

Do board interlocks motivate voluntary disclosure? Evidence from Taiwan

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Abstract Conference calls have become a widely used medium for voluntary corporate disclosure, especially among firms associated with greater information asymmetry, intangible assets, and external competition. These features are common in high-tech sectors, which dominate the Taiwanese economy and render it a useful research setting for investigating whether board interlock, as a social network, affects corporate decisions to hold conference calls. We show that firms connected to conference-call-making firms through interlocked directors are more likely to hold conference calls and the frequency of holding conference calls increases with interlocking directors' relevant experience. Moreover, such evidence is more pronounced if the connections are held through independent directors and among firms with greater information asymmetry. These results support the argument that the spread of corporate practices is positively associated with board interlock networks. Our findings have implications for the choice of board of director members, and can be generalized to other emerging economies characterized by weaker corporate information environments.

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1 Introduction

This study examines the relation between board interlocks and corporate voluntary disclosure through conference calls. A board interlock is a communication channel that is formed when one board of director sits on multiple boards simultaneously and transfers information from one board to another. These interlocking boards create connections between firms and these connections form a network that transfers reliable information (Galaskiewicz and Wasserman 1989). Social network theory suggests that a firm's decisions or behaviors are influenced by information spread through social networks (Haunschild 1993). Prior studies argue that board interlocking is associated with the spread of poison pills and golden parachutes during the take-over wave in the US in the 1980s (Davis 1991; Davis and Greve 1997), option grants backdating (Bizjak et al. 2009), synchronous returns (Khanna and Thomas 2009), private equity offers (Stuart and Yim 2010), tax shelters (Brown 2011), earnings contagion (Chiu et al. 2013), and the selection of auditors (Davison et al. 1984).

Conference calls are considered to be more effective than other channels of voluntary disclosure due to their interactive characteristics. Information asymmetry between the management and outside investors is an agency problem that has long been a cause for concern and which leads to a higher cost of capital. Voluntary disclosure provides important communication between firms and investors, mitigating information asymmetry. Specifically, for firms that rely heavily on external financing, reducing the cost of capital is the main incentive for disclosing corporate information voluntarily (Verrecchia 1983; Donnelly and Mulcahy 2008). Indeed, many studies find that conference call helps mitigate the information asymmetry between inside managers and outside investors by increasing the firm-specific information available to the market (e.g. Tasker 1998; Bowen et al. 2002; Brown et al. 2004; Irani 2004; Kimbrough 2005). Investors are more confident about investing in firms when corporate information is easier to obtain, which in turn will reduce the cost of capital (Diamond and Verrecchia 1991; Healy and Palepu 2001; Francis et al. 2005, 2008).

This study concentrates on the argument that information about conference call disclosure policies is transferred through board interlocks. Corporate behaviors, decisions, and practices can be influenced through board interlocks because such connections serve as a reliable, valuable, and imitable information resource between firms (Galaskiewicz and Wasserman 1989; Barney 1991; Haunschild 1993). Under the growing trend for using conference calls as a voluntary disclosure medium in Taiwan (e.g. Chin et al. 2007; Liang et al. 2012), firms tied to firms that hold conference calls have chances to observe information about conference calls and better understand the importance of this voluntary medium. Specifically, interlocked directors have chances to observe the decision process behind holding conference calls in interlocked firms and the expected benefits of reducing the information asymmetry between the management and outside investors. Thus, we expect a positive association between focal firms' interlocked ties to conference-call-making firms and its decision to hold conference calls. Our sample consists of listed firms

in Taiwan from 2000 to 2009 and we use logistic regression and zero-inflated regression to test our hypotheses.

Taiwan provides an ideal setting for examining the relationship between board interlocks and voluntary disclosure through conference calls for two reasons. First, the high-tech industry is the driving force behind Taiwan's economic growth (e.g. Chang and Su 2010), and firms in this sector rely heavily on external funding from outside investors, provided through the capital market. The majority of the assets of these high-tech firms are intangible. However, firms are inclined to book these intangibles as R&D expenditures and barely capitalize them. Moreover, firms are reluctant to disclose sensitive information regarding their products to the public due to high proprietary cost and litigation risk (e.g. Gu and Li 2007; Ciftci and Zhou 2014). Hence, information asymmetries tend to be greater among R&D-intensive firms and they rely heavily on voluntary disclosure to mitigate the problem. Prior literature suggests that firms that make technological innovations are more likely to use conference calls to disseminate private information to investors in order to avoid losing their competitive advantages to their competitors (Chin et al. 2007). Second, although the use of conference calls as a medium for voluntary disclosure is viewed as a common practice in the mature market, it is not clear how well they work in an emerging market such as Taiwan. Previous studies regarding conference calls have mostly been conducted in the US market setting (e.g. Tasker 1998; Bushee et al. 2003; Brown et al. 2004). Existing studies suggest that firms may have less incentive to disclose information voluntarily in non-US markets because of the relatively lower demand for high reporting quality and transparency (e.g. Ball et al. 2003; Leuz et al. 2003; Liang et al. 2012). Given this institutional environment, it is interesting to look at whether engaging in interlock networking through directors affects firms' behavior regarding holding conference calls to improve their disclosure. Therefore, we believe that the Taiwanese sample is a good fit for our study.

The results of this study support the argument that the spread of corporate practices is positively associated with board interlock networks. Specifically, we find that focal firms connected to conference-call-making firms through board interlocks are more likely to hold conference calls and tend to hold them more frequently. This result is more pronounced when the connection is formed through the focal firm's independent directors. This evidence implies that interlocked directors with different board positions have different impacts on a firm's disclosure policy. Further, we show that the impact of board interlocks on the decision to hold conference calls is more pronounced among firms with greater information asymmetry, proxied by R&D intensity. This suggests that interlocking directors' outside experience influences a firm's disclosure policy, especially among those with a greater demand to reduce information asymmetry between management and outside investors. Our evidence is robust to controlling for other conference call determinants that are motivated by previous literature, as well as to applying alternative measures of conference calls, board interlocks, and board independence in our empirical analyses.

Our study contributes to the literature in two ways. First, we contribute to prior research on board interlocking showing that social networking helps promote the diffusion of disclosure practices (e.g. Cai et al. 2014) as well as accounting choices (e.g. Kang and Tan 2008; Chiu et al. 2013). Our study emphasizes the importance of social networking in facilitating the dissemination of firms' disclosure policies and practices. Second, we add to the corporate governance literature showing that board independence has a significant influence on voluntary disclosure policies aimed at improving reporting transparency, particularly among firms with higher information asymmetry (e.g. Armstrong et al. 2014; Chiu et al. 2013). Lastly, given that board interlocks could exert a significant influence on

firms' reporting practices, our study can help investors and regulators to better comprehend the underlying factors behind voluntary disclosure practices.

The remainder of this study is organized as follows. Section 2 describes the related literature and background on conference calls and board interlocks. In Sect. 3, we develop hypotheses based on prior research and construct the regression models. Section 4 reports the descriptive statistical analysis, correlation analysis, and empirical results. Section 5 concludes.

2 Literature review and hypothesis development

2.1 Board interlocks

A board interlock is formed when the same individuals sit on multiple boards of directors (e.g. Useem 1984; Davis and Powell 1992). Based on the network theory, if companies share the same directors, information and experiences will be transferred between these companies through these directors' communication, influencing other firms' structures and practices. Useem (1984) states that director interlocks act as a channel through which managers can receive an optimal scan of the latest business practices and overall business environment. Social learning theory (Bandura 1977) specifically argues that observers of transmitted information imitate the behaviors of others. Granovetter (1985) argues that, like individual behavior, economic behavior is socially embedded in that those who exhibit it are affected by their relationship to other actors. Just as connection between individuals leads to the imitation of individual behaviors, connections between firms lead to the imitation of corporate practices.

Galaskiewicz and Wasserman (1989) further indicate that network ties between organizations act as pipes for disseminating ideas and are familiar information channels that decision makers trust. Because these decision makers trust the interlocking network, they are more likely to mimic other firms' practices or strategies that are passed on to them through interlocking ties. Moreover, the board directors are often in the highest decision-making position, meaning that firm strategies and structures are influenced by the communication between these interlocking directors. Prior studies identify the spread of financial strategies through board interlocks. Davis (1991) and Davis and Greve (1997) show that the spread of poison pills and golden parachutes during the take-over wave in the US in the 1980s was associated with board interlocks. Rao et al. (2000) indicate that the likelihood of firms migrating from the NASDAQ to the NYSE is strengthened by director links to NYSE firms and weakened by director links to NASDAQ firms. Bizjak et al. (2009) indicate that option grants backdating is associated with board interlocks. Khanna and Thomas (2009) show that firms that have interlocking directorates are particularly likely to have synchronous returns. In the field of accounting, Brown (2011) finds that board-interlocked ties increase the likelihood of firms adopting tax shelters. Davison et al. (1984) provide evidence that board-interlocking directors affect the choice of auditors. These results support the argument that board interlocks serve as an information network that leads to the diffusion of corporate strategies, practices, and even business structure. Based on these studies, we are interested in examining whether board interlocks are associated with the spread of conference calls as a voluntary disclosure mechanism.

From the perspective of disclosure theory, firms that rely more on external financing have incentives to disclose reliable information voluntarily (e.g. Verrecchia 1983) and this

voluntary disclosure helps mitigate the information asymmetry between the firm's management and outside investors and reduce a firm's cost of capital. Frankel et al. (1995) indicate that firms seeking external financing have greater incentives to voluntarily disclose information than their counterparts without external financing needs, suggesting that market forces provide incentives to disclose more. Diamond and Verrecchia (1991) show that revealing public information to reduce information asymmetry can reduce a firm's cost of capital by attracting increased demand from large investors due to the increased liquidity of its securities. These studies support the idea that voluntary disclosure helps reduce information asymmetry and a firm's cost of external financing.

2.2 Conference calls

Conference calls are a voluntary disclosure medium through which companies can communicate firm-specific information to the public effectively and increase the information content in the market (Tasker 1998; Frankel et al. 1999). The increased information content in the capital market means that the information asymmetry between managers and investors is mitigated (e.g. Tasker 1998; Bowen et al. 2002; Brown et al. 2004; Kimbrough 2005; Liang et al. 2012). Reducing the information asymmetry between firms and investors leads to economic consequences such as decreases in analysts' forecast errors (Bowen et al. 2002), increases in the liquidity of shares (Diamond and Verrecchia 1991; Agarwal et al. 2015), the lowering of costs of capital (Merton 1987; Brown et al. 2004), and higher merger announcement returns (Kimbrough and Louis 2011). For listed companies, increasing the liquidity of shares and lowering the cost of capital are two major consequences that increase managers' incentives to voluntarily disclose information (Diamond and Verrecchia 1991; Healy and Palepu 1993; Frankel et al. 1995; Healy and Palepu 2001).

Conference calls have an interactive characteristic that makes communication more effective and efficient than through any other type of voluntary disclosure. Typically, a conference call consists of two sections: a presentation by the management, and a question and answer session between the audience and the management (Frankel et al. 1999; Hollander et al. 2010; Matsumoto et al. 2011; Cicon 2015). In the presentation section, managers will share information they wish to disclose or emphasize to the participants, such as their interpretation of the firm's performance, and any additional voluntary disclosure. In the question and answer section, also called the "discussion" section (Matsumoto et al. 2011), participants have the opportunity either to ask questions about the firm or to question the information disclosed by the managers during the presentation. This discussion section provides a forum for analysts or investors who participate in the call to communicate with the firm's managers face-to-face. Due to this interactive characteristic, conference calls, compared to other types of voluntary disclosure, provide an ideal channel for inside managers to convey corporate information to the public and for outside investors and analysts to request the information they need (Hollander et al. 2010).

2.3 Institutional setting

Since the 1990s, Taiwan has been known as a home for leading high-tech companies manufacturing semiconductors, screen panels, and integrated circuit (IC) products. Its high-tech sector is one of the top players in the global arena and contributes significantly to the global supply (Hung et al. 2004). For instance, the thin film transistor—liquid crystal display (TFT-LCD) sector in Taiwan accounts for approximately 40 % of the world-wide TFT-LCD production, which made it the largest global supplier in 2004 (e.g. Hung 2006;

Su et al. 2006, Tseng et al. 2009; Cheng and Lee 2010). Since these innovative firms need external financing to grow, and their financial reports may not reflect their true potential and future prospects, voluntary disclosure is an important way for them to reduce information asymmetry and the cost of equity.

Previous studies suggest that conference calls have been a widely used medium for voluntary disclosure among firms in emerging markets like Taiwan since the early 2000s (e.g. Chin et al. 2007; Liang et al. 2012). Relative to that of mature markets such as the US, the information environment of emerging markets could be perceived as less transparent. Hence, conference calls can help to improve the reporting transparency between firms in such markets and outside investors, particularly foreign investors (Liang et al. 2012). Moreover, since technology and electronics are the dominant industries in emerging markets such as Taiwan, conference calls provide management with a channel for communicating information not contained in the financial statements of firms with innovative activities (Chin et al. 2007; Chan 2014).

Interlocked firms may also influence the information content disclosed in each other's conference calls. For instance, WahLee Industrial Corp. is interlocked with Wah Hong Industrial Corp and both firms held conference calls in the year 2005. According to the content published on the Taiwanese Stock Exchange Market Observation Post System, both firms mentioned the expected sales and market reaction of their new products in the conference calls. Another example is that YAGEO was interlocked with ProMOS Technologies in the year 2006. In their conference calls at the beginning of the year, both firms mentioned the current capacity utilization at their major plants.¹

2.4 Hypothesis development

Based on the aforementioned literature review and institutional setting, we formulate our testable hypotheses. Board interlocks can provide a reliable source of information, sharing and disseminating experiences of corporate strategies, decisions, and practices across firms. Conference calls can be an important channel of voluntary disclosure for firms wishing to mitigate the information asymmetry with outside investors in order to reduce the cost of equity capital. Thus, focal firm directors who sit on the boards of firms that experience the benefits of conference calls could potentially facilitate and promote the decision of the focal firm to adopt a similar practice. In other words, the benefits and importance of conference calls would be transferred from firm to firm through these interlocking directors. Therefore, we hypothesize that firms connected to firms that hold conference calls are more likely to adopt such practices themselves.

H1 Firms with interlocked directors connected to conference-call-making firms are more likely to hold conference calls themselves.

According to the theory of corporate governance and agency problems, independent boards of directors and better disclosure mechanisms could alleviate the information asymmetry between managers and investors, an agency problem that arises from the separation of management and ownership (e.g. Kanagaretnam et al. 2007; Andres and Vallelado 2008). Boards of directors monitor and give advice on the operation of the firm. In particular, independent directors are considered to be more willing and able to protect shareholders' interests due to their impartiality (e.g. Yeh et al. 2012). Ajinkya et al. (2005)

¹ Future research could further determine the type of information that is most likely to be transferred through interlocked directors.

argue that independent directors not only monitor the quality of financial information but also play a role in determining and monitoring a firm's voluntary disclosure policy. They find that firms with more outside directors are more likely to issue a forecast and are inclined to forecast more frequently, suggesting that director independence is positively associated with voluntary disclosure. Based on data from Hong Kong, Ho and Shun Wong (2001) indicate that the audit committee, which is made up of all the independent directors in a firm, is positively related to voluntary disclosure. Cheng and Courtenay (2006) provide evidence that firms with a higher proportion of independent directors on the board are associated with higher levels of voluntary disclosure. Consistent with this finding, Donnelly and Mulcahy (2008) posit that firms that have more independent directors or non-executive directors provide more voluntary disclosure than other firms. These studies support the idea that independent directors alleviate information asymmetry by increasing the level of voluntary disclosure.

Since independent directors increase firms' voluntary disclosure, and conference calls are an important voluntary disclosure medium that helps reduce information asymmetry between management and outside investors, an interesting question emerges: When independent directors sit on the boards of conference-call-making firms, do they spread the practice of holding conference calls and facilitate the decision to hold conference calls at the focal firm? Chiu et al. (2013) argue that board interlocks formed through directors with different board positions have different influences over financial statements.² Following their argument and prior studies on the relationship between independent directors and voluntary disclosure, we hypothesize that, when the focal firm has independent directors who sit on the boards of firms that hold conference calls, it is more likely to adopt such practices.

H2 Firms linked to conference-call-making firms through interlocked independent directors are more likely to hold conference calls themselves.

Firms undertaking innovation activities create asymmetric information between insiders and outside investors. Investors have greater difficulty in processing information related to new technologies and innovations, as the latter are associated with a high degree of uncertainty about a firm's future prospects (Lu et al. 2012; Hirshleifer et al. 2013). Barth et al. (2001) find that the number of analysts following R&D-intensive firms is significantly larger than the number following low-R&D or non-R&D firms. Furthermore, Tasker (1998) shows that R&D-intensive firms conduct more conference calls. Thus, innovation-intensive firms are subject to more information asymmetry between managers and outside investors, which creates incentives and opportunities for managers to improve corporate transparency. As the future economic benefits associated with innovative activities (e.g. developing new products or markets or inventing manufacturing processes) are difficult to assess and verify, firms with higher R&D have a greater incentive to enhance their voluntary disclosure and reduce their information asymmetry. We argue that the influence of interlocking directors' outside experience on the likelihood of holding conference calls is more pronounced among R&D-intensive firms. This leads to the third hypothesis:

H3a Firms with interlocked directors connected to conference-call-making firms are more likely to hold conference calls themselves, and this effect is more pronounced among R&D-intensive firms.

² Chiu et al. (2013) find that firms are even more likely to manage earnings when their interlocking directors serve as the members or the chairman of the audit committee, because audit committees generally exert a greater influence over a firm's financial reporting decisions, relative to other board positions.

H3b Firms linked to conference-call-making firms through interlocked independent directors are more likely to hold conference calls themselves, and this effect is more pronounced among R&D-intensive firms.

3 Research design

In hypothesis H1 we predict that the dissemination of corporate behaviors and practices among interlocked directors may influence a firm's disclosure of firm-specific information via conference calls. To test this prediction, we perform the following regression models:

$$CALL = \alpha_0 + \alpha_1 DLINK + \alpha_2 ROA + \alpha_3 SIZE + \alpha_4 LEV + \alpha_5 MB + \alpha_6 DSHARE + \alpha_7 LSHARE + \alpha_8 ISHARE + YEAR + IND + \varepsilon \quad (1A)$$

$$CALL = \alpha_0 + \alpha_1 LINK + \alpha_2 ROA + \alpha_3 SIZE + \alpha_4 LEV + \alpha_5 MB + \alpha_6 DSHARE + \alpha_7 LSHARE + \alpha_8 ISHARE + YEAR + IND + \varepsilon \quad (1B)$$

$$NCALL = \alpha_0 + \alpha_1 DLINK + \alpha_2 ROA + \alpha_3 SIZE + \alpha_4 LEV + \alpha_5 MB + \alpha_6 DSHARE + \alpha_7 LSHARE + \alpha_8 ISHARE + YEAR + IND + \varepsilon \quad (1C)$$

$$NCALL = \alpha_0 + \alpha_1 LINK + \alpha_2 ROA + \alpha_3 SIZE + \alpha_4 LEV + \alpha_5 MB + \alpha_6 DSHARE + \alpha_7 LSHARE + \alpha_8 ISHARE + YEAR + IND + \varepsilon \quad (1D)$$

The dependent variable of Eqs. (1A) and (1B), *CALL*, is a dummy indicator that equals 1 if the firm holds conference calls in a year and 0 otherwise. We also test the effect of interlocking directors with experience of holding conference calls on the frequency of conference calls at the focal company. *NCALL* in Eqs. (1C) and (1D) is the frequency of conference calls that a firm holds within a year. *DLINK* is a dummy variable that equals 1 if the focal firm is connected to conference-call-making firms through interlocked directors and 0 otherwise. *LINK* is the number of conference-call-making firms connected to the focal firm through interlocked directors. For example, if the focal firm has three directors tied to conference-call-making firms, and one of them sits on the boards of three conference-call-making firms, another sits on the boards of four other conference-call-making firms, and the final one sits on the boards of five other conference-call-making firms, the number of conference-call-making firms tied to the focal firm is five (i.e. the minimum number of connected firms). We expect the coefficients of *DLINK* and *LINK* to be positive.

Following previous studies, we control for several firm-specific characteristics that affect the decision to host conference calls, which include the return on assets (*ROA*), the natural log of total assets (*SIZE*), leverage (*LEV*), and the market-to-book ratio (*MB*) (e.g. Lang and Lundholm 1993; Tasker 1998; Frankel et al. 1999; Donnelly and Mulcahy 2008). Previous research finds that profitability is one of the key determinants of whether a firm hosts conference calls. Frankel et al. (1999) suggest that more profitable firms tend to host conference calls. In our study, we calculate *ROA* as net income scaled by total assets.

Existing studies find that company size is positively associated with the likelihood of holding conference calls (e.g. Lang and Lundholm 1993; Frankel et al. 1999; Tasker 1998; Donnelly and Mulcahy 2008). Donnelly and Mulcahy (2008) document three reasons why larger firms tend to have a higher level of voluntary disclosure. First, it is assumed to be less costly for large firms to disclose detailed information because they likely produce

more information for internal purposes. Second, as larger firms are more closely watched by various government and regulatory authorities, better financial reporting may lessen undesired pressure from the government. Third, larger firms need more funds from external capital markets. Increasing disclosure may increase investors' confidence and the liquidity of a company's shares, making external financing easier to obtain. We measure *SIZE* using the natural log of total sales and predict that firm size will have a positive effect on the likelihood of holding conference calls.

Eng and Mak (2003) indicate that debt is a mechanism for controlling free cash flow and find that firms with lower debts tend to disclose more information. *LEV* is calculated as total liabilities divided by total assets and we expect it to be negatively associated with conference calls. Frankel et al. (1999) find that firms with higher market-to-book ratios are more likely to hold conference calls, suggesting that growth firms are more likely to voluntarily disclose firm-specific information. We control for *MB* and expect firms with a higher *MB* to be more likely to hold conference calls.

In terms of the corporate governance variables, empirical evidence from Ruland et al. (1990), Eng and Mak (2003) and Chin et al. (2007) indicates that higher directors' shareholdings are associated with a lower level of voluntary disclosure. We expect that firms with higher directors' shareholdings (*DSHARE*) would be less likely to hold conference calls. Diamond and Verrecchia (1991) find that institutional investors encourage more disclosure to reduce information asymmetry, which could further increase the liquidity of firms' securities. Therefore, we expect that institutional shareholdings (*ISHARE*) will increase the probability of a firm deciding to hold conference calls. Bushee et al. (2003) argue that firms with a more dispersed investor base are likely to experience greater pressure from shareholders to broaden their disclosure practices and are therefore more likely to provide open conference calls. Consistent with this conjecture, they find a negative association between the number of investors and a firm's probability of initiating conference calls. Thus, we expect that firms with higher dominant shareholdings will be less likely to hold conference calls. We measure the level of dominant shareholdings using the total shareholding of the largest ten shareholders (*LSHARE*). We also control for year and industry fixed effects.³

In hypothesis H2, we further predict that interlocks formed through independent directors will have a greater influence on conference call practice than those achieved through other board positions. When a firm has independent directors tied to conference-call-making firms, they are more likely to facilitate the holding of conference calls in the focal firm. Thus, we expect the positive association between board interlocks and conference calls to exist mainly among those interlocking directorates who are also independent directors. Thus, we predict the coefficient β_1 in both Eqs. (2A) and (2B) to be positive:

$$CALL = \beta_0 + \beta_1 INDLINK + \beta_2 ROA + \beta_3 SIZE + \beta_4 LEV + \beta_5 MB + \beta_6 DSHARE + \beta_7 LSHARE + \beta_8 ISHARE + YEAR + IND + \varepsilon \quad (2A)$$

³ When controlling for industry fixed effects, industries without conference call observations (i.e. with no variation in the dependent variable) by construct will be dropped from the analysis. This accounts for only 3 out of a total of 18 industries and 362 out of a total of 9031 firm-year observations. We do, however, carry out a robustness test without industry fixed effects to allow for the inclusion of these industries in our analysis. Overall, we find that the results remain qualitatively consistent with the previous results and do not affect the inferences of our study.

$$\begin{aligned}
NCALL = & \beta_0 + \beta_1 INDLINK + \beta_2 ROA + \beta_3 SIZE + \beta_4 LEV + \beta_5 MB + \beta_6 DSHARE \\
& + \beta_7 LSHARE + \beta_8 ISHARE + YEAR + IND + \varepsilon
\end{aligned}
\tag{2B}$$

where *INDLINK* is dummy variable that equals 1 if the focal firm is connected to conference-call-making firms through interlocked independent directors, and 0 otherwise. We include *ROA*, *SIZE*, *LEV*, and *MB* to control for corporate characteristics, and *DSHARE*, *LSHARE*, and *ISHARE* to control for corporate governance.

We perform logistic regressions to examine the influence of interlocking directors with experience of holding conference calls on the decision of the focal firms to hold conference calls (i.e. when the dependent variable is *CALL*), and zero-inflated Poisson regressions to examine the influence of interlocking directors on the frequency with which the focal firms hold conference calls (i.e. when the dependent variable is *NCALL*). We use zero-inflated Poisson to allow for the possibility that *NCALL* could equal 0. Prior literature suggests that zero-inflated Poisson is one of the most popular count data models for dealing with an excessive number of zero-valued outcomes (e.g. Rock et al. 2000).

In hypothesis H3, we assume that conference calls are used to reduce information asymmetry, and we argue that R&D-intensive firms are more likely to adopt such practices through board interlocks. We use the following models:

$$\begin{aligned}
CALL = & \delta_0 + \delta_1 LINKTYPE + \delta_2 RD + \delta_3 LINKTYPE \times RD + \delta_4 ROA + \delta_5 SIZE \\
& + \delta_6 LEV + \delta_7 MB + \delta_8 DSHARE + \delta_9 LSHARE + \delta_{10} ISHARE \\
& + YEAR + IND + \varepsilon
\end{aligned}
\tag{3A}$$

$$\begin{aligned}
NCALL = & \delta_0 + \delta_1 LINKTYPE + \delta_2 RD + \delta_3 LINKTYPE \times RD + \delta_4 ROA + \delta_5 SIZE \\
& + \delta_6 LEV + \delta_7 MB + \delta_8 DSHARE + \delta_9 LSHARE + \delta_{10} ISHARE \\
& + YEAR + IND + \varepsilon
\end{aligned}
\tag{3B}$$

where *LINKTYPE* is either *DLINK*, *LINK*, or *INDLINK*. *RD* is R&D intensity measured as R&D expenses divided by net sales. We predict that firms with higher R&D intensity will be more likely to hold conference calls and that this decision may be affected by directors, especially independent directors, with relevant outside experience. Thus, we expect the coefficient of *LINKTYPE*RD* to be positive.

4 Research results

4.1 Descriptive and correlation analyses

Our sample consists of Taiwanese listed companies for the period of 2000–2009, coming from 15 industries, excluding the financial services industry. The final sample consists of 8669 firm-year observations. Table 1 shows the distribution of the firms across the 15 industries. Approximately 57.77 % (5008 firm-year observations) of the sample comes from the electronics industry, consistent with the fact that the electronic industry is one of the dominant industries in Taiwan. 6.69 % (580 observations) are for firms from the chemical industry, which is the second-largest industry in our sample.

Tables 2 and 3 present the distributions of board-interlocking relations through independent and non-independent directors by year and industry. From Table 2, we can

Table 1 Sample distribution

Industry	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
Cement	11	10	10	10	9	9	9	10	10	9	97
Plastic	18	19	21	21	23	21	21	25	25	26	220
Textile	53	58	57	56	55	53	56	56	55	55	554
Electric machinery	38	43	48	54	58	62	63	64	66	69	565
Chemical	33	41	44	50	61	65	67	69	72	78	580
Paper	7	5	7	6	6	6	6	7	7	6	63
Iron and steel	30	33	32	30	33	33	38	41	44	43	357
Rubber	7	7	7	8	8	8	10	10	10	10	85
Automobile	2	2	2	2	3	3	3	3	3	3	26
Electronics	214	269	375	449	524	573	602	642	665	695	5008
Building material and construction	38	41	40	39	41	41	42	44	42	47	415
Shipping and transportation	16	19	18	18	15	15	15	15	15	16	162
Tourism	6	7	7	9	9	9	8	10	10	10	85
Trading and consumers' goods	7	9	11	10	10	12	13	13	13	12	110
General	25	28	31	36	36	38	35	38	38	37	342
Total	505	591	710	798	891	948	988	1047	1075	1116	8669

Reports of the distribution of our Taiwanese listed companies sample during the period of 2000–2009 across 15 industries. The final sample consists of 8669 firm-year observation

Table 2 Yearly distribution of board interlocks

Year	Total firms	Firms without any link to conference-call-making firms	Firms with links to conference-call-making firms	Firms linked to conference-call-making firms via independent directors	Firms linked to conference-call-making firms via non-independent directors only
2000	505	486	19	16 (84.21 %)	3 (15.79 %)
2001	591	560	31	26 (83.87 %)	5 (16.13 %)
2002	710	609	101	68 (67.33 %)	33 (32.67 %)
2003	798	622	176	100 (56.82 %)	76 (43.18 %)
2004	891	683	208	98 (47.12 %)	110 (52.88 %)
2005	948	693	255	117 (45.88 %)	138 (54.12 %)
2006	988	717	271	131 (48.34 %)	140 (51.66 %)
2007	1047	777	270	146 (54.07 %)	124 (45.93 %)
2008	1075	809	266	152 (57.14 %)	114 (42.86 %)
2009	1116	847	269	174 (64.68 %)	95 (35.32 %)
Total	8669	6803	1866	1028 (55.09 %)	838 (44.91 %)

Reports of the distribution of board interlocking relations via independent directors by year. Of the final sample, 1866 firm-year observations have board interlock networks with conference-call-making call firms

Table 3 Industrial distribution of board interlocks

Industry	Total firms	Firms without any link to conference-call-making firms	Firms with links to conference-call-making firms	Firms linked to conference-call-making firms via independent directors	Firms linked to conference-call-making firms via non-independent directors only
Cement	97	83	14	14 (100 %)	0 (0 %)
Plastic	220	185	35	29 (82.86 %)	6 (17.14 %)
Textile	554	531	23	17 (73.91 %)	6 (26.09 %)
Electric machinery	565	477	88	48 (54.55 %)	40 (45.45 %)
Chemical	580	496	84	47 (55.95 %)	37 (44.05 %)
Paper	63	61	2	2 (100 %)	0 (0 %)
Iron and steel	357	331	26	19 (73.08 %)	7 (26.92 %)
Rubber	85	73	12	2 (16.67 %)	10 (83.33 %)
Automobile	26	20	6	0 (0 %)	6 (100 %)
Electronics	5008	3534	1474	779 (52.85 %)	695 (47.15 %)
Building material and construction	415	371	44	31 (70.45 %)	13 (29.55 %)
Shipping and transportations	162	146	16	15 (93.75 %)	1 (6.25 %)
Tourism	85	81	4	2 (50 %)	2 (50 %)
Trading and consumers' foods	110	94	16	16 (100 %)	0 (0 %)
General	342	320	22	7 (31.82 %)	15 (68.18 %)
Total	8669	6803	1866	1028 (55.09 %)	838 (44.91 %)

Reports of the distribution of board interlocking relations via independent directors by industry. Of the final sample, 1866 firm-year observations have board interlock networks with conference-call-making firms

observe that the percentage of connected companies has been increasing over time, and reaches an average about 25 % after year 2005. For instance, in year 2007, the percentage of firms with links to other conference-call-making firms to total sample firms is about 25.79 % (270/1047). The percentage of connected companies is highest in the year 2005 (255/948 = 27.4 %). We further show the distribution by year of connected firms that are interlocked via independent directors. This includes two situations, i.e. companies connected via independent directors alone and via both independent directors and non-independent directors. On average, we find that approximately half of the connected companies are linked via independent directors. The percentage of firms linked to conference-call-making firms through independent directors, relative to the total number of connected firms, increases after 2005. One possible explanation is that the majority of Taiwanese listed companies are family businesses (Yeh et al. 2001a, b). To ensure their power, family members control a number of seats on the boards of subsidiaries or group companies, resulting in interlocked directors (e.g. Yeh et al. 2001a; Liu and Yang 2008). However, since the Taiwanese governance reform of 2002, there has been an increasing desire to appoint outside directors to board positions (Su and Lee 2013).

Table 3 shows that all the firms connected to conference-call-making firms are connected through independent directors in the cement and trading and consumer goods industries. In the automobile industry, no firm is connected to conference-call-making firms through independent directors. Overall, 55.09 % of firms connected to conference-call-making firms are connected through independent interlocked directors.

Table 4 provides descriptive statistics of the main variables. To control for extreme values, all control variables are winsorized at the top and bottom 1 % of observations. The median and third quartile of *CALL* and *NCALL* are both zero, consistent with the distributions in Tables 2 and 3 showing that only 14.86 % hold conference calls while 85.14 % do not. The mean values of *CALL* and *NCALL* are 0.149 and 0.251, indicating that around 14.9 % of the sample firms hold at least one conference call per year. Turning to the interlocked board indicators, the median and third quartile of *DLINK* and *LINK* are zero, consistent with the distributions in Tables 2 and 3 showing that around 21.52 % of firms are linked to conference-call-making firms. The mean value of *LINK* is 0.475, demonstrating that, on average, each focal firm is connected to about 0.475 conference-call-making firms through interlocked directors. In addition, the mean value of *INDLINK* is 0.119, suggesting that 11.9 % of the sample firms are connected to conference-call-making firms through independent interlocked directors.

Regarding the control variables, the mean values of *MB*, *SIZE*, and *LEV* are 1.557, 14.941, and 0.428 respectively. The mean (median) value of *ROA* is 0.035 (0.04).

Table 4 Descriptive statistics

	Mean	Stdev.	Min	Q1	Median	Q3	Max
<i>CALL</i>	0.149	0.356	0.000	0.000	0.000	0.000	1.000
<i>NCALL</i>	0.251	0.761	0.000	0.000	0.000	0.000	8.000
<i>DLINK</i>	0.215	0.411	0.000	0.000	0.000	0.000	1.000
<i>LINK</i>	0.475	1.108	0.000	0.000	0.000	0.000	8.000
<i>INDLINK</i>	0.119	0.323	0.000	0.000	0.000	0.000	1.000
<i>MB</i>	1.557	1.150	0.250	0.790	1.220	1.940	6.680
<i>SIZE</i>	14.941	1.415	11.760	13.986	14.791	15.747	19.117
<i>LEV</i>	0.428	0.169	0.079	0.303	0.435	0.549	0.828
<i>ROA</i>	0.035	0.095	-0.354	0.003	0.040	0.085	0.264
<i>DSHARE</i>	24.438	13.297	5.590	14.540	21.660	31.320	68.490
<i>LSHARE</i>	17.155	10.570	0.000	9.770	15.720	22.840	51.090
<i>ISHARE</i>	32.837	21.812	0.000	15.470	29.390	47.710	88.790
Observations	8669	8669	8669	8669	8669	8669	8669

Descriptive statistics for the sample firms. *CALL* is a dummy variable that equals 1 if the firm holds conference calls in a year and 0 otherwise. *NCALL* is the frequency of conference calls that a firm holds within in a year. *DLINK* is a dummy variable that equals 1 if the focal firm is connected to conference-call-making firms through interlocked directors and 0 otherwise. *LINK* is the number of conference-call-making firms connected to the focal firm through interlocked directors. *INDLINK* is a dummy variable that equals 1 if the focal firm is connected to conference-call-making firms through interlocked independent directors and 0 otherwise. *ROA* is net income divided by total assets. *SIZE* is nature log of a firm's sales. *LEV* is total liabilities divided by total assets. *MB* is market value divided by book value. *DSHARE* is directors' shareholdings. *LSHARE* is shareholdings of the largest ten shareholders. *ISHARE* is institutional shareholdings

Regarding the corporate governance variables, the mean (median) values of directors' shareholding (*DSHARE*), the shareholdings of the largest ten shareholders (*LSHARE*), and institutional shareholdings (*ISHARE*) are 24.438 % (21.660 %), 17.155 % (15.720 %), and 32.837 % (29.390 %), respectively.

We report Pearson and Spearman correlation analyses in Table 5. We find that a focal firm's connection to conference-call-making firms (*DLINK*) and the number of conference-call-making firms connected to the focal firm (*LINK*) are positively correlated with the focal firm's decision to hold conference calls (*CALL*) and its frequency of conference calls (*NCALL*). Moreover, *INDLINK* is also positively associated with both *CALL* and *NCALL*, indicating that the focal firm's connection to conference-call-making firms through independent directors also has a positive association with the focal firm's decision to hold conference calls and their frequency. Regarding the control variables, we find that the market-to-book value (*MB*), firm size (*SIZE*), return on assets (*ROA*), and institutional shareholdings (*ISHARE*) are positively correlated with *CALL* and *NCALL*. These results are consistent with prior studies showing that firms that hold conference calls tend to be larger, and have higher market-to-book values, better financial performance, and larger institutional shareholdings (e.g. Tasker 1998; Frankel et al. 1999). On the other hand, firm leverage (*LEV*), directors' shareholding (*DSHARE*), and the shareholdings of the largest ten shareholders (*LSHARE*) are negatively associated with *CALL* and *NCALL* (e.g. Eng and Mak 2003; Chin et al. 2007; Donnelly and Mulcahy 2008).

4.2 Regression results

4.2.1 Test of hypotheses H1 and H2

Table 6 reports the results of logistic regressions on the impact of interlocked directors with relevant outside experience on the focal company's decision to conduct conference calls, where the dummy variable *CALL* is the dependent variable. Columns (1) and (2) of Table 6 report the results of estimating Eqs. (1A) and (1B). Consistent with our hypothesis H1, we find that the coefficient on *DLINK* is significantly positive (0.356, p value = 0.000), after controlling for firm-specific characteristics, corporate governance variables, and year and industry fixed effects. This suggests that firms connected to conference-call-making firms through interlocked directors, regardless of their position on the board, are more likely to hold conference calls. In addition, the coefficient on *LINK* (0.133, p value = 0.000) in Column (2) is positive and statistically significant. The results indicate that the greater is the number of conference-call-making firms to which a focal firm is connected, the greater is the likelihood that the focal firm itself will hold conference calls. The results support the notion from the extant literature that interlocked board networking facilitates firms' sharing of their information and disclosure practices (e.g. Kang and Tan 2008; Cai et al. 2014). While existing studies based on US firms find that corporate behavior (e.g. Rao et al. 2000; Bizjak et al. 2009) as well as firms' accounting choices (Kang and Tan 2008; Chiu et al. 2013) could be transmitted through social networking, we contribute to this literature by examining how board interlocks affect a firm's decision to hold conference calls among firms from an emerging market.

Moreover, consistent with the findings from previous studies (e.g. Tasker 1998; Frankel et al. 1999; Eng and Mak 2003; Chin et al. 2007; Donnelly and Mulcahy 2008), *ROA*, *SIZE*, *MB* and *ISHARE* are positively associated with the likelihood of holding conference calls, while *LEV*, *DSHARE* and *LSHARE* are negatively associated with that likelihood. The pseudo R-squares are 21.7 % for specifications (1) and (2).

Table 5 Correlation analyses

	<i>NCALL</i>	<i>CALL</i>	<i>LINK</i>	<i>DLINK</i>	<i>INDLINK</i>	<i>MB</i>	<i>SIZE</i>	<i>LEV</i>	<i>ROA</i>	<i>DSHARE</i>	<i>LSHARE</i>	<i>ISHARE</i>
<i>NCALL</i>	1.000	0.997 (0.000)	0.163 (0.000)	0.156 (0.000)	0.112 (0.000)	0.268 (0.000)	0.222 (0.000)	-0.048 (0.000)	0.256 (0.000)	-0.056 (0.000)	-0.047 (0.000)	0.179 (0.000)
<i>CALL</i>	0.799 (0.000)	1.000	0.157 (0.000)	0.151 (0.000)	0.108 (0.000)	0.269 (0.000)	0.211 (0.000)	-0.047 (0.000)	0.258 (0.000)	-0.050 (0.000)	-0.046 (0.000)	0.173 (0.000)
<i>LINK</i>	0.188 (0.000)	0.156 (0.000)	1.000	0.991 (0.000)	0.705 (0.000)	0.130 (0.000)	0.130 (0.000)	-0.045 (0.000)	0.092 (0.000)	-0.068 (0.000)	-0.007 (0.509)	0.124 (0.000)
<i>DLINK</i>	0.164 (0.000)	0.151 (0.000)	0.819 (0.000)	1.000	0.700 (0.000)	0.130 (0.000)	0.118 (0.000)	-0.046 (0.000)	0.093 (0.000)	-0.068 (0.000)	-0.006 (0.557)	0.115 (0.000)
<i>INDLINK</i>	0.121 (0.000)	0.108 (0.000)	0.621 (0.000)	0.700 (0.000)	1.000	0.041 (0.000)	0.111 (0.000)	0.000 (0.971)	0.010 (0.374)	-0.072 (0.000)	-0.012 (0.258)	0.050 (0.000)
<i>MB</i>	0.208 (0.000)	0.259 (0.000)	0.102 (0.000)	0.112 (0.000)	0.032 (0.003)	1.000	0.031 (0.004)	-0.153 (0.000)	0.591 (0.000)	0.073 (0.000)	0.050 (0.000)	0.209 (0.000)
<i>SIZE</i>	0.307 (0.000)	0.238 (0.000)	0.183 (0.000)	0.135 (0.000)	0.126 (0.000)	0.024 (0.023)	1.000	0.316 (0.000)	0.161 (0.000)	-0.179 (0.000)	-0.099 (0.000)	0.308 (0.000)
<i>LEV</i>	-0.056 (0.000)	-0.053 (0.000)	-0.038 (0.000)	-0.046 (0.000)	0.001 (0.928)	-0.149 (0.000)	0.294 (0.000)	1.000	-0.354 (0.000)	-0.058 (0.000)	0.049 (0.000)	0.006 (0.571)
<i>ROA</i>	0.170 (0.000)	0.223 (0.000)	0.060 (0.000)	0.071 (0.000)	0.000 (0.992)	0.434 (0.000)	0.203 (0.000)	-0.333 (0.000)	1.000	0.108 (0.000)	0.014 (0.201)	0.213 (0.000)
<i>DSHARE</i>	-0.068 (0.000)	-0.043 (0.000)	-0.033 (0.002)	-0.058 (0.000)	-0.072 (0.000)	0.063 (0.000)	-0.136 (0.000)	-0.056 (0.000)	0.101 (0.000)	1.000	-0.077 (0.000)	0.247 (0.000)
<i>LSHARE</i>	-0.055 (0.000)	-0.058 (0.000)	-0.013 (0.225)	-0.017 (0.123)	-0.016 (0.133)	0.029 (0.007)	-0.091 (0.000)	0.058 (0.000)	-0.027 (0.013)	-0.132 (0.000)	1.000	0.181 (0.000)
<i>ISHARE</i>	0.202 (0.000)	0.173 (0.000)	0.149 (0.000)	0.115 (0.000)	0.050 (0.000)	0.188 (0.000)	0.341 (0.000)	0.010 (0.368)	0.191 (0.000)	0.353 (0.000)	0.191 (0.000)	1.000 (0.000)

Pearson (below the diagonal) and Spearman (above the diagonal) correlation analyses for our test and control variables. Variables are defined in Table 4. *p* values are in parentheses

Table 6 Regression results of the decision to hold conference calls

Variable	Expected direction	Dependent variable: <i>CALL</i>			
		H1		H2	
		(1)	(2)	(3)	(4)
Intercept	?	-9.556 (0.000)***	-9.398 (0.000)***	-9.517 (0.000)***	-11.119 (0.000)***
<i>DLINK</i>	+	0.356 (0.000)***			
<i>LINK</i>	+		0.133 (0.000)***		
<i>INDLINK</i>	+			0.423 (0.000)***	0.175 (0.186)
<i>ROA</i>	+	3.854 (0.000)***	3.902 (0.000)***	3.913 (0.000)***	3.741 (0.000)***
<i>SIZE</i>	+	0.383 (0.000)***	0.373 (0.000)***	0.379 (0.000)***	0.465 (0.000)***
<i>LEV</i>	-	-0.622 (0.022)**	-0.601 (0.027)**	-0.646 (0.017)**	-0.603 (0.210)
<i>MB</i>	+	0.303 (0.000)***	0.304 (0.000)***	0.307 (0.000)***	0.156 (0.015)**
<i>DSHARE</i>	-	-0.017 (0.000)***	-0.018 (0.000)***	-0.018 (0.000)***	-0.015 (0.012)**
<i>LSHARE</i>	-	-0.017 (0.000)***	-0.017 (0.000)***	-0.017 (0.000)***	-0.017 (0.033)**
<i>ISHARE</i>	+	0.015 (0.000)***	0.015 (0.000)***	0.016 (0.000)***	0.021 (0.000)***
Year fixed effect		Included	Included	Included	Included
Industry fixed effect		Included	Included	Included	Included
Observations		8669	8669	8669	1864
Pseudo R ²		0.217	0.217	0.217	0.221

Reports of the results of logistic regressions on the impact of interlocked directors and independent interlocked directors networking on firms' decisions to hold conference calls, where the dependent variable is *CALL*. *CALL* is a dummy variable that equals 1 if the firm holds conference calls in a year and 0 otherwise. *DLINK* is a dummy variable that equals 1 if the focal firm is connected to conference-call-making firms through interlocked directors and 0 otherwise. *LINK* is the number of conference-call-making firms connected to the focal firm through interlocked directors. *INDLINK* is a dummy variable that equals 1 if the focal firm is connected to conference-call-making firms through interlocked independent directors and 0 otherwise. *ROA* is net income divided by total assets. *SIZE* is nature log of a firm's sales. *LEV* is total liabilities divided by total assets. *MB* is market value divided by book value. *DSHARE* is directors' shareholdings. *LSHARE* is shareholdings of the largest ten shareholders. *ISHARE* is institutional shareholdings. *p* values are in parentheses

***, ** and * denote significant levels at 1 %, 5 % and 10 %, respectively

We further investigate whether different board positions held by interlocking directors affect the decision to hold conference calls. Column (3) reports the results for independent directors with outside experience of conference calls. The significant positive coefficient of

Table 7 Regression results of the frequency of conference calls

Variable	Expected direction	Dependent variable: <i>NCALL</i>			
		H1		H2	
		(1)	(2)	(3)	(4)
<i>Intercept</i>	?	-8.035 (0.000)***	-7.959 (0.000)***	-8.056 (0.000)***	-8.283 (0.000)***
<i>DLINK</i>	+	0.245 (0.000)***			
<i>LINK</i>	+		0.078 (0.000)***		
<i>INDLINK</i>	+			0.286 (0.000)***	0.147 (0.052)*
<i>ROA</i>	+	1.176 (0.002)***	1.248 (0.001)***	1.174 (0.002)***	1.236 (0.041)**
<i>SIZE</i>	+	0.392 (0.000)***	0.388 (0.000)***	0.394 (0.000)***	0.388 (0.000)***
<i>LEV</i>	-	-1.054 (0.000)***	-1.041 (0.000)***	-1.116 (0.000)***	-0.856 (0.001)***
<i>MB</i>	+	0.159 (0.000)***	0.157 (0.000)***	0.157 (0.000)***	0.087 (0.021)**
<i>DSHARE</i>	-	-0.013 (0.000)***	-0.014 (0.000)***	-0.013 (0.000)***	-0.008 (0.020)**
<i>LSHARE</i>	-	-0.023 (0.000)***	-0.023 (0.000)***	-0.023 (0.000)***	-0.025 (0.000)***
<i>ISHARE</i>	+	0.013 (0.000)***	0.013 (0.000)***	0.013 (0.000)***	0.013 (0.000)***
Year fixed effect		Included	Included	Included	Included
Industry fixed effect		Included	Included	Included	Included
Observations		8669	8669	8669	1866
LR Chi square		1944.861***	1945.722***	1946.595***	613.107***

Reports of the results of zero-inflated Poisson regressions on the impact of interlocked directors and independent interlocked directors networking on firms' decisions to hold conference calls, where the dependent variable is *NCALL*. *NCALL* is the frequency of conference calls that a firm holds within in a year. *DLINK* is a dummy variable that equals 1 if the focal firm is connected to conference-call-making firms through interlocked directors and 0 otherwise. *LINK* is the number of conference-call-making firms connected to the focal firm through interlocked directors. *INDLINK* is a dummy variable that equals 1 if the focal firm is connected to conference-call-making firms through interlocked independent directors and 0 otherwise. *ROA* is net income divided by total assets. *SIZE* is nature log of a firm's sales. *LEV* is total liabilities divided by total assets. *MB* is market value divided by book value. *DSHARE* is directors' shareholdings. *LSHARE* is shareholdings of the largest ten shareholders. *ISHARE* is institutional shareholdings. *p* values are in parentheses

***, ** and * denote significant levels at 1 %, 5 % and 10 %, respectively

Table 8 Regression results conditional on R&D intensity

Variable	Expected direction	<i>LINKTYPE</i>		
		<i>DLINK</i>	<i>LINK</i>	<i>INDLINK</i>
Panel A: dependent variable: <i>CALL</i>				
Intercept	?	-9.976 (0.000)***	-9.803 (0.000)***	-9.915 (0.000)***
<i>LINKTYPE</i>	+	0.244 (0.006)***	0.096 (0.002)***	0.292 (0.008)***
<i>RD</i>	+	1.280 (0.000)***	1.327 (0.000)***	1.333 (0.000)***
<i>LINKTYPE*RD</i>	+	2.492 (0.009)***	0.914 (0.020)**	2.997 (0.018)**
<i>ROA</i>	+	4.514 (0.000)***	4.577 (0.000)***	4.541 (0.000)***
<i>SIZE</i>	+	0.399 (0.000)***	0.388 (0.000)***	0.395 (0.000)***
<i>LEV</i>	-	-0.296 (0.292)	-0.286 (0.308)	-0.366 (0.188)
<i>MB</i>	+	0.270 (0.000)***	0.272 (0.000)***	0.277 (0.000)***
<i>DSHARE</i>	-	-0.016 (0.000)***	-0.017 (0.000)***	-0.017 (0.000)***
<i>LSHARE</i>	-	-0.016 (0.000)***	-0.016 (0.000)***	-0.016 (0.000)***
<i>ISHARE</i>	+	0.015 (0.000)***	0.015 (0.000)***	0.016 (0.000)***
Year fixed effect		Included	Included	Included
Industry fixed effect		Included	Included	Included
Observations		8669	8669	8669
Pseudo R ²		0.220	0.221	0.220
Panel B: dependent variable: <i>NCALL</i>				
Intercept	?	-8.917 (0.000)***	-8.837 (0.000)***	-8.899 (0.000)***
<i>LINKTYPE</i>	+	0.179 (0.006)***	0.069 (0.001)***	0.191 (0.008)***
<i>RD</i>	+	4.217 (0.000)***	4.484 (0.000)***	4.145 (0.000)***
<i>LINKTYPE*RD</i>	+	1.102 (0.146) ^a	0.271 (0.289)	1.474 (0.064)**
<i>ROA</i>	+	2.381 (0.000)***	2.495 (0.000)***	2.391 (0.000)***
<i>SIZE</i>	+	0.416 (0.000)***	0.409 (0.000)***	0.416 (0.000)***
<i>LEV</i>	-	-0.250 (0.174)	-0.210 (0.253)	-0.340 (0.066)*

Table 8 continued

Variable	Expected direction	LINKTYPE		
		DLINK	LINK	INDLINK
<i>MB</i>	+	0.096 (0.000)***	0.094 (0.000)***	0.095 (0.000)***
<i>DSHARE</i>	–	–0.010 (0.000)***	–0.011 (0.000)***	–0.010 (0.000)***
<i>LSHARE</i>	–	–0.020 (0.000)***	–0.019 (0.000)***	–0.020 (0.000)***
<i>ISHARE</i>	+	0.013 (0.000)***	0.012 (0.000)***	0.013 (0.000)***
Year fixed effect		Included	Included	Included
Industry fixed effect		Included	Included	Included
Observations		8669	8669	8669
LR Chi square		2041.96***	2045.03***	2043.12***

Panel A (B) reports the results of logistic regressions (zero-inflated Poisson regressions) on the impact of interlocked directors and independent interlocked directors networking on firms' decisions to hold conference calls among R&D intensive firms, where the dependent variable is *CALL* (*NCALL*). *CALL* is a dummy variable that equals 1 if the firm holds conference calls in a year, and 0 otherwise. *NCALL* is the frequency of conference calls that a firm holds within a year. *RD* is R&D intensity measured as R&D expenditures scaled by net sales. *DLINK* is a dummy variable that equals 1 if the focal firm is connected to conference-call-making firms through interlocked directors and 0 otherwise. *LINK* is the number of conference-call-making firms connected to the focal firm through interlocked directors. *INDLINK* is a dummy variable that equals 1 if the focal firm is connected to conference-call-making firms through interlocked independent directors and 0 otherwise. *ROA* is net income divided by total assets. *SIZE* is natural log of a firm's sales. *LEV* is total liabilities divided by total assets. *MB* is market value divided by book value. *DSHARE* is directors' shareholdings. *LSHARE* is shareholdings of the largest ten shareholders. *ISHARE* is institutional shareholdings. *p* values are in parentheses

***, ** and * denote significant levels at 1 %, 5 % and 10 %, respectively

INDLINK (0.423, *p* value = 0.000) implies that, when the focal firms are connected to conference-call-making firms through independent directors, they are more likely to hold conference calls. To directly compare the impact of connection via independent directors and non-independent directors only, we exclude firms without connections to conference-call-making firms. This reduces the sample to 1866 firm-year observations. The findings in Column (4) show that the coefficient of *INDLINK* becomes marginally significant at a one-tailed 10 %. This suggests that the information transmission effect is stronger between companies that are connected via independent directors than between those connected through non-independent directors only. These results are consistent with our prediction in hypothesis H2 and extant research showing that independent directors play an important monitoring role in the setting of corporate disclosure policy (e.g. Cheng and Courtenay 2006; Armstrong et al. 2014).

Furthermore, we perform zero-inflated Poisson regression to examine the influence of interlocked directors with outside experience of conference calls on the frequency of calls held by the focal firm (*NCALL*) in order to mitigate the concern over the relatively large number of companies with the tendency not to hold conference calls. The results are reported in Table 7. Similarly to in Table 6, here we find that the coefficients of *DLINK*

and *LINK* are significantly positive after controlling for firm characteristics, corporate governance, and year and industry fixed effects. These findings suggest that, when focal firms are connected to a greater number of conference-call-making firms, they are likely to hold conference calls more frequently. Columns (3) and (4) of Table 7 report the results for interlocked boards connected via independent directors with relevant outside experience. Consistent with our prediction, focal firms connected to conference-call-making firms through independent directors tend to hold conference calls more frequently. The coefficient of *INDLINK* is significantly positive before and after excluding firms without board connections to conference-call-making firms. Overall, the findings in Table 7 provide further robustness to our evidence consistent with hypotheses H1 and H2 that was reported in Table 6. Overall, our results are consistent with previous studies (e.g. Kang and Tan 2008; Cai et al. 2014) that board interlocked board networking increase the likelihood of firms' sharing of their accounting practices and disclosure policies. In addition, we further provide empirical evidence that the number of board interlocks and the type of board interlocks also affects the frequency of providing voluntary disclosures.

4.2.2 Test of hypotheses H3a and H3b

Barth et al. (2001) suggest that the degree of information asymmetry is largely attributable to intangible assets and R&D expenditures. Chin et al. (2007) find that the likelihood and frequency of conference calls are both positively correlated with innovative activities and the wish to further disclose innovation-related information to alleviate information asymmetry. If this is true, we predict that the evidence in favor of hypotheses H1 and H2 should be more pronounced among R&D-intensive firms. That is, we expect the information transmission effect that occurs through networking to be stronger for innovative firms. Panel A of Table 8 reports the results of logistic regressions estimating Eq. (3A), where *CALL* is the dependent variable. We find that the coefficient on *RD* is significantly positive across all three regressions, suggesting that firms with higher R&D intensity tend to hold conference calls to lower information asymmetry. Our variable of interest is the interaction term, *LINKTYPE*RD*. Consistent with our hypothesis, we find that the coefficient on *LINKTYPE*RD* is significantly positive across all three regressions. This indicates that, among R&D-intensive firms, interlocked directors' networking has an incremental effect on the decision to hold conference calls.⁴

Panel B of Table 8 reports the results of estimating Eq. (3B), where the dependent variable is the frequency of holding conference calls (*NCALL*). We find that the coefficient on *LINKTYPE*RD* is significantly positive at a two-tailed 5 % (1.474, *p* value = 0.064), where *LINKTYPE* is *INDLINK*. This implies that the impact of interlocking directors on the hosting of conference calls is more pronounced when the connections are created via independent directors.

Overall, the results in Table 8 support our hypotheses H3a and H3b that the information transmission effect is stronger among R&D-intensive companies, whose intangible assets

⁴ As a robustness check, we convert a firm's decision to hold conference calls that is made via interlocked independent directors into a categorical dummy variable, *RANKLINK*. *RANKLINK* takes three values: 0 if a firm shares a director with a firm that does not hold conference calls, 1 if a firm shares a non-independent director but not an independent director with a firm that holds conference calls, and 2 if a firm shares an independent director with a firm that holds conference calls. We replace *LINKTYPE* in Eqs. (3A) and (3B) with *RANKLINK* and repeat the analyses. The untabulated results show that the coefficient of *RANKLINK*RD* is positive and statistically significant, suggesting that independent directors' outside experience has a greater influence than non-independent directors' in determining the focal firm's disclosure policy.

are usually under-recognized in financial statements (Chin et al. 2007; Chan 2014). These firms have greater incentives to lower the high level of information asymmetry and hence they exploit conference calls as one of their voluntary disclosure mechanisms (e.g. Tasker 1998; Chin et al. 2007).

Table 9 An alternative measure of the frequency of holding conference calls

Variable	Expected direction	<i>LINKTYPE</i>		
		<i>DLINK</i>	<i>LINK</i>	<i>INDLINK</i>
Intercept	?	-0.381 (0.000)***	-0.373 (0.000)***	-0.379 (0.000)***
<i>DLINK</i>	+	0.019 (0.000)***		
<i>LINK</i>	+		0.008 (0.000)***	
<i>INDLINK</i>	+			0.025 (0.000)***
<i>ROA</i>	+	0.001 (0.970)	0.004 (0.877)	0.004 (0.872)
<i>SIZE</i>	+	0.029 (0.000)***	0.028 (0.000)***	0.029 (0.000)***
<i>LEV</i>	-	-0.074 (0.000)***	-0.072 (0.000)***	-0.074 (0.000)***
<i>MB</i>	+	0.026 (0.000)***	0.026 (0.000)***	0.026 (0.000)***
<i>DSHARE</i>	-	-0.001 (0.000)***	-0.001 (0.000)***	-0.001 (0.000)***
<i>LSHARE</i>	-	-0.001 (0.000)***	-0.001 (0.000)***	-0.001 (0.000)***
<i>ISHARE</i>	+	0.001 (0.000)***	0.001 (0.000)***	0.001 (0.000)***
Year fixed effect		Included	Included	Included
Industry fixed effect		Included	Included	Included
Observations		7977	7977	7977
Adjusted R ²		0.118	0.119	0.118

Reports of the regression results for testing hypotheses H1 and H2, where the dependent variable is *PCALL*. *PCALL* is the number of calls divided by the maximum number of calls made by a firm in the industry each year. *DLINK* is a dummy variable that equals 1 if the focal firm is connected to conference-call-making firms through interlocked directors and 0 otherwise. *LINK* is the number of conference-call-making firms connected to the focal firm through interlocked directors. *INDLINK* is a dummy variable that equals 1 if the focal firm is connected to conference-call-making firms through interlocked independent directors and 0 otherwise. *ROA* is net income divided by total assets. *SIZE* is nature log of a firm's sales. *LEV* is total liabilities divided by total assets. *MB* is market value divided by book value. *DSHARE* is directors' shareholdings. *LSHARE* is shareholdings of the largest ten shareholders. *ISHARE* is institutional shareholdings. *p* values are in parentheses

***, ** and * denote significant levels at 1 %, 5 % and 10 %, respectively

4.3 Robustness tests

4.3.1 Alternative measure of the frequency of holding conference calls (*PCALL*)

To test whether our results are sensitive to the measure of the frequency of holding conference calls, we repeat all analyses using the number of calls divided by the maximum number of calls made by a firm in the industry each year (*PCALL*) as an alternative

Table 10 An alternative measure of interlocked independent directors

Variable	Expected direction	Dependent variable: <i>CALL</i>	Dependent variable: <i>NCALL</i>
Intercept	?	-9.812 (0.000)***	-8.153 (0.000)***
<i>PIND</i>	+	0.417 (0.000)***	0.209 (0.000)***
<i>ROA</i>	+	3.584 (0.000)***	1.109 (0.003)***
<i>SIZE</i>	+	0.403 (0.000)***	0.402 (0.000)***
<i>LEV</i>	-	-0.717 (0.008)***	-1.046 (0.000)***
<i>MB</i>	+	0.304 (0.000)***	0.156 (0.000)***
<i>DSHARE</i>	-	-0.019 (0.000)***	-0.014 (0.000)***
<i>LSHARE</i>	-	-0.017 (0.000)***	-0.023 (0.000)***
<i>ISHARE</i>	+	0.015 (0.000)***	0.013 (0.000)***
Year fixed effect		Included	Included
Industry fixed effect		Included	Included
Observations		8669	8669
Pseudo R ²		0.217	
LR Chi square			1758.063***

Reports of the results of logistic regressions (zero-inflated Poisson regressions) using an alternative measure of interlocked independent directors (*PIND*). *PIND* is the percentage of independent directors among interlocked directors in focal firms. The dependent variable is either *CALL* or *NCALL*. *CALL* is a dummy variable that equals 1 if the firm holds conference calls in a year and 0 otherwise. *NCALL* is the frequency of conference calls that a firm holds within a year. *DLINK* is a dummy variable that equals 1 if the focal firm is connected to conference-call-making firms through interlocked directors and 0 otherwise. *LINK* is the number of conference-call-making firms connected to the focal firm through interlocked directors. *INDLINK* is a dummy variable that equals 1 if the focal firm is connected to conference-call-making firms through interlocked independent directors and 0 otherwise. *ROA* is net income divided by total assets. *SIZE* is natural log of a firm's sales. *LEV* is total liabilities divided by total assets. *MB* is market value divided by book value. *DSHARE* is directors' shareholdings. *LSHARE* is shareholdings of the largest ten shareholders. *ISHARE* is institutional shareholdings. *p* values are in parentheses

***, ** and * denote significant levels at 1 %, 5 % and 10 %, respectively

measure. For example, Taiwan Semiconductor Manufacturing Company (TSMC) held four conference calls in the year 2000 and the maximum number of conference calls made by a firm in the electronics industry in that year was also four. In this case, our alternative measure of conference calls equals one. We exclude cases where the industry maximum is zero, resulting in 7977 firm-year observations. Table 9 reports the results. We find that the coefficients on *LINK*, *DLINK*, and *INDLINK* are all positive and statistically significant, indicating that firms with interlocked directors, particularly independent directors, connected to conference-call-making firms have a greater likelihood of conducting conference calls than other firms within the same industry. Thus, these findings reinforce our main results in Tables 6 and 7 on the relationship between board-interlock networking and a firm's decision to conduct conference calls.

4.3.2 Alternative measure of interlocked independent directors

As an alternative, we measure the number of connected independent directors as the percentage of independent directors among interlocked directors in the focal firm (*PIND*), to test our hypothesis H2. This measurement represents a different perspective of interlocking independent directors. The findings in Table 10 show that, when the focal firms have a higher proportion of independent directors among their interlocked directors, they are more likely to hold conference calls, and they hold them more frequently. In other words, the power of independent directors in determining a firm's disclosure policy becomes stronger if the proportion of interlocked boards connected via independent directors is greater, which support our main regressions presented in Tables 6 and 7.

5 Conclusion

We examine the association between board-interlock networking and firms' decision to hold conference calls. In terms of inter-organizational connections, a firm's decision to adopt conference call practices can be disseminated to other firms through interlocking directors. Consistent with our prediction, we find that firms connected to conference-call-making firms through board interlocks are more likely to hold conference calls, and hold conference calls more frequently. Our results are robust to firms' characteristics and industry fixed effects, as well as to alternative measures of conference calls.

We also find that firms with a higher proportion of interlocked independent directors on their boards are more likely to hold conference calls, and hold them more frequently. Consistent with extant literature on corporate governance, the findings support the argument that independent directors play an important role in monitoring firms' disclosure policies. Moreover, we find that such effects are more pronounced among high-tech firms, which have more difficulty incorporating and quantifying their R&D-intensive activities in their financial reports. Hence, conference calls provide them with a channel for communicating their innovative efforts so as to lower the information asymmetry among investors, particularly in an electronics and technology-dominated economy such as Taiwan.

Our study makes contributions relevant to both academics and practitioners. We contribute to previous literature on board interlocking, a social network that serves as a reliable information source for boards of directors (e.g. Kang and Tan 2008; Chiu et al. 2013; Cai et al. 2014). The findings also add to existing studies on the independence of board directors, especially in emerging market settings where the information environment is less

transparent. Lastly, our study can help investors and regulators to gain a better understanding of the underlying factors behind firms' voluntary disclosure practices.

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