analysis makes a contribution to this field of work by drawing attention to the moderating effect of board diversity and encourages investigation of *when*, *how* and *under what conditions* this inter-organisational form of connectedness can enhance board task performance and be translated into positive strategic outcomes and firm financial performance.

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Table 1: Descriptive statistics and the correlation matrix

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Firm Performance	1.38	1.50	1.00													
2. Board Interlocks	3.16	1.80	-0.08	1.00												
3. Busy Board	0.26	0.44	-0.10	0.48	1.00											
4. Board Size	9.89	3.70	-0.01	0.09	-0.13	1.00										
5. CEO Ownership	967.95	3669.58	0.00	-0.03	-0.01	0.12	1.00									
6. CEO Tenure	4.73	4.71	0.17	0.02	-0.12	-0.07	0.23	1.00								
7. CEO/Chairman Separation	0.67	0.47	0.18	-0.11	-0.24	0.47	0.16	0.03	1.00							
8. NED Ratio	0.69	0.20	-0.03	0.29	0.48	-0.40	-0.08	-0.03	-0.52	1.00						
9. Board Committees	3.47	1.29	-0.02	-0.11	-0.13	0.21	0.07	-0.05	0.25	-0.28	1.00					
10. Firm Diversification	1.47	0.85	-0.03	0.09	0.07	0.47	0.08	0.02	0.34	-0.26	0.24	1.00				
11. Firm Age	33.89	38.17	-0.19	0.19	0.25	-0.20	-0.09	-0.02	-0.25	0.38	-0.27	-0.09	1.00			
12. Firm Size	3742.50	9260.02	-0.12	0.07	0.00	0.61	0.12	-0.14	0.29	-0.15	0.13	0.35	-0.02	1.00		
13. Board Diversity	0.35	0.08	-0.02	-0.05	-0.02	0.40	0.10	-0.05	0.20	0.02	0.09	0.29	0.09	0.31	1.00	
14. Change in Board Diversity	0.01	0.04	-0.01	-0.02	-0.05	0.12	-0.01	-0.02	0.00	-0.02	0.13	0.06	-0.03	0.08	0.26	1.00

Note: N= 439. All variables are expressed in the level form. The absolute values of the correlation coefficients equaling 0.10 or higher are significant at the $p<.05$ level (two-tailed).

Table 2: Random effects models with lagged regressors

	Independent Variables	Dependent Variable: Firm performance			
		Model 1		Model 2	
		B	(SE)	β	(SE)
	Main effects				
H_1	Board Interlocks	-0.10***	(0.04)		
H_2	Busy Board			-0.06*	(0.04)
	Control Variables				
	Board Size	-0.06	(0.07)	-0.05	(0.07)
	CEO Ownership	-0.02***	(0.01)	-0.02***	(0.01)
	CEO Tenure	0.03	(0.02)	0.02	(0.02)
	CEO/Chair Separation	0.06	(0.04)	0.06	(0.04)
	NED Ratio	-0.36	(0.23)	-0.38	(0.24)
	Board Committees	0.01	(0.06)	-0.01	(0.06)
	Firm Diversification	0.13	(0.10)	0.13	(0.10)
	Firm Age	-0.07**	(0.03)	-0.07**	(0.03)
	Firm Size	0.00	(0.02)	0.00	(0.02)
	Constant	0.69***	(0.25)	0.76***	(0.25)
	Year Dummy	Yes		Yes	
	Wald Chi2	83.38***		78.30***	
	Number of Observations	605		605	
	Number of Companies	105		105	

*p<.10; **p<.05; ***p<.01 (two-tailed).

Note: Standard errors are reported in the parentheses. All variables are transformed to natural logarithms, except for a dummy coded variable CEO/Chair Separation and the value "1" is added where variables are less than 0. Variables on interlocks and corporate governance are lagged one period.

Definitions of variables: Firm performance- Tobin's q defined as the ratio of the firm's market value to its book value (the firm's market value calculated as the book value of assets minus the book value of equity plus the market value of an equity); Board interlocks- the total of directors' interlocks minus board size divided by board size (director-to-company connections; Busy board- coded as 1, if NEDs holding 3 external board directorships or more constitute at least half of the board, 0 otherwise; Board size- a count of all board members; CEO ownership- the value of equity held by the CEO (absolute values); CEO tenure- the number of years during which the current CEO served in this role in a given firm; CEO/ Chair separation- coded as 1, if the CEO and Chairman roles are separated, 0 otherwise; NED ratio- the proportion of NEDs to the total board size; Board committees- a count of all board sub-committees; Firm diversification- the number of business segments in which the firm is active classified according to the two-digit SIC codes; Firm age- the number of years since the firm was established as an economic entity; Firm size- the value of total sales; Year effects- year dummy variable for the period 1999- 2008.

Table 3: Random effects model with lagged regressors

	Independent Variables (Mean centred)	Dependent Variable: Firm performance					
		Model 3a: Financial companies		Model 3b: Utility companies		Model 4	
		β	(SE)	β	(SE)	β	(SE)
	Main effects						
	Board Interlocks	-0.45**	(0.20)	-1.65***	(0.66)	-0.07	(0.05)
	Control Variables						
	Board Size	-0.14	(0.11)	0.48**	(0.23)	-0.05	(0.09)
	CEO Ownership	-0.01*	(0.01)	-0.03	(0.02)	-0.01**	(0.01)
	CEO Tenure	0.04	(0.03)	-0.05	(0.09)	0.03	(0.03)
	CEO/Chair Separation	0.16**	(0.07)	0.14	(0.15)	0.09*	(0.06)
	NED Ratio	-0.41	(0.35)	2.64***	(0.77)	-0.60**	(0.30)
	Board Committees	-0.11	(0.09)	-0.10	(0.18)	-0.00	(0.08)
	Firm Diversification	0.05	(0.12)	0.15	(0.13)	0.06	(0.11)
	Firm Age	-0.15***	(0.04)	-0.13**	(0.05)	-0.14***	(0.04)
	Firm Size	-0.02	(0.02)	-0.03	(0.06)	-0.02***	(0.02)
	Moderating Variable						
	Board Diversity	-1.69*	(0.91)	-2.89*	(1.66)		
	Change in Board Diversity					-1.95**	(0.87)
	Interaction Effects						
H_3	Interlocks*Diversity	1.34*	(0.70)	4.84**	(2.28)		
H_4	Interlocks*Change in Diversity					1.45*	(0.80)
	Constant	1.78***	(0.44)	-0.11	(0.78)	1.07***	(0.32)
	Year Dummy	Yes		Yes		Yes	
	Wald Chi2	74.22***		44.08***		81.71***	
	Number of Observations	343		110		435	
	Number of Companies	68		18		83	

*p<.10; **p<.05; ***p<.01 (two-tailed).

Note: Standard errors are reported in the parentheses. All variables are transformed to natural logarithms, except for a dummy coded variable CEO/Chair Separation and the value "1" is added where variables are less than 0. Variables on interlocks and corporate governance are lagged one period.

Definitions of variables: Firm performance- Tobin's q defined as the ratio of the firm's market value to its book value (the firm's market value calculated as the book value of assets minus the book value of equity plus the market value of an equity); Board interlocks- the total of directors' interlocks minus board size divided by board size (director-to-company connections; Board size- a count of all board members; CEO ownership- the value of equity held by the CEO (absolute values); CEO tenure- the number of years during which the current CEO served in this role in a given firm; CEO/ Chair separation- coded as 1, if the CEO and Chairman roles are separated, 0 otherwise; NED ratio- the proportion of NEDs to the total board size; Board committees- a count of all board sub-committees; Firm diversification- the number of business segments in which the firm is active classified according to the two-digit SIC codes; Firm age- the number of years since the firm was established as an economic entity; Firm size- the value of total sales; Board diversity- the mean of the diversity scores for directors': (1) age, (2) gender, (3) nationality, (4) education, (5) board tenure and (6) financial background. The diversity scores are calculated based on the Blau's index for categorical variables and coefficient of variation for interval variables; Change in board diversity- transformation of the level of diversity values with the first difference function expressed as the series of changes from one period to the next. Year effects- year dummy variable for the period 1999- 2008.

Fig. 1: The contingency model: interlocking- firm performance relationship in the presence of board diversity/ change in board diversity (Illustration of hypotheses 3 and 4)