The dark side of board network centrality: Evidence from merger performance

Abstract

We show that greater board network centrality is associated with lower acquirer stock returns in the Chinese capital market. This negative effect is mainly due to inside directors' networks, and is stronger for state-owned enterprises. Firms with greater board centrality tend to engage in more value-destroying mergers and acquisitions, and board directors with more centrality utilize their connections for private benefits at the expense of shareholder wealth. Consistent with an integrated agency–resource dependence perspective, the results imply both board directors' motivation derived from their independence and social capital–related ability are important considerations in their monitoring and advising functions.

Keywords

Social network; Merger and acquisition; insiders; Chinese capital market

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1. Introduction

We examine corporate merger and acquisition (M&A) transactions by considering board directors' connections in a social environment. In particular, we investigate the impact of board network centrality on acquiring firms' stock performance upon M&A announcements. Using a rich database that features directors' kinship, educational background, and corporate employment in publicly listed Chinese firms between 2008 and 2015, we construct four measures for board network centrality — degree, closeness, betweenness, and eigenvector — to reflect the status, influence, and power of an individual director with respect to the entire network to which the director is connected (Proctor & Loomis, 1951; Sabidussi, 1966; Bonacich, 1972; Freeman 1979; El-Khatib et al., 2015). Merger performance is measured by acquirers' cumulative abnormal stock returns around the M&A announcement event window.

Following Hillman and Dalziel (2003) and Dalziel et al. (2011), we adopt an integrated agency–resource dependence perspective to analyze board directors' effect on M&A performance. On the one hand, board directors with more social connections can provide valuable information and resources that are essential to M&A success (Pfeffer & Salancik, 1978). They are also in a better position to effectively monitor and advise management, thus reducing value-destroying activities during M&A transactions (Cai & Sevilir, 2012). On the other hand, board directors, particularly inside directors who are senior managers or employees of the firm, are less willing to monitor other managers (Jensen & Meckling, 1976; Fama & Jensen, 1983). Moreover, connected board directors could take advantage of their network to pursue private benefits or collude with entrenched executives (Hwang & Kim, 2009; Bruynseels & Cardinaels, 2014; Duru et al., 2016). By

integrating both a resource dependence view and agency issues within a single framework, as suggested by Hillman and Dalziel (2003) and Dalziel et al. (2011), we are able to consider two important aspects together when board directors perform their monitoring and advising functions: (1) board directors' *ability* related to their networks and social capital and (2) their *motivation* derived from their independence (i.e., inside or independent directors).

We conduct a series of tests to investigate the effect of board network centrality using M&A transactions in China, one of the largest emerging economies in the world. M&As in China provide an interesting and valuable setting for examining the impact of board networks. First, network effects tend to be more prominent in an emerging economy such as China's, where the formal legal system is relatively weak and the market is inefficient. Facing challenges and opportunities that are vastly different from those of developed economies (e.g., Hoskisson et al., 2000), Chinese firms are more likely to seek alternative, non-market resources and channels, including social networks and connections, to conduct business activities. With the emergence of "network capitalism" (Meyer et al., 2009), board connections have become valuable to business transactions, capital investment, and M&A in emerging markets. Second, fundamentally speaking, networking, or *guanxi*, plays an integrated role in China's culture and society (e.g., Lin and Lin, 2016). Anecdotal evidence indicates that networks are critically important to people and businesses in China's relationship-based environment. We thus expect board connections to have more pronounced effects on corporate decisions (Guan et al., 2016). Third, as one of the most crucial corporate events, M&As in China have grown rapidly in number and size during recent years and have attracted growing research interest (Netter et al., 2009). Examining the impacts of board networks on acquirers' stock performance in China can

shed new light on corporate governance issues in other emerging markets that are typically characterized by different institutional environments and cultural backgrounds (Allen et al., 2005).

Our findings are generally consistent with an integrated agency–resource dependence perspective and reveal a dark side of board network centrality. We show that corporate boards with a greater level of centrality are associated with lower acquirer abnormal stock returns upon M&A announcements. Such a negative effect is mainly due to inside directors' networks, not to independent directors. After classifying Chinese firms into state-owned enterprises (SOEs) and non-SOEs based on state ownership, we find that the negative effect of inside directors' centrality on merger performance is stronger for SOEs. Further analysis shows that firms with greater board centrality tend to conduct more value-destroying acquisitions. Finally, we find that board directors with greater centrality utilize their connections for private benefits at the expense of shareholder wealth during M&As, as evidenced by the higher excess management expenses with increases in network centrality.

This study makes important contributions to the literature. We report interesting evidence on the dark side of board networks in the context of Chinese M&A transactions. Our paper thus joins a number of prior studies regarding the impact of board networks on acquisition performance and corporate decisions (Cai & Sevilir, 2012; Ishii & Xuan, 2014; Renneboog & Zhao, 2014). However, ours differs in a few important ways. Instead of focusing on board connections between acquirers and targets, we examine the overall social networks of board directors. We also attempt to capture the holistic picture of a board's

social network based on a number of each board director's dimensions,[1] whereas prior studies, except for that of Ishii and Xuan (2014), mainly define networks based on board interlocking. Our study is among the first to show the negative impact of directors' networks on acquisition performance and that it is conditional on board independence and state ownership. More importantly, we provide new evidence supporting an integrated agency–resource dependence perspective, complementing the studies of Dalziel et al. (2011) and Hillman and Dalziel (2003). Dalziel et al. (2011) examine the influence of directors' human and relational capital on research and development spending, and Hillman and Dalziel (2003) investigate the effect of board directors' ability and motivation on firm performance. Our results indicate that both board directors' motivation derived from their independence and their ability related to networks and social capital are important considerations when they perform their monitoring and advising functions. Finally, we contribute to the M&A literature by shedding new light on why some deals are value creating or value destroying. We show that inside directors could take advantage of their social network resources to pursue their own benefits at the expense of shareholder wealth. This finding again shows the important role of directors' incentives derived from their independence when performing their monitoring and advising functions.

The remainder of the paper is organized as follows. We review the literature and develop our main hypothesis in Section 2. We report our data, sample construction, and variable definitions in Section 3. Section 4 presents the empirical results and robustness check. We conclude the study after discussing our main findings in Section 5.

[1] Recent literature has documented a sharp decline in the practice of board interlocking in the United States since the turn of the 21st century (Chu & Davis, 2016).

2. Literature review and hypothesis development

2.1. Consequences of social networks

Previous studies have provided theories and evidence on the different characteristics of corporate boards and their functions (Dalton et al., 1998; Dalton et al., 1999; Adams et al., 2010； Platt & Platt, 2012). Recently, researchers in corporate finance have found that, in addition to board characteristics, board directors' networks play an important role in shaping business decisions and corporate governance. Using interlocking board directorships to construct the social networks of board directors across different firms, several studies show that board networks have a significant impact on firm decisions, including organization structure and strategic alliances (Palmer et al., 1993), poison pill adoption (Davis, 1991), acquisition activities (Haunschild, 1993, 1994; Haunschild & Beckman, 1998), stock exchange switching (Rao et al., 2000), option backdating (Bizjak et al., 2009; Janney & Gove, 2017), earnings management (Chiu et al., 2013), and operating performance and financial conditions (Non & Francis, 2007; Cai & Sevilir, 2012; Larcker et al., 2013; Omer et al., 2014).

Regarding the influence of board networks on acquisition performance, Cai and Sevilir (2012) find that acquirers earn higher announcement returns when board interlocking connections exist between acquirers and targets in the United States. In contrast, Renneboog and Zhao (2014) fail to find such a positive effect after examining board interlocks among public firms in the United Kingdom. Instead of relying on board interlocks, Ishii and Xuan (2014) identify connections between board directors and executives in acquiring and target firms in the United States, based on education and employment history; interestingly, they show that such connections have negative impacts on announcement returns. Given these contrasting findings, we seek to provide new

evidence on how directors' network centrality affects acquiring firms' returns upon M&A announcements, using a sample of Chinese firms.

2.2. Hypothesis development

2.2.1. Acquirers' board network centrality and merger performance

Organizations depend on various resources, and the successful procurement of resources is critical, according to resource dependence theory (Pfeffer & Salancik, 1978). Corporate boards of directors play a key role in providing valuable information, strategic advice, and access to various resources (Pugliese et al., 2014). To conduct M&As, acquiring firms typically need to seek support from various stakeholders. As emerging markets are generally lacking in terms of contract and property right protection, social connections have become crucial for firms conducting business. Well-connected boards can help firms garner more resources and support from stakeholders (Certo, 2003) and improve performance (Larcker et al., 2013). Moreover, well-connected boards of acquiring firms have access to valuable market- and industry-wide information (e.g., Cohen et al., 2008; Huang et al., 2014) and are thus able to better assess target firm value and potential synergy between acquirers and targets. With such resource advantages, including information, knowledge, and expertise, a well-connected board is more likely to identify value-creating opportunities during M&A transactions.

The above discussions suggest that well-connected boards are capable of providing valuable resources to firms. However, Hillman and Dalziel (2003) and Dalziel et al. (2011) advocate an integrated agency–resource dependence view on the influence of directors' capital and ability on firm performance, since both directors' ability and incentives can significantly affect their monitoring and advising behaviors. The authors contend that

incentives have long been considered a key moderating factor between an individual's ability and performance (e.g., Hunter & Hunter, 1984; Becker & Huselid, 1992), and, therefore, integrating directors' ability to provide resources and incentive to monitor and advise will "not only more accurately reflect the real world but also may overcome theoretical weaknesses" in choosing one view over another (Hillman & Dalziel 2003, *p.*388). According to Jensen and Meckling (1976), conflicts of interest exist between principals (shareholders) and agents (managers and board directors). Board directors are generally senior managers of the firm and could be less motivated to monitor other managers to whom they are connected (e.g., Fracassi & Tate, 2012). In addition, well-connected board directors could have strong incentives to mimic the self-dealing behaviors of connected parties (e.g., Bizjak et al., 2009), and are more likely to take advantage of their network connections to pursue self-interested activities. This incentive issue can become more prominent in a transitional economy such as China's (e.g., Fan, 2002; Du et al., 2010) due to the weak legal enforcement.

Furthermore, a firm's relationship through its directors with the government in China, one of the key stakeholders, plays an important role in the impact of a social network on stock performance.[2] Well-connecfted directors can help firms obtain more resources and enjoy great benefits from the government, including easier access to the capital market through initial public offerings or bank loans (Sapienza, 2004; Charumilind et al., 2006), lower taxes (Faccio, 2007), or lucrative government contracts (Goldman et al., 2009; Tao et al., 2017). Such a helping hand effect becomes particularly valuable in China, where *guanxi* dominates the economy. However, a potential grabbing hand effect could arise, and

[2] We thank an anonymous referee for providing this insight on the political connections of Chinese firms.

previous studies have shown that such a grabbing hand effect actually exists. By modeling bargaining power between the government and corporate managers, Shleifer and Vishny (1994) show that the government and politicians prefer private ownership, since they can seek rents or extract more benefits from private shareholders. In this case, directors' connections with the government could harm firm value and stock returns (Shleifer, 1997; La Porta et al., 1999). Chen et al. (2017) report empirical evidence of a negative effect of political connections on firm value in China.

Based on the above discussions from an integrated agency–resource dependence perspective, we develop our first hypothesis on the relation between a board's network and acquirer stock performance, as follows.

H1: *There is a negative relation between board network centrality and acquirer stock performance*.

2.2.2. Independent versus inside directors

Board directors are generally classified into inside and independent directors. Inside directors are former or current employees or senior managers of a firm, while independent directors are outsiders who are independent, and not former or current employees or senior managers.[3] According to an integrated agency–resource dependence perspective, board directors' independence (i.e., independent vs. inside directors) should be assessed together with their network capital, since their proclivity to monitor or advise

[3] In the United States, the Sarbanes–Oxley Act of 2002 requires that a majority of a board's audit committee consist of independent directors. In 2003, New York Stock Exchange Rule 303A and NASD Rule 4350(c) began requiring firms to have a majority of independent directors. In China, according to the requirements of the Chinese Securities Regulatory Commission (CSRC), at least one-third of a board's directors should be independent.

senior managers is conditional not only on their human and network capital, but also on their independence (Hillman & Dalziel, 2003; Dalziel et al., 2011).

Previous studies have documented significant differences between independent and inside board directors in their incentives to safeguard shareholder interests (e.g., Fama & Jensen, 1983; Adams & Ferreira, 2007; Duchin et al., 2010; Fahlenbrach et al., 2013). A director is considered independent if he/she is not an executive officer — chief executive officer (CEO), chief financial officer, board chairperson, or board secretary — or has not been employed by the firm in which he/she sat as a director during the past three years. Otherwise, we consider the director an inside director. Independent directors generally have strong motivation to exert control or provide advice to managers. Moreover, those with more connections have strong reputational incentives to exercise their monitoring responsibilities, since their network represents an important channel through which they can develop their reputation and secure additional board seats (Freeman, 1979; Chen et al., 2008). In the meantime, widely connected independent directors, less concerned about losing their seats and with greater access to the job market (e.g., Granovetter, 1973, 1985, and 1995), have greater bargaining power with controlling shareholders and are under less pressure to voice their opinion. Independent directors in China are also expected to play an important advisory role by acting as a brain trust or as consultants. A greater number of connections can help independent directors achieve advisory value, since they have access to more information, knowledge, and professional insight within the network.

In contrast, inside directors, most of whom are former or current employees or senior managers, are not well motivated to monitor other managers. With more connections and network capital available, inside directors become more capable of providing advice

to managers or monitoring them. However, their dependence on the managers/firms creates a disincentive to "side with shareholders when their interests oppose those of management" (Hillman and Dalziel, 2003, *p.385*). For example, inside directors could be less willing to fight against value-destroying initiatives proposed by managers and controlling shareholders. Moreover, when their connections reach a certain high level, these directors can also become overly occupied with social connections and less committed to monitoring or advising senior managers (Fich & Shivdasani, 2006).[4] Last but not the least, inside directors are in a more advantageous position to pursue private benefits by increasing their network connections. Our second hypothesis regarding the effect of network centrality on independent versus inside directors is stated as follows.

H2: *The negative effect of inside directors' networks on acquisition performance is stronger than that of independent directors' networks*.

2.2.3. SOEs versus non-SOEs

Chinese firms are generally classified into two groups based on their ultimate controlling ownership, SOEs and non-SOEs, with the latter including privately controlled or family firms (i.e., Lin et al., 2012; Chen et al., 2017). SOEs and non-SOEs differ significantly in their objectives and business status. An ultimate objective for non-SOEs is to maximize shareholder wealth. In contrast, an important objective for SOEs is to fulfill certain political agendas, such as generating more tax revenues for the government and maintaining society stability (North, 1990; Olson, 1993; Lin et al., 2012; Chen et al., 2017). SOEs also enjoy the implicit guarantee of the government (Wei & Wang, 1997), have easier access to loans and the capital market (Sapienza, 2004; Yang & Tang, 2017), and possess

[4] This implies a potential nonlinear relation between inside directors' connections and their monitoring and advising effectiveness.

monopolistic power in the product market (Duan & Saich, 2014; Hubbard, 2016). Compared to non-SOEs, SOEs generally have a different governance environment, a lower level of accountability, and lenient information disclosure requirements (e.g., Firth et al., 2008) but lower market value (Chen et al., 2017). Therefore, when directors with greater network centrality exert negative effects on the firm, such negative effects should be even greater for SOEs because of their objectives beyond shareholder wealth maximization and their different governance environment. The above discussions lead to the following hypothesis.

H3: *The negative effect of board network centrality on acquirer stock returns is stronger for SOEs than for non-SOEs*.

Our final hypothesis addresses the different effects of the network centrality of inside directors associated with SOEs versus non-SOEs. The agency issue is more serious for SOEs than for non-SOEs in China (e.g., Xu et al., 2005; Chen et al., 2017). SOEs have been found to engage in perks and related-party transactions, and they manipulate earnings more frequently than non-SOEs to achieve certain political objectives (Jiang et al., 2010; Lo and Wong, 2016). Berkman et al. (2009) report that SOEs expropriate wealth from minority shareholders by issuing loan guarantees to their related parties. It is natural to expect these related-party transactions to become more prevalent with an increase in board connections. Moreover, the inside directors of SOEs are generally government appointees who enjoy cadre status and have a certain political rank. These directors, together with SOE managers, are charged with the important objective of generating tax revenue for the government, increasing local employment, and promoting social welfare programs so that they can be promoted to the next higher political rank. *The Performance Evaluation*

Guideline for SOEs in China, published by the Ministry of Finance in 2002 and 2006, explicitly uses SOEs' overall contributions to society as a key criterion for the performance evaluation and promotion of managers and directors. Inside directors in SOEs are more likely to advance in the political regime with an increase in their network connections. Therefore, their incentive to monitor and advise managers to the benefit of shareholders is significantly weaker than that of inside directors associated with non-SOEs. We thus expect the negative impact of board network centrality to be more pronounced for inside directors in SOEs, and formulate our last hypothesis as follows.

> H4: *The negative effect of inside directors' network centrality is stronger in SOEs than in non-SOEs.*

3. Data, sample, and variables

3.1. Data and sample

We obtain information about board directors from the board file in the China Stock Market & Accounting Research (CSMAR) database. The database provides detailed information on board directors' kinship, educational background, corporate employment, and public service–related (i.e., government) employment history since 2005. Following previous studies (e.g., Fracassi, 2016), we construct yearly network centrality measures based on these board director characteristics. Our measures capture a holistic picture of a network and are consistent with the human and social dimensions of an individual's social ties.[5] We estimate the measures for each board director's network centrality and then

[5] When constructing network centrality measures, we assume that, once a connection between two individuals is formed, it continues to exist until one of the parties dies (e.g., El-Khatib et al., 2015). Under

construct an aggregated firm-level board centrality variable for each year, which will be detailed in the next section.[6] We also obtain other information, including acquiring firms' stock returns and financial accounting data, from the CSMAR database. Additionally, we obtain firm management expense data and information on female directors, board size, and director independence from Wind, another premier financial information vendor in China.

We retrieve a sample of M&A announcements from the merger and acquisition file in the CSMAR database. Our sample starts in 2008 and ends in 2015.[7] We match the M&A sample with one-year-lagged board centrality measures. We exclude firms with a special treatment (ST) designation,[8] financial firms, and firms missing board director information. To be included in the final sample, a firm needs to have at least one year of accounting information and a 240-day stock trading record available prior to the acquisition announcement date. Our final sample includes 5,453 firm–year observations from 2008 to 2015.

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this assumption of a connection until death, the network size increases annually, peaking at 2,232,906 pairwise connections among all board directors of Chinese listed firms in 2015.

[6] Following previous studies (e.g., Goyal et al., 2006), we use the software package Pajek to conduct the network analysis.

[7] Prior to 2005, Chinese firms listed on stock exchanges had a unique split share structure, that is, both non-tradable shares (shares owned by the state government and legal entities) and tradable shares (shares held by public investors). Between April 2005 and the end of 2007, a majority of Chinese firms converted their non-tradable shares into tradable shares under policies issued by the CSRC. The split share structure of Chinese firms ended in 2007. To avoid the potential confounding impact of the share structure reform, we start our sample in 2008.

[8] In China, the ST designation is a delisting warning for firms typically in financial distress. Stocks denoted ST are subject to different trading rules.

3.2. Key variables

3.2.1. Network centrality measures

Our main independent variable in the regression analysis is firm-level board network centrality. Common social network measures include centrality, structural autonomy, structural equivalence, and density. In recent years, centrality has been widely used in empirical studies by management, finance, and accounting researchers. It measures the extent to which an actor is located at the center of a network. Major measures of centrality include degree, closeness, betweenness (Freeman, 1979), and eigenvector (Bonacich, 1972). Degree is the number of direct ties that a director possesses in the network. The higher the degree, the more popular a director is in the network. Closeness, the inverse of the sum of the shortest distance from a director to all the other individuals in a network (Freeman, 1979), measures the speed at which a director receives information from others in the network. A director with greater closeness receives information more quickly than others. Betweenness measures the extent to which a director lies on the shortest path between any other network actors (El-Khatib et al., 2015). A larger betweenness value indicates that a director has more control over the information flow. That is, when a person is between two others in a network, that person can act as a gatekeeper, or bridge, by either facilitating or interrupting the information flow (El-Khatib et al., 2015). Finally, the eigenvector is a measure of the influence or importance of a director in the network.

We follow a three-step process to construct the network centrality variables. First, the centrality measures, including degree, closeness, betweenness, and eigenvector, are calculated for each board director based on their kinship, educational background,

corporate employment, and government work experience. These are raw measures of director network centrality. Second, we calculate the annual percentile for each centrality measure, based on the entire director database, with 1 denoting the least central value and 100 the most central. This transformation allows for a centrality measure that is independent of network size and comparable across different years. Finally, we obtain an aggregated firm-level board centrality measure by averaging the values (raw measures and percentile measures, respectively) of all the board directors' centrality measures in a certain year.

3.2.2. Merger performance measure

We use acquiring firms' stock returns around the M&A announcement period to measure merger performance. For each M&A announcement, the abnormal returns for acquirers' stocks during a six-day (0, +5) window are estimated, where day 0 is the announcement date. For each firm j on any day t, the daily abnormal return AR_{jt} is calculated using a standard ordinary least squares market model, as follows:

$$AR_{jt} = R_{jt} - (\alpha_j + \beta_j R_{mt}) \quad (1)$$

where R_{jt} is the holding period return for firm j's common stock on day t and R_{mt} is the corresponding value-weighted market return. The time window (-240, -40) is used to estimate α_j and β_j. Based on daily abnormal returns, the six-day (0, +5) cumulative abnormal returns (CARs) for firm j is defined as follows and becomes the dependent variable in our regression model:

$$CAR_j = \sum_{t=0}^{5} AR_{jt} \quad (2)$$

We estimate merger performance by employing a conventional event study to calculate daily CARs around the merger announcement. This method has been commonly used by

previous studies (e.g., El-Khatib et al., 2015). Nonetheless, an important limitation of this method is that CARs capture only investors' short-term assessment upon M&A announcement and fail to reflect the long-term value creation (or destruction) of the M&A deals.[9]

3.2.3. Political connection index and other measures

One of the important control variables in the study is the political connection index (*POLITICSINDEX*).[10] Previous studies generally use a binary variable to classify whether a firm is politically connected (Faccio et al., 2006; Du & Girma, 2010; Boubakri et al., 2012). We create a unique and comprehensive numerical political connection index to quantify the strength of an acquiring firm's connections with the government and politicians. We estimate *PCINDEX* as the sum of all political scores assigned to the CEO, chairperson, and board directors of an acquirer. The scores for the corresponding political administrative levels are as follows: premier of the State Council, 10; deputy premier of the State Council, 9; minister (or provincial governor), 8; deputy minister (or vice provincial governor), 7; director-general (or city mayor), 6; deputy director-general (or vice city mayor), 5; county chief, 4; deputy county chief, 3; section chief, 2; deputy section chief, 1; and no political experience, 0.[11] Considering the skewness of the political

[9] Some potential measures for long-term performance include buy-and-hold abnormal stock returns, calendar time Fama French three-factor abnormal returns (i.e., Barber & Lyon, 1997; Hertzel et al., 2002), and operating performance ratios, such as operating profit margin and return on equity (i.e., Lee and Loughran, 1998; Dichev and Piotroski, 2001).

[10] A binary measure can fail to reflect a firm's true level of political connections. Additionally, it cannot differentiate the degree of political connections, since Chinese government officials of different ranks can have significantly diverse levels of authority that affect firms differently. Moreover, a firm can have a CEO, a chairperson, and board directors with political connections simultaneously, whereas previous studies generally only consider only one dimension—the CEO, board chairperson, or the directors—thus significantly underestimating the degree of political connections (Chen et al., 2017).

[11] In constructing the political connection index, we arbitrarily assign a score for each government rank (i.e., minister, deputy minister, etc) and do not consider the level of a particular position (i.e., national, provincial, or county level). Thus we assume the power distance between a minister and a deputy minister to be the same as that between a county chief and a deputy county chief. An old Chinese saying puts it this way: "One political rank higher, a mountain of difference" (Chen et al., 2017).

connection index, as well as the fact that some firms have no political connections, we then transform *PCINDEX* as follows: *POLITICSINDEX* = *LN*(1+ *PCINDEX*).

Other variables include M&A deal size (*RELSIZE*), deal payment method (*CASH*), change in the control of a target firm (*CONTROLCHG*), a high-tech industry indicator (*HIGHTECH*), an indicator of whether a target firm is publicly listed prior to the announcement date (*PUBLIC*), an acquirer's operating performance measured by return on assets (*ROA*), acquirer size (*SIZE*), leverage ratio (*LEVERAGE*), Tobin's Q (*TOBINQ*), and free cash flow (*FREECASH*). We provide detailed definitions of these variables in the Appendix.

3.3. Summary statistics

Table 1 reports summary statistics for the major variables used in the regression analysis. All continuous variables are winsorized at the top and bottom 1% across years to control for the potential influence of outliers. Panel A presents the sample distribution by year and industry. The sample period shows a steady increase in the number of M&A transactions, from 197 deals in 2008 to 1,880 in 2015. A similar growth trend is also reported by Price Waterhouse Coopers (PwC)' M&A Review Report of 2015. Regarding the industry distribution based on two-digit Global Industry Classification Standard codes, we find that manufacturing firms have the greatest representation (1,351), followed by the information technology (1,090) and material industries (921).

Panel B of Table 1 presents the abnormal stock returns of acquirers around the M&A announcement date. Upon the announcement date, acquirers' stocks react positively to the news, with an average daily abnormal return of 1.186% on day 0. The average daily abnormal returns then gradually decrease to 0.0790% on day +5. The average six-day

CAR(0, +5) is approximately 2.3341%, consistent with prior literature (e.g. Chi et al., 2011), where acquiring firms in China generally experience positive abnormal returns.[12]

We report descriptive statistics of network centrality measures in Panel C of Table 1. The top four rows indicate the values for *Degree, Closeness*, *Betweenness,* and *Eigenvector*, representing the average raw values of the centrality of all the board directors' for a firm–year, respectively. The next four rows show the values for *Percentile_Degree, Percentile_Closeness, Percentile_Betweenness,* and *Percentile_Eigenvector*, which represent the average percentile values of the centrality measures for a firm–year, respectively. The variable *Percentile_All* is defined as the average of *Percentile_Degree, Percentile_Closeness, Percentile_Betweenness,* and *Percentile_Eigenvector*. The mean (median) of *Percentile_Degree* is 49.09 (49.00), indicating that the average (median) value of board degree centrality in our sample falls in the 49.09th percentile (49th percentile) rank of the director network. The means (medians) of the other three centrality measures and *Percentile_All* are generally similar to that of *Percentile_Degree*.

Regarding the descriptive statistics for the dependent and control variables, as reported in Panel D of Table 1, CAR(0, +5) has a standard deviation of 11.124%, with a median of 0.0437%. About 79% of the transactions use full cash as a payment method. Target firms experience a change of control in about 64% of acquisition deals. Approximately 32.88% of acquirers are in the high-tech industry, and 3.91% of target firms are publicly listed. The average debt ratio, Tobin's Q, and the free cash flow ratio for acquirers are 42.36%, 3.10, and -0.02, respectively. Regarding board composition, we note

[12] In contrast to typical negative market reactions to M&A announcement for acquirer stocks in the US stock market, acquirer stocks generally react positively to M&A announcements in China. This is because the internal growth of Chinese firms is generally constrained by institutional environments, and pursuing acquisitions is one of the most important growth strategies for firms in China's fast-growing economy (Peng and Health, 1996).

that approximately 12.95% of directors are female and 38.5% are independent directors. The average board size is 10.77, with a political connection index (*POLITICSINDEX*) of 2.32.

[Insert Table 1 here]

4. Empirical results

4.1. Baseline regression

As a preliminary test of the relation between merger performance and board network centrality, we conduct a multivariate regression analysis with the six-day CAR, CAR(0, +5), as the dependent variable. The main independent variables are the aggregated firm-level board centrality measures (*Percentile_Degree*, *Percentile_Closeness, Percentile_Betweenness, Percentile_Eigenvector*, and *Percentile_All*). Table 2 reports the results of the regression analysis after controlling for both industry and year fixed effects.

In model (1) in Table 2, we use *Percentile_Degree* to measure the number of direct ties that a board possesses in the network. A higher value indicates that a board has more connections or is more popular in the network. The coefficient of *Percentile_Degree* is significant and negative (β = -0.0209, t = -3.66*),* suggesting that the more connections possessed by board directors in the network, the smaller the CARs for acquiring firms' stocks. In particular, a one standard deviation increase of *Percentile_Degree* (28.7635, reported in Panel C of Table 1) is associated with a reduction of 0.601% in the six-day CAR of acquirer stock. Considering that the average CAR(0, +5) of acquirer stock is 2.3341% (Panel B of Table 1), this reduction is approximately equivalent to a 25.76% decrease in acquirers' abnormal stocks returns. Such a negative effect is thus both statistically and

economically significant, consistent with H1, which hypothesizes a negative relation between board network centrality and acquirer stock performance.

Several control variables in model (1) in Table 2—*CASH*, *CONTROLCHG*, and *ROA*—are significantly related to acquiring firms' CARs. The coefficient of *CASH* is -7.3507 (t = -19.09), indicating that, when acquirers use cash to finance the deal, their announcement abnormal returns are about 7.35% lower than those associated with acquisitions paid fully or partially in stocks. This finding supports the investment opportunities hypothesis (e.g., Martin, 1996; Chatterjee & Kuenzi, 1999), which states that acquirers who choose stocks as a payment method during M&As receive more positive market reactions due to their higher growth opportunities as perceived by investors.[13] The indicator of whether controlling ownership changes during the acquisition (*CONTROLCHG*) has a positive and statistically significant coefficient (β = 1.9053, t = 6.05), indicating that acquirers' stocks exhibit higher announcement abnormal returns when the controlling ownership of the target firm is transferred to the acquirer. The negative and significant coefficient of *ROA* (β = -0.1532, t = -4.67) suggests that acquirers with poorer (better) operating performance prior to the acquisition experience higher (lower) stock returns. Interestingly, board size, the percentage of female directors, and the percentage of independent directors have no significant relation with the acquiring firm's CAR, whereas there is a negative and significant relation between the political connection index and CARs (β = -0.0252, t = -1.86). This finding is consistent with the evidence reported by Chen et al. (2017), in that firm value decreases with an increase of political connections.

[13] Other studies that document more positive market reactions to stock-swap acquisitions in China include those of Xie et al. (2012) and Tian et al. (2013).

In models (2) to (4) in Table 2, we use different measures of board network centrality while keeping the same control variables used in model (1). The coefficients of *Percentile_Closeness* in model (2) and *Percentile_Betweenness* in model (3) remain negative and significant, while *Percentile_Eigenvector* in model (4) has a nonsignificant coefficient. When using *Percentile_All* as a measure for network centrality in model (5), we also obtain a negative and significant coefficient (β = -0.0165, t = -2.56). In addition, the coefficients of all the control variables are generally consistent across different model specifications. Overall, our baseline test in Table 2 shows that board network centrality is negatively related to merger performance, consistent with H1, which was developed based on agency–resource dependence theory.

[Insert Table 2 here]

4.2. Network centrality effect of independent versus inside directors

In this section, we examine whether acquiring firms' independent and inside directors in social networks exert different impacts on merger performance. When first comparing the network centrality measures of independent and inside directors, we note that, in Panel A of Table 3, the means of *Degree* (*Percentile_Degree*) for independent and inside directors, respectively, are 275.70 (68.86) and 31.99 (29.96), and the difference is statistically significant. This result implies that independent directors are generally better connected than inside directors. We find similar results when using other centrality measures to estimate the network centrality of independent and inside directors. This finding is consistent with the conventional wisdom that independent board directors in China tend to be better connected because of their multiple outside positions at various different firms.

Next, we conduct a multivariate regression analysis similar to that used in Table 2 to formally examine the impacts of independent and inside directors on acquisition performance. We run the regression using acquiring firms' independent and inside director centrality measures separately and report the results in Panel B of Table 3.[14] When independent director centrality measures are used in models (1) to (5), we note that none of the centrality variables has a significant coefficient. These results suggest that the social networks of independent directors generally have no significant effect on acquisition performance. In contrast, when we conduct the regression analysis using the inside director centrality measures in models (6) to (10), the coefficients of all the centrality measures become negative and significant, with t-values ranging from -1.99 to -4.29. For instance, Percentile_All in model (10) has a negative and significant coefficient of -0.0294 (t = -3.31). To interpret the economic significance of the result, we estimate that an increase of one standard deviation in Percentile_All is associated with a reduction of 0.54% of the acquirer stock CAR. Panel C compares the coefficients of the centrality measures for independent and inside director samples based on a chi-squared test. We find that the differences in the coefficients of all the centrality measures, with the exception of Percentile_Betweenness, are statistically significant. These findings support H2.

[Insert Table 3 here]

4.3. SOEs versus non-SOEs

This section examines whether the impact of a board network on acquisition performance is conditional on state ownership. Chinese listed firms are generally classified into SOEs and non-SOEs, based on their ownership structure. Following previous studies

[14] We include all the control variables in the regression as those used in Table 2, but do not tabulate their coefficients in the table to reserve space.

(e.g., An et al., 2016; Chen et al., 2017), we classify a firm as an SOE if its ultimate controlling shareholder is a state government; otherwise, it is classified as a non-SOE. Information on the ultimate controlling shareholder is obtained from the CSMAR database. In our sample, from 2008 to 2015, 1,693 acquisition announcements (about 31.05% of the whole sample) involved SOE acquisitions.

We first compare the M&A announcement returns conducted by SOEs and non-SOEs in Panel A of Table 4. The average six-day CAR(0, +5) values around SOE and non-SOE acquisitions are 1.6170% and 2.6570%, respectively. The *t*-test on the mean difference indicates that non-SOE acquisitions have significantly higher announcement returns than SOEs.

We next use a multivariate regression model to examine the impact of board networks for the SOE and non-SOE subsamples, respectively, and report the results in Panel B of Table 4. We note that, for the SOE subsample, the negative effect of network centrality on acquirers' announcement returns persists, as evidenced by the negative and significant coefficients of four out of the five centrality measures in models (1) to (3) and (5). The exception is *Percentile_Eigenvector* in model (4), which has a coefficient that is not significantly different from zero (β = -0.0163, t = -1.53). As an interesting contrast, network centrality measures lose their prediction power for acquirers' stock returns in the non-SOE subsample, as shown in models (7) to (10), except that *Percentile_Degree* in model (6) has a negative and significant coefficient (β = -0.0120, t = -1.79). These results suggest that the dark side of board network centrality on acquirer stock performance is mainly driven by SOEs, not by non-SOEs, supporting H3.

In Section 4.2, we have shown that the network centrality of inside directors, not that of independent directors, has a negative effect on acquiring firms' stock performance around the M&A announcement date. Naturally, we then examine both the inside and independent director centrality measures for the two groups, SOEs and non-SOEs, and conduct the regressions separately. Consistent with previous results reported in Panel B of Table 3, our untabulated results show that, for independent directors, none of the network measures has a significant coefficient for either SOE or non-SOE firms. That is, independent directors' networks generally do not have a significant effect on the merger performance of SOEs or non-SOEs. We report the results in Panel C of Table 4 for the impact of inside director centrality for SOEs and non-SOEs. For SOEs in models (1) to (5), the coefficients of the network variables for inside directors are negative and statistically significant, with the exception of *Percentile_Closeness* in model (2). In contrast, for non-SOE firms, none of the coefficients of the network centrality variables is significant, as shown in models (6) through (10). These findings suggest that the negative effects of inside directors in China are mainly derived from inside directors in SOEs, not from inside directors in non-SOEs. The evidence here is consistent with H4.

[Insert Table 4 here]

4.4. Further analysis

So far we have shown that, consistent with agency–resource dependence theory, greater board network centrality is associated with the lower stock returns of acquiring firms upon the acquisition announcement. A natural question then follows: how does board network centrality affect acquiring firms' stock returns? Two potential actions taken by acquiring firms could be related to the negative stock performance: the appointment of

board directors with greater or lesser centrality and the choice to conduct an M&A.[15] Since these two actions can overlap or can be independent of each other, it is reasonable to expect (1) firms with greater board network centrality to conduct more M&As that are value-destroying, and (2) board directors with greater centrality to utilize their connections for private benefits at the expense of shareholder wealth during M&As, resulting in lower stock returns. In this section, we conduct a series of tests to further identify these two potential actions.

4.4.1. Board centrality, M&A frequency, and value-destroying transactions

We first examine whether firms with greater board network centrality tend to conduct more M&As. We run the regression with the number of acquisition transactions in year *t* (*N_MA*) for firms from 2008 to 2015 as the dependent variable. The samples include both firms having M&As in year *t* and firms having no M&As. The mean and standard deviation of *N_MA* are 0.3662 and 0.8862, respectively. The independent variables are the board centrality measures in year *t* - 1. Our control variables include firm size (*SIZE*), the current ratio (*CURRENT_RATIO*), *ROA*, Tobin's Q (*TOBINQ*), and the leverage ratio (*LEVERAGE*) in year *t* - 1, as defined in the Appendix. As tabulated in Panel A of Table 5, we find that all the centrality measures (models (1) to (5)) have a positive and significant coefficient, indicating that firms with greater board centrality conduct more M&A transactions. To interpret the economic significance, we estimate that, for a one standard deviation increase in *Percentile_All*, firms, on average, increase the number of acquisition transactions by 15.5975%. We obtain similar results when using a probit model to analyze the likelihood of acquisitions conditional on board centrality, where the

[15] We are grateful to the referee for making this point.

dependent variable becomes a dummy variable equal to one when a firm conducts an acquisition in year *t*, and zero otherwise.

We next examine whether boards with well-connected directors are more likely to carry out value-destroying acquisitions. Since the negative association between centrality measures and acquirer stock returns is stronger for inside directors, we construct a logit regression model to examine the impact of director centrality on the likelihood of firms' value-destroying acquisitions using the inside directors' centrality measures only. The dependent variable is an indicator for value-destroying acquisitions that equals one if CAR(0,+5) < 0, and zero otherwise. The other variables are defined as in the previous tables.

Panel B of Table 5 shows the regression results. We find that, for the subsample of SOEs, the coefficients of the network variables of inside directors are all positive and statistically significant. This result indicates that boards with well-connected inside directors in SOEs are more likely to carry out value-destroying acquisitions. To better understand the economic significance, we calculate the average partial effects of those network variables' coefficients (Wooldridge, 2015). We find that the average partial effects for *Percentile_All, Percentile_Degree*, *Percentile_Closeness*, *Percentile_Betweenness*, and *Percentile_Eigenvector* are 0.0021, 0.0015, 0.0013, 0.0019, and 0.0014, respectively. An increase of one standard deviation in *Percentile_All* (*Percentile_Degree*, *Percentile_Closeness*, *Percentile_Betweenness*, and *Percentile_Eigenvector*) raises the likelihood that an SOE will conduct value-destroying acquisitions by 3.82% (3.04%, 2.34%, 3.46%, and 3.58%, respectively). However, for the subsample of non-SOEs (models (6) through (10)), we do not find similar evidence.

[Insert Table 5 here]

4.4.2. Board network centrality and excess management expenses

The second possible action associated with negative stock returns could be that board directors with greater centrality utilize their connections for private benefits at the expense of shareholder wealth during M&As. We conjecture that, conditional on firms conducting M&As, well-connected board directors, especially insider directors, can utilize their connections for private benefits at the expense of shareholder wealth. To test this conjecture, we use a firm's excess management expenses (*EXCESS_MGT_EXP*) as a proxy for private benefits, following Richardson (2006). Excess management expenses are associated with business activities that deviate from normal operating activities but are at managers' full discretion, including cash bonus, perks, travel and lodging expenses, and business entertainment and consultation fees. They are normally less subject to monitoring and scrutiny by board directors, regulators, and other outside stakeholders (Kim & Sohn, 2013). If board directors, especially inside directors, utilize their network for self-interest at the expense of shareholder wealth, we expect a positive relation between board network centrality and acquirers' excess management expenses (*EXCESS_MGT_EXP*).

We define *EXCESS_MGT_EXP* as a firm's actual management expenses reported on its financial statements minus expected management expenses. Consistent with Richardson (2006), we first use the following regression to model the factors associated with a firm's reported management expenses (*MGT_EXP*):

$$MGT\_EXP = \beta_0 + \beta_1 SALE + \beta_2 LEVERAGE + \beta_3 GROW + \beta_4 BOARDSIZE + \beta_5 STAF + \beta_6 BIG4 + \beta_7 FIRMAGE + \beta_8 MARGIN + \beta_9 H5 + u \quad (3)$$

We scale the firm's management expenses by its total revenue at the fiscal year-end.[16] Based on the above regression, we estimate the expected management expenses (*EXP_MGT_EXP*), which are the fitted value of the above regression. Excess management expenses are then estimated as the difference between a firm's reported and expected management expenses; that is, *EXCESS_MGT_EXP = MGT_EXP – EXP_MGT_EXP*.

We now conduct a regression analysis by regressing excess management expenses on network centrality measures and other control variables, and we report the results in Table 6. Panel A shows the results for the full sample. When using *Percentile_Degree* as a measure for network centrality in model (1), we note that it has a positive and significant coefficient ($\beta = 0.0001$, $t = 5.89$), suggesting that the more connections possessed by board directors in the network, the higher excess management expenses. A one standard deviation increase in *Percentile_Degree* (28.7635) is associated with an increase of 0.288% in excess management expenses. Considering that the average *EXCESS_MGT_EXP* value is 0.0057, this increase is approximately equivalent to a 50.46% increase in excess management expenses.

All of the control variables in model (1) in Table 6 Panel A are significantly related to excess management expenses. In particular, younger firms and firms with fewer total assets, a lower leverage ratio, and poorer operating performance have more excess management expenses. Excess management expenses increase with the decrease in a firm's largest shareholder's ownership, as evidenced by the negative and significant coefficient for *TOP1* ($\beta = -0.0002$, $t = -6.17$). Additionally, there are positive relations between excess

[16] We provide the definitions of the other variables in regression equation (3) in the Appendix.

management expenses and the percentage of independent directors, the compensation of the top five most highly paid directors, and CEO duality.

We use different measures of board network centrality (i.e., *Percentile_Degree*, *Percentile_Betweenness*, and *Percentile_Eigenvector*) in the other three models while retaining the same control variables used in model (1). The coefficients of these alternative network centrality measures are all significantly positive. When using *Percentile_All* as a network measure in model (5), we obtain a consistent finding that supports a positive association between board network centrality and excess management expenses (β = 0.0001, t = 5.04). The results in Panel A imply that better-connected board directors tend to utilize their networks for self-interest at the expense of shareholder wealth, resulting in higher excess management expenses.

We classify the full sample into (1) independent and inside directors and (2) SOEs and non-SOEs and then conduct the regression analysis again, with the results tabulated in Panels B and D of Table 6, respectively. The coefficients for the network centrality measures remain positive and significant for both the independent and inside directors samples in Panel B, consistent with the findings reported in Panel A, except that *Percentile_Betweenness* in model (3) has a nonsignificant coefficient (β = 0.00003, t = 1.11). Moreover, we find that all the coefficients of the network centrality measures for the inside director sample are larger than those for the independent director sample, based on a chi-squared test (Panel C). This result suggests that inside directors are more likely to use their networks for private benefits at the expense of shareholder wealth. In addition, as shown in Panel D, where the sample is divided into SOE and non-SOE groups, all five board network centrality measures have a positive and significant coefficient in both groups. More importantly, we find that all the coefficients of the network centrality measures for

the SOE subsample are larger than those for the non-SOE subsample, based on a chi-squared test (Panel E), implying that SOE directors are more likely to use their networks for private benefits at the expense of shareholder wealth.

[Insert Table 6 here]

We have reported that independent directors generally possess greater network centrality than inside directors, but the centrality of independent directors does not have a significant impact on acquirer stock returns. In contrast, the impact of inside director centrality on acquirers' stock returns is significantly negative, particularly for SOEs. We now focus on inside directors only and examine whether they have a different impact on excess management expenses for SOEs versus non-SOEs. We find untabulated results to be consistent with those reported in Panel C of Table 4, that is, all network centrality measures have a positive and significant coefficient, suggesting that inside directors utilize their networks for self-interest at the expense of shareholder wealth. When comparing the coefficient difference for each centrality measure between SOEs and non-SOEs, we note that the centrality measures for the SOE subsample generally have larger coefficients than those for the non-SOE subsample (except for *Percentile_Eigenvector*). This finding suggests that the results reported in Panel A of Table 6 are mainly duet o the impact of inside director centrality at SOEs.

Overall, the findings in this section identify two possible actions related to the association between lower acquirer stock returns and greater board network centrality. The first is that firms with greater board centrality tend to conduct more M&As and these value-destroying M&As. The second finding is that board directors with greater centrality utilize their connections for private benefits at the expense of shareholder wealth during M&As,

as evidenced by the higher excess management expenses for their firms. These two actions are not necessarily mutually exclusive.

4.5. Robustness

4.5.1 Endogeneity issue

Our main finding is that a higher level of board network centrality is associated with lower acquirer stock returns around M&A announcements. One potential issue is endogeneity, which is related to the likelihood of (1) the firm hiring connected directors and (2) the firm conducting M&As. Following previous literature (Giroud, 2013; Bernstein et al., 2016; Bernile et al., 2018), we conduct a two-stage least squares (2SLS) regression by using an instrumental variable (IV) to alleviate endogeneity concerns. Our IV is an innovative measure: the number of years before the M&A announcement year an acquiring firm's headquarters has had access to a high-speed railway station (*YEAR_STATIONS*). The rationale behind this instrument is that, if an acquirer's headquarters enjoy access to such a station, it will be easier and less costly for its directors to develop network capital. We conjecture that the more years a headquarters has had access to a railway station, the more connections board directors can develop. Meantime, it is reasonable to believe that this IV is not directly related to M&A announcement stock returns.[17]

We report our 2SLS results in Table 7. In Panel A, the IV, *YEAR_STATIONS* and the same control variables as in Table 2 are used in the first-stage regression, with the network centrality measures as the dependent variables. In Panel B, we regress CAR(0,+5)

[17] Our selection of the IV here is based on the work of Giroud (2013), Bernstein et al. (2016), and Bernile et al. (2018), who use the frequency of direct flight as an instrument in their board composition and corporate innovation studies. An alternative IV is a dummy variable indicating whether an acquiring firm's headquarters have a high-speed train station in China, with which we obtain similar results.

on the fitted value of the centrality measures. We note that the estimated coefficients of the IV, *YEAR_STATIONS*, are highly significant in the first-stage regressions in columns (1) to (5). The statistics also indicate that the instrument is valid and strong. For instance, the IV in column (1) has a coefficient of 1.5556 (t = 7.79), with a Cragg–Donald Wald F-statistic of 36.06, exceeding the 10% critical value of 19.93. As Panel B of Table 7 shows, the negative and significant relation between board centrality and acquirer M&A announcement returns continues to hold, except in column (4), where centrality is measured by the eigenvector. We then proceed to rerun 2SLS regression tests after classifying (1) directors into independent and inside directors and (2) firms into SOEs and non-SOEs, as with Tables 3 and 4. Untabulated results show that the previous main findings still hold; that is, the negative effect of board centrality on acquirer stock performance is mainly due to inside directors' networks, and it is stronger for SOEs.

[Insert Table 7 here]

To further alleviate endogeneity concerns, we examine the effect of network centrality two years ago (t - 2) on acquirer stock returns. The regression is similar to that previously used, except that the independent variables are centrality measures in the year t - 2. We find that our main results continue to hold for the whole sample, the SOE subsample, and the non-SOE subsample. In addition, we use changes in the network centrality measures (or the differences in the variables calculated by subtracting the value for year t - 2 from the value for year t) as alternative independent variables, and our regression results still hold. Finally, to address unobservable omitted correlated variables,

we also carry out a random effect analysis and obtain similar results.[18] Overall, these findings suggest that our main results are not subject to potential endogeneity issues.

4.5.2 Other tests

We replace the dependent variable with three-day abnormal returns and use CAR (-1, +1) as a dependent variable in the regressions and find that our conclusions still hold for this alternative measure of acquisition performance. In addition, when constructing network measures, we make the important assumption of a connection existing till death. In an alternative test, we build network variables without this assumption and rerun the regressions. We report similar findings. As the last robustness check, we exclude M&As with a deal value below RMB10 million and rerun the regressions. Our main results continue to hold.[19]

5. Discussions and conclusions

We construct the social networks of board directors in publicly listed firms in China and examine the impact of board centrality on acquisition performance for the period from 2008 to 2015. Our measures of board directors' social networks in publicly listed Chinese firms are estimated based on each director's kinship, educational background, corporate employment, and public service history. These measures, including degree, closeness, betweenness, and eigenvector, reflect a director's status, influence, and power in the network. Our objective is to examine the impact of board connections on acquiring firms' stock performance upon M&A announcements.

[18] The detailed results of these robustness checks, including those in Section 4.5.2, are not tabulated in the paper to save space, but they are available from the authors upon request.
[19] The detailed results of these robustness checks are not tabulated here to save space, but they are available from the authors upon request.

Two separate theories appear to be related to the core issue examined in this study: resource dependence theory and agency theory. According to resource dependence theory (Pfeffer & Salancik, 1978), board directors' social and relational capital provides valuable information and resources that are essential to the success of M&As. In contrast, agency theory implies that social connections can diminish the function of effective monitoring and corporate governance when directors take advantage of their connections to pursue self-interest or to collude with entrenched executives (Hwang & Kim, 2009; Bruynseels & Cardinaels, 2014; Duru et al., 2016). Nonetheless, Hillman and Dalziel (2003) and Dalziel et al. (2011) have proposed an integrated agency–resource dependence theoretical framework to analyze the important role and functions of board directors in corporate governance. By integrating these two theories within a single framework, we are able to consider two important aspects simultaneously when board directors perform their monitoring and advising functions: (1) board directors' motivation derived from their independence status (i.e., inside or independent directors) and (2) their networks and social capital–related ability (Hillman & Dalziel, 2003; Dalziel et al., 2011).

We report interesting and consistent evidence that supports an integrated agency–resource dependence theory. Overall, greater board centrality is associated with lower acquirer stock performance. After classifying directors into independent and inside directors, we find that independent directors who possess superior network resources have no significant effect on acquisition performance. However, inside directors' network centrality has a negative and significant effect on acquisition performance, and this negative impact is more prominent in SOEs. Our results imply that, although both directors' ability and incentives exert significant effects on their monitoring and advising behaviors, directors' incentives have become a key moderating factor between their ability and their

performance (e.g., Hunter & Hunter, 1984; Becker & Huselid, 1992). The result also echoes Hillman and Dalziel (2003) and Dalziel et al. (2011), in that the integration of both directors' abilities and incentives not only can more accurately reflect the real world but also can overcome theoretical weaknesses in the choice of one view over another (Hillman & Dalziel, 2003).

The nonsignificant impact of independent directors' networks indicates that the superior social network resources possessed by independent directors are not fully utilized in their monitoring and advising functions. This could be due to the "rubber stamp" role of independent board directors in China, as documented by previous studies (e.g., Xie et al., 2012; Tian et al., 2013). In contrast, inside board directors, a majority of whom are insiders, take a "driver's seat" in boardrooms. The social network centrality of inside directors is significantly negatively related with acquirer stock returns, indicating that inside directors can take advantage of their social network resources to pursue their own benefits at the expense of shareholders. Our further analysis confirms this conjecture. We find that boards with greater centrality tend to carry out more M&As which are likely to destroy shareholder wealth. In addition, inside directors utilize their network for self-interest at the expense of shareholder wealth, as evidenced by a positive relation between board centrality and excess management expenses. These here are consistent with agency–resource dependence theory.

So far we have sought to disentangle the centrality effect by differentiating between inside and independent directors and between SOEs and non-SOEs. However, a limitation of this method is that board network centrality does not fully capture one attribute: some firms could appoint directors with greater centrality to leverage their experience and connections as a result of the firm being under scrutiny for political purposes. As one way

to remedy the limitation, we control for acquirers' political connections in the regressions.[20]

Social connections, or *guanxi,* are a fundamental part of China's society and business environment, which is unique and vastly different from that of other emerging economies. Therefore, it is important to clearly define the boundaries of validity of our findings. Nonetheless, China's stock market is similar to those of most emerging markets in terms of underdeveloped corporate governance and legal systems. Our main findings have important implications for policy makers in China and other emerging economies. Our evidence on the negative association between the centrality of inside directors and acquisition performance implies that policy makers should design better corporate governance systems to strengthen the role of independent directors and improve the monitoring and advising effectiveness of independent board directors.

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Appendix: Variable definitions

CAR(0,+5): An acquiring firm's 6-day cumulative abnormal returns over days (0, + 5) around an M&A announcement date using a standard ordinary least square market model framework.

[20] While the coefficients on the acquirers' political connections are negative and significant in the baseline regressions, they become nonsignificant in the second-stage regressions when we conduct a 2SLS analysis using an IV.

Centrality: A measure of the extent to which a board director is located in the center of a network. Major measures of centrality include degree, closeness, betweenness (Freeman, 1979), and Eigenvector (Bonacich, 1972).

Degree: The number of direct ties a director possesses in the network. The higher the degree, the more popular a director becomes in the network.

Closeness: The inverse of the sum of the shortest distance of a director to all other directors in a network (Freeman, 1979). *Closeness* measures the speed at which an individual receives the information from other people in the network. Higher closeness indicates an individual director receives information more quickly than others.

Betweenness: A measure of the extent to which a director lies on the shortest path between any other directors (El-Khatib et al., 2015). A larger betweenness indicates that an individual director has more control over the information flow in a network.

Eigenvector: A measure of the influence or importance of an individual director in a network.

Percentile_Degree: Percentile ranking of acquiring firm directors' centrality measured by degree centrality.

Percentile-Closeness: Percentile ranking of acquiring firm directors' centrality measured by closeness centrality.

Percentile_Betweenness: Percentile ranking of acquiring firm directors' centrality measured by betweenness centrality.

Percentile_Eigenvector: Percentile ranking of acquiring firm directors' centrality measured by eigenvector centrality.

Percentile_All: Average percentile ranking of acquiring firm directors' centrality measured by closeness, degree, betweenness, and Eigenvector centrality.

ASSET: Natural logarithm of total assets of an acquiring firm at the end of fiscal year prior to the transaction.

BIG4: A proxy of audit quality, and it equals one if an acquirer' auditor is one of the "big four" public accounting firms (PWC\KPMG\EY\DT).

BOARDSIZE: Number of directors on board of an acquiring firm at the end of fiscal year prior to M&A announcement date.

CASH: Dummy variable for payment method for an M&A; it takes1 if the deal is fully paid with cash, and 0 if otherwise.

COMP: Natural logarithm of total compensations of the five directors with the highest compensations in the fiscal year prior to M&A announcement date.

CONTROLCHG: Dummy variable for the change of control of the target; and it takes 1 if there is a change of control, and 0 if otherwise. We follow "Measures for the Administration of the Takeover of Listed Companies" issued by China Securities Regulatory Commission (CSRC) in 2008 to determine the change of control during M&As.

CURRENT_RATIO: Ratio of current assets over current liabilities at the end of fiscal year prior to M&A announcement date.

DUAL: Dummy variable that takes 1 if an acquirer's CEO is also a board director in the fiscal year prior to M&A announcement date.

EXCESS_MGT_EXP: Excess management expenses is defined as a firm's actual management expenses reported on its financial statements minus the expected management expenses. We scale a firm's management expenses by its total revenue in the fiscal year end. We first use a regression to model the factors associated with a firm's reported management expenses *(MGT_EXP)*. Based on the regression, we estimate expected management expenses *(EXP_MGT_EXP)* which is the fitted value of the regression. Excess management expenses is then estimated as the difference between a firm's reported management expenses and expected management expenses; that is, *EXCESS_MGT_EXP = MGT_EXP – EXP_MGT_EXP*.

FIRMAGE: Natural logarithm of the total years since the founding of an acquirer at the end of fiscal year prior to M&A announcement date.

FREECASH: Ratio of free cash flow over total asset of an acquirer at the end of fiscal year prior to M&A announcement date.

GROW: An acquirer's growth rate of revenues in the fiscal year prior to M&A announcement.

H5: Herfindahl-Hirschman index of the top5 shareholder which indicates the extent of ownership concentration.

HIGHTECH: Dummy variable that it takes 1 if an acquirer belongs to a high tech industry, where we define a high tech industry following Loughran and Ritter (2004).

LEVERAGE: Ratio of total debt over total asset of an acquirer at the end of fiscal year prior to M&A announcement date.

SALE: Natural logarithm of total sales of an acquiring firm in the fiscal year prior to M&A announcement.

MARGIN: Gross profit margin of an acquirer in the fiscal year prior to M&A announcement.

PFEMALE: Ratio of female directors over all directors of acquirer at the end of fiscal year prior to M&A announcement date.

PINDEPENDENT: Ratio of independent directors over total directors of an acquirer at the end of fiscal year prior to M&A announcement date.

POLITICSINDEX: An acquirer's overall political connection index at the end of fiscal year prior to M&A announcement date. In particular, we consider political background of a firm's CEO, chairperson, and board directors in the current and previous years based on their biographies and curriculum vitae. We first identify whether a firm's chairperson, CEO, or board directors are (were) working in the government administrative system (the Central, Provincial and local government). Then we track their respective political ranks in each year, and assign a numerical score from 0 to 10 based on their ranks. To be specific, we assign a 0 for no political experience, 1 for Deputy Section Chief, 2 Section Chief, 3 for Deputy County Chief… up to 8 for Minister, 9 for Deputy Premier of the State Council and 10 for Premier of the State Council. An acquiring firm's overall political connection index or *PCINDEX* at the end of fiscal year prior to M&A announcement is simply the sum of all the scores assigned to its CEO, chairperson and board directors. We transform the index using a natural logarithm function as follows: $POLITICSINDEX = LN(1 + PCINDEX)$ as the index is highly skewed to the left and some firms do not have any political connections at all.

PUBLIC: Dummy variable that takes 1 if a target firm is publicly listed, and 0 if otherwise.

RELSIZE: Ratio of the value of an M&A transaction over total asset of an acquirer in the fiscal year prior to M&A announcement date.

ROA: Ratio of an acquirer's net income over total asset in the fiscal year prior to M&A announcement date.

SIZE: Natural logarithm of market value of an acquirer at the end of fiscal year prior to M&A announcement date.

SRPS: Surplus reserves per share of an acquirer in the fiscal year prior to M&A announcement date.

STAF: the number of employees of an acquirer at the end of fiscal year prior to announcement.

TOBINGQ: Tobin's Q of an acquirer at the end of fiscal year prior to M&A announcement date; it is defined as the ratio of the sum of market value of equity and debt over tangible asset, where tangible asset is total asset minus amortization minus intangible asset minus deferred taxes.

TOP1: Ratio of shares of the largest shareholder over total shares of an acquirer at the end of fiscal year prior to M&A announcement date.

YEAR_STATIONS: The number of years for an acquiring firm's headquarters to have a high-speed railway station before the M&A announcement year.

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Table 1: Summary statistics

This table reports the times series averages of summary statistics for the major variables. Panel A shows the distribution by year and industry of the sample. The industry is defined by two-digit Global Industry Classification Standard (GICS) code. Panel B reports summary statistics for announcement returns (daily abnormal return from Day 0 to Day +5 and cumulative abnormal return CAR(0, +5). Panel C and D report summary statistics for network variables and other variables, respectively.

Panel A: Sample distribution by year and industry.

Year	No.	Acquirer Industry (2008-2015)	No.
2008	197	10 (Energy)	128
2009	174	15 (Material)	921
2010	212	20 (Manufacturing)	1,351

2011	322	25 (Optional Consumption)	904
2012	446	30 (Daily Consumption)	312
2013	836	35 (Health Care)	478
2014	1,386	45 (Information Technology)	1,090
2015	1,880	50 (Telecommunication)	26
		55 (Public Service)	242
		60 (Real Estate)	1
Total	5,453	Total	5,453

Panel B: Abnormal stock returns for acquirers around M&A announcement date

	Day 0	Day +1	Day +2	Day +3	Day +4	Day +5	CAR(0,+5)
Mean (%)	1.1860	0.4362	0.2748	0.2310	0.1272	0.0790	2.3341
t-value	30.4969***	11.2158***	7.0651***	5.9385***	3.2702***	2.0313**	24.5022***

Panel C: Summary statistics of network centrality measures

Variable	Mean	Std. Dev.	p25	p50	p75
Degree	83.3585	82.9526	27.3158	55.7692	110.7220
Closeness	0.1866	0.0166	0.1781	0.1879	0.1969
Betweenness	0.0001	0.0002	0.0000	0.0001	0.0002
Eigenvector	0.0005	0.0016	0.0000	0.0000	0.0002
Percentile_Degree	49.0933	28.7635	23.0000	49.0000	74.0000
Percentile_Closeness	49.7097	29.0750	23.0000	49.0000	75.0000
Percentile_Betweenness	50.4194	28.2392	26.0000	50.0000	74.0000
Percentile_Eigenvector	50.4145	28.7436	26.0000	51.0000	75.0000
Percentile_All	49.9092	25.9628	28.0000	49.2500	72.0000

Panel D: Summary statistics of acquirers' stock returns or CAR(0,+5) and other control variables

Variable	Mean	Std. Dev.	p25	p50	p75
CAR(0,+5)	2.3341	11.1240	-3.1110	0.0437	4.7716
POLITICSINDEX	2.3183	1.0224	1.9461	2.5649	4.8124
RELSIZE	0.5578	13.7057	0.0064	0.0243	0.0998
CASH	0.7922	0.4058	1.0000	1.0000	1.0000
CONTROLCHG	0.6382	0.4806	0.0000	1.0000	1.0000
HIGHTECH	0.3288	0.4698	0.0000	0.0000	1.0000
PUBLIC	0.0391	0.1938	0.0000	0.0000	0.0000
ROA (%)	7.4570	6.1828	3.8670	6.7747	10.5152
SIZE	2.0647	0.9745	1.3788	2.0216	2.7233
LEVERAGE (%)	42.3616	47.7020	24.1314	41.0110	57.2181
TOBINQ	3.0998	13.8358	1.1520	2.0517	3.5952
FREECASH	-0.0242	0.7808	-0.0386	0.0284	0.0879
PFEMALE	0.1295	0.1144	0.0000	0.1111	0.2000
BOARDSIZE	10.7700	3.3589	9.0000	10.0000	30.0000
PINDEPENDENT	0.3850	0.0731	0.3333	0.3636	0.4286

Table 2: Baseline regression results of the effect of board network on acquirers' stock CAR(0,+5) around M&A announcement

This table provides regression results for the impacts of board centrality on acquirers' M&A announcement returns for the whole sample after controlling for industry and year fixed effect. Dependent variable is six-day cumulative abnormal returns or CAR(0, +5). *t*-values are reported in the parentheses. *, ** and *** represents the significance level of 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)
INTERCEPT	8.9856***	8.6604***	8.5654***	8.3783***	8.7576***
	(8.14)	(7.90)	7.79)	7.62)	7.93)
Percentile_Degree	-0.0209***				
	(-3.66)				
Percentile_Closeness		-0.0153***			
		(-2.66)			
Percentile_Betweenness			-0.0105*		
			(-1.86)		
Percentile_Eigenvector				-0.0049	
				(-0.86)	
Percentile_All					-0.0165**
					(-2.56)
POLITICSINDEX	-0.0252*	-0.0289**	-0.0325**	-0.0366***	-0.0291**
	(-1.86)	(-2.14)	(-2.42)	(-2.76)	(-2.15)
RELSIZE	-0.016	-0.0182	-0.0215	-0.0229	-0.0192
	(-0.48)	(-0.55)	(-0.65)	(-0.69)	(-0.58)
CASH	-7.3507***	-7.3331***	-7.3211***	-7.3174***	-7.3376***
	(-19.09)	(-19.04)	(-19.00)	(-18.98)	(-19.05)
CONTROLCHG	1.9053***	1.9071***	1.9160***	1.9161***	1.9102***
	(6.05)	(6.05)	(6.08)	(6.08)	(6.06)
HIGHTECH	0.0589	0.0495	0.0471	0.0469	0.0507
	(0.18)	(0.16)	(0.15)	(0.15)	(0.16)
PUBLIC	-0.8987	-0.9402	-0.9604	-0.9846	-0.9293
	(-1.15)	(-1.20)	(-1.22)	(-1.25)	(-1.18)
ROA	-0.1532***	-0.1499***	-0.1486***	-0.1479***	-0.1499***
	(-4.67)	(-4.57)	(-4.53)	(-4.51)	(-4.57)
SIZE	0.3039*	0.2716	0.1995	0.1891	0.2522
	(1.75)	(1.56)	(1.17)	(1.10)	(1.46)
LEVERAGE	-0.0025	-0.0024	-0.0029	-0.003	-0.0027
	(-0.76)	(-0.73)	(-0.89)	(-0.91)	(-0.82)
TOBINQ	0.0129	0.0149	0.0187	0.0203	0.0162
	(0.40)	(0.46)	(0.58)	(0.62)	(0.50)
FREECASH	-0.3017	-0.3126	-0.336	-0.3485	-0.3219
	(-1.38)	(-1.43)	(-1.54)	(-1.60)	(-1.47)
PFEMALE	0.4468	0.4976	0.7051	0.7465	0.5591
	(0.34)	(0.38)	(0.54)	(0.57)	(0.43)
BOARDSIZE	-0.0707	-0.0622	-0.0615	-0.0551	-0.0629
	(-1.48)	(-1.30)	(-1.29)	(-1.16)	(-1.32)
PINDEPENDENT	1.8333	1.926	1.9633	1.696	1.9746
	(0.90)	(0.94)	(0.96)	(0.83)	(0.97)
N	5,453	5,453	5,453	5,453	5,453
Adj R^2	0.0967	0.0956	0.0949	0.0945	0.0955

Table 3: Regression results of the impact of independent and inside directors' network centrality on acquirers' stock CAR(0,+5) around M&A announcement

Panel A provides statistics for the network measures of independent and inside directors. Panel B shows the regression results of the impact of network centrality measures on acquirers' abnormal stock returns after controlling for industry and year fixed effect. Dependent variable is six-day cumulative abnormal returns or CAR(0, +5). Panel C presents the results from a chi-squared test on the difference between the coefficients of network variables for independent and inside directors. We include all the control variables in the regression as those used in Table 2 but do not report their coefficients in the table to reserve space. *t*-values are reported in the parentheses. *, ** and *** represent the significance level of 10%, 5%, and 1%, respectively.

Panel A：A comparison of network measures between independent vs. inside directors

Variable	Independent directors					Inside directors					Mean Diff.
	Mean	Std. Dev.	p25	p50	p75	Mean	Std. Dev.	p25	p50	p75	Independent – dependent
Degree	275.6963	332.8757	60.0000	158.6670	366.3330	31.9882	42.0392	8.5000	18.0667	37.6429	243.7081***
Closeness	0.2160	0.0253	0.2010	0.2181	0.2341	0.1787	0.0155	0.1705	0.1794	0.1877	0.0373***
Betweenness	0.0006	0.0007	0.0001	0.0003	0.0008	0.0000	0.0001	0.0000	0.0000	0.0000	0.0006***
Eigenvector	0.0021	0.0074	0.0000	0.0002	0.0007	0.0001	0.0007	0.0000	0.0000	0.0000	0.0020***
Percentile_Degree	68.8623	23.5455	55.0000	74.0000	87.0000	29.9595	20.2429	13.0000	27.0000	44.0000	38.9028***
Percentile_Closeness	71.1786	21.9481	61.0000	75.0000	88.0000	29.3824	18.0358	14.0000	28.0000	44.0000	41.7962***
Percentile_Betweenness	73.1311	18.2733	62.0000	75.0000	88.0000	27.3086	18.2351	14.0000	27.0000	41.0000	45.8225***
Percentile_Eigenvector	68.2855	24.4325	55.0000	74.0000	87.0000	27.0774	25.5711	1.0000	28.0000	46.0000	41.2081***
Percentile_All	70.3644	20.4086	59.5000	74.2500	86.0000	28.4320	18.2075	12.5000	26.2500	41.7500	41.9324***

Panel B: Regression results of network centrality impact on acquirers' stock CAR(0,+5) around M&A announcement: independent vs. inside directors

	Independent directors					Inside directors				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
INTERCEPT	8.3489***	8.0538***	8.6644***	7.9713***	8.2392***	9.2707***	8.6878***	8.6159***	8.3271***	8.8660***
	(7.37)	(6.94)	(7.26)	(7.19)	(7.12)	(8.44)	(8.01)	(7.92)	(7.77)	(8.13)
Percentile_Degree	-0.0052					-0.0340***				
	(-0.81)					(-4.29)				
Percentile_Closeness		-0.0004					-0.0267***			
		(-0.06)					(-2.96)			
Percentile_Betweenness			-0.0095					-0.0208**		
			(-1.17)					(-2.46)		
Percentile_Eigenvector				0.0011					-0.0121**	
				(0.18)					(-1.99)	
Percentile_All					-0.0034					-0.0294***
					(-0.46)					(-3.31)

Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	5,453	5,453	5,453	5,453	5,453	5,453	5,453	5,453	5,453	5,453
Adj R2	0.092	0.0919	0.0921	0.0919	0.0919	0.0949	0.0933	0.0929	0.0925	0.0937

Panel C: Tests for the coefficient difference between independent and inside directors

	Percentile_All	Percentile_Degree	Percentile_Closeness	Percentile_Betweenness	Percentile_Eigenvector
Difference between coefficients on independent and inside directors	0.0260	0.0288	0.0263	0.0113	0.0132
p-value based Chi2	0.0120**	0.0026***	0.0008***	0.3603	0.0878*

Table 4: Regression results of network centrality impact on acquirers' stock CAR(0,+5) around M&A announcement: SOEs vs. non-SOEs

Panel A compares the abnormal stock returns around M&A announcement date conducted by SOE vs. non-SOEs. Panel B shows the regression results for the impacts of board directors' centrality on M&A announcement returns for the sub-samples of SOEs and non-SOEs. Panel C reports results for the impacts of inside directors' centrality on M&A announcement returns for the sub-samples of SOEs and non-SOEs. The dependent variable is acquiring firms' six-day cumulative abnormal returns or CAR(0,+5). We include all the control variables in the regression as those used in Table 2 but do not report their coefficients in the table to reserve space. All regressions are controlled for industry and year fixed effect. *t*-values are reported in the parentheses. *, ** and *** represent the significance level of 10%, 5%, and 1%, respectively.

Panel A: Comparison of announcement returns on acquisitions by SOEs and non-SOEs

	SOE (p-value)	non-SOE (p-value)	Difference in Mean	t-value	p-value
CAR	1.6170*** (<.001)	2.6570*** (<.001)	-1.040***	-3.1970	0.0014

Panel B: Regression results on the impacts of board directors' centrality on M&A announcement returns: SOEs and non-SOEs

	SOEs subsample					Non-SOE subsample				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
INTERCEPT	8.1117***	7.5672***	7.7740***	7.3802***	7.7951***	10.3174***	10.1244***	10.1908***	10.0942***	10.2402***
	(4.52)	(4.26)	(4.37)	(4.15)	(4.35)	(7.25)	(7.14)	(7.14)	(7.08)	(7.18)
Percentile_Degree	-0.0327***					-0.0120*				
	(-3.05)					(-1.79)				
Percentile_Closeness		-0.0239**					-0.0071			
		(-2.21)					(-1.15)			
Percentile_Betweenness			-0.0186*					-0.0078		
			(-1.73)					(-0.90)		
Percentile_Eigenvector				-0.0163					-0.0011	
				(-1.53)					(-0.28)	
Percentile_All					-0.0291**					-0.0106
					(-2.40)					(-1.00)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,693	1,693	1,693	1,693	1,693	3,760	3,760	3,760	3,760	3,760
Adj R2	0.0975	0.0951	0.0941	0.0937	0.0956	0.1132	0.1127	0.1126	0.1124	0.1126

Panel C: Regression results of the impacts of inside director centrality of SOEs and non-SOEs subsamples

	SOEs subsample					non-SOEs subsample				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
INTERCEPT	8.2188***	7.6042***	8.1806***	7.6734***	8.0601***	10.1879***	10.0793***	9.9312***	9.8684***	10.0134***

	(4.60)	(4.37)	(4.67)	(4.47)	(4.59)	(7.21)	(7.18)	(7.05)	(7.07)	(7.10)
Percentile_Degree	-0.0301**					-0.0119				
	(-2.25)					(-1.08)				
Percentile_Closeness		-0.0099					-0.0101			
		(-0.69)					(-0.83)			
Percentile_Betweenness			-0.0305**					-0.0015		
			(-2.02)					(-0.14)		
Percentile_Eigenvector				-0.0362**					0.0014	
				(-2.39)					(0.18)	
Percentile_All					-0.0246*					-0.0054
					(-1.66)					(-0.46)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,693	1,693	1,693	1,693	1,693	3,760	3,760	3,760	3,760	3,760
Adj R2	0.1029	0.1018	0.1037	0.1027	0.103	0.1068	0.1067	0.1065	0.1065	0.1066

Table 5: Regression results of network centrality impact on the frequency of M&A transactions and the likelihood of conducting value-destroying acquisitions

Panel A reports regression results of board network centrality on the number of M&A transactions. The sample include all firms from 2008 to 2015, including those without making any M&As. The dependent variable is the number of acquisition transactions in a year *t* (*N_MA*). The independent variables are the centrality measures in year *t*-1. Panel B provide results from a logit regression for the impact of the centrality of inside board directors on the likelihood of firms' value-destroying acquisition announcement. Dependent variable is a dummy variable that is equal to 1 if CAR(0,+5)<0, and 0 if otherwise. We include all the control variables in the regression as those used in Table 2 but do not report their coefficients in the table to reserve space. All regressions are controlled for industry and year fixed effect. *t*-values are reported in the parentheses. *, ** and *** represent the significance level of 10%, 5%, and 1%, respectively.

Panel A: Regression analysis of board network centrality on the number of M&A deals

	(1)	(2)	(3)	(4)	(5)
INTERCEPT	-0.1400***	-0.1864***	-0.1299**	-0.1292**	-0.1588***
	(-2.60)	(-3.49)	(-2.43)	(-2.47)	(-2.97)
Percentile_Degree	0.0013**				
	(2.33)				
Percentile_Closeness		0.0031***			
		(6.31)			
Percentile_Betweenness			0.0009*		
			(1.94)		
Percentile_Eigenvector				0.0013***	
				(3.33)	
Percentile_All					0.0022***
					(4.05)
SIZE	0.0575***	0.0529***	0.0585***	0.0582***	0.0549***
	(9.65)	(9.06)	(9.90)	(10.07)	(9.29)
LIQUIDITY	0.0054***	0.0050***	0.0053***	0.0052***	0.0052***
	(2.88)	(2.67)	(2.85)	(2.77)	(2.79)
ROA	-0.0392	-0.0559	-0.0379	-0.0446	-0.0466
	(-1.13)	(-1.61)	(-1.09)	(-1.28)	(-1.34)
TOBINQ	0.00002	0.00002	0.00002	0.00002	0.00002
	(0.84)	(0.82)	(0.83)	(0.83)	(0.83)
LEVERAGE	-0.0049	-0.0049	-0.0048	-0.0049	-0.0049
	(-0.84)	(-0.85)	(-0.83)	(-0.84)	(-0.85)
N	14438	14438	14438	14438	14438
Adj R^2	0.0090	0.0114	0.0089	0.0094	0.0098

Panel B: Logit regression results of inside director centrality on the likelihood of conducting value-destroying acquisitions: SOEs vs. non-SOEs

SOEs subsample	non-SOEs subsample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
INTERCEPT	-1.0165**	-0.9158**	-1.0087**	-0.9095**	-1.0250**	-0.6623**	-0.6651***	-0.6214**	-0.6236**	-0.6436**
	(-2.37)	(-2.18)	(-2.38)	(-2.18)	(-2.42)	(-2.55)	(-2.58)	(-2.40)	(-2.43)	(-2.48)
Percentile_Degree	0.0060**					0.0015				
	(2.07)					(0.75)				
Percentile_Closeness		0.0053*					0.0022			
		(1.72)					(0.99)			
Percentile_Betweenness			0.0081**					-0.0002		
			(2.47)					(-0.08)		
Percentile_Eigenvector				0.0058***					-0.0001	
				(2.74)					(-0.05)	
Percentile_All					0.0085***					0.0009
					(2.66)					(0.40)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,693	1,693	1,693	1,693	1,693	3,760	3,760	3,760	3,760	3,760
Prob>chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 6: Regression results of network centrality on acquirers' excess management expenses

Panel A reports regression results of board network centrality on firm excess management expenses (*EXCESS_MGT_EXP*) using full sample. Panel B and C show regression results and coefficient differences for inside vs. independent directors samples. Panel D and E show regression results and coefficient differences for SOEs vs. non-SOEs subsamples. The dependent variable is acquiring firms' excess management expenses. In Panel B and D, we include all the control variables in the regression as those used in Panel A but do not report their coefficients in the table to reserve space. All regressions are controlled for industry and year fixed effect. *t*-values are reported in the parentheses. *, ** and *** represent the significance level of 10%, 5%, and 1%, respectively.

Panel A: Regression analysis of board network centrality on firm excess management expenses: full sample

	(1)	(2)	(3)	(4)	(5)
INTERCEPT	-0.0308*	-0.0309*	-0.0512***	-0.0465***	-0.0371**
	(-1.80)	(-1.80)	(-3.06)	(-2.78)	(-2.18)
Percentile_Degree	0.0001***				
	(5.89)				
Percentile_Closeness		0.0001***			
		(5.54)			
Percentile_Betweenness			0.00005**		
			(2.49)		
Percentile_Eigenvector				0.0001***	
				(4.23)	
Percentile_All					0.0001***
					(5.04)
ASSET	-0.0051***	-0.0050***	-0.0046***	-0.0047***	-0.0049***
	(-6.62)	(-6.50)	(-6.04)	(-6.08)	(-6.39)
LEVERAGE	-0.0004***	-0.0004***	-0.0004***	-0.0004***	-0.0004***
	(-12.44)	(-12.44)	(-12.20)	(-12.29)	(-12.35)
ROA	-0.0007***	-0.0007***	-0.0007***	-0.0007***	-0.0007***
	(-6.01)	(-6.11)	(-6.11)	(-6.12)	(-6.06)
FIRMAGE	-0.0082***	-0.0084***	-0.0074***	-0.0073***	-0.0078***
	(-4.78)	(-4.88)	(-4.32)	(-4.26)	(-4.55)
PINDEPENDENT	0.0185**	0.0177*	0.0204**	0.0196**	0.0178*
	(2.00)	(1.91)	(2.19)	(2.12)	(1.92)
TOP1	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***
	(-6.17)	(-5.92)	(-5.94)	(-5.98)	(-6.02)
COMP	0.0129***	0.0128***	0.0137***	0.0133***	0.0130***
	(12.16)	(12.01)	(12.96)	(12.52)	(12.23)
DUAL	0.0032***	0.0032***	0.0029**	0.0030***	0.0031***
	(2.82)	(2.77)	(2.52)	(2.58)	(2.68)
Observations	5,453	5,453	5,453	5,453	5,453
Adj R2	0.1068	0.1061	0.1021	0.104	0.1053

Panel B: Regression analysis of board network centrality on firm excess management expenses: independent vs. inside directors

	Independent directors					Inside directors				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
INTERCEPT	-0.0495***	-0.0495***	-0.0553***	-0.0521***	-0.0513***	-0.0259	-0.0264	-0.0387**	-0.0358**	-0.0252
	(-3.06)	(-3.07)	(-3.44)	(-3.23)	(-3.18)	(-1.54)	(-1.59)	(-2.37)	(-2.19)	(-1.52)
Percentile_Degree	0.0001***					0.0002***				
	(3.14)					(5.86)				
Percentile_Closeness		0.0001***					0.0002***			
		(3.35)					(6.61)			
Percentile_Betweenness			0.00003					0.0002***		
			(1.11)					(5.35)		
Percentile_Eigenvector				0.00005**					0.0001***	
				(2.12)					(5.60)	
Percentile_All					0.0001***					0.0002***
					(2.69)					(6.67)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,453	5,453	5,453	5,453	5,453	5,453	5,453	5,453	5,453	5,453
Adj R2	0.0987	0.0989	0.0973	0.0978	0.0983	0.1027	0.1042	0.1018	0.1022	0.1044

Panel C: Tests for the coefficient difference between independent and inside directors

	Percentile_All	Percentile_Degree	Percentile_Closeness	Percentile_Betweenness	Percentile_Eigenvector
Difference between coefficients on independent and inside directors	0.00010	0.00013	0.00013	0.00007	0.00014
p-value based on Chi square	0.0030***	0.0000***	0.0026***	0.0067***	0.0001***

Panel D: Regression analysis of board network centrality on firm excess management expenses: SOEs vs. non-SOEs

	SOEs subsample					non-SOEs subsample				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
INTERCEPT	0.0600**	0.0580**	0.0287	0.0345	0.0486*	-0.0707***	-0.0727***	-0.0803***	-0.0787***	-0.0739***
	(2.04)	(1.97)	(1.00)	(1.20)	(1.66)	(-3.47	(-3.56)	(-3.98)	(-3.90)	(-3.64)
Percentile_Degree	0.0002***					0.0001***				
	(4.78)					(3.65)				
Percentile_Closeness		0.0002***					0.0001***			
		(4.55)					(3.16)			
Percentile_Betweenness			0.0001*					0.00004*		
			(1.73)					(1.93)		
Percentile_Eigenvector				0.0001***					0.0001***	
				(3.13)					(2.66)	
Percentile_All					0.0002***					0.0001***

					(3.96)					(3.14)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,693	1,693	1,693	1,693	1,693	3,760	3,760	3,760	3,760	3,760
Adj R2	0.0692	0.0681	0.0583	0.0621	0.0653	0.1306	0.1298	0.1284	0.1292	0.1298

Panel E: Tests for the coefficient difference between SOEs and non-SOEs directors' subsample

	Percentile_All	Percentile_Degree	Percentile_Closeness	Percentile_Betweenness	Percentile_Eigenvector
Difference between coefficients on all directors of SOE and of non-SOE	0.00008	0.00010	0.00009	0.00002	0.00005
p-value based on Chi square	0.0881*	0.0234**	0.0366**	0.7134	0.2321

Table 7: IV regression results

This table reports two-stage least squares regression with IV test result. Panel A shows first stage regression result, with IV of YEAR_STATIONT, the number of years before the M&A announcement year an acquiring firm's headquarters has had access to a high-speed railway station. Panel B reports second-stage results where we regress CAR(0,+5) on the fitted value of centrality measures obtained from Panel A. All regression results are controlled for industry and year fixed effect. *t*-values are reported in the parentheses. *, ** and *** represent the significance level of 10%, 5%, and 1%, respectively.

Panel A: First stage regression

	Dependent variables				
	(1)	(2)	(3)	(4)	(5)
	Percentile_Degree	Percentile_Closeness	Percentile_Betweenness	Percentile_Eigenvector	Percentile_All
INTERCEPT	24.3485***	11.6003***	24.0252***	21.5866***	20.3902***
	(6.39)	(3.05)	(6.14)	(5.44)	(5.92)
YEAR_STATIONS	1.5556***	2.1370***	0.8153***	2.0572***	1.6413***
	(7.79)	(10.72)	(3.97)	(9.89)	(9.09)
POLITICSINDEX	8.3113***	7.6856***	7.6232***	6.2927***	7.4782***
	(22.67)	(21.02)	(20.24)	(16.48)	(22.57)
RELSIZE	0.3641***	0.3171***	0.2682***	0.2289***	0.2946***
	(4.47)	(3.91)	(3.21)	(2.7)	(4.01)
CASH	-1.3439	-0.916	-1.0385	-1.6714*	-1.2424
	(-1.44)	(-0.98)	(-1.08)	(-1.72)	(-1.47)
CONTROLCHG	-0.9530	-1.1210	-0.2803	-0.7414	-0.7739
	(-1.26)	(-1.49)	(-0.36)	(-0.94)	(-1.13)
HIGHTECH	0.6403	0.0523	-0.2063	-2.1609*	-0.4186
	(0.57)	(0.05)	(-0.18)	(-1.83)	(-0.41)
PUBLIC	2.6420	1.9795	2.9645	4.0572**	2.9108
	(1.35)	(1.01)	(1.47)	(1.99)	(1.64)
ROA	-0.4540***	-0.4188***	-0.2001**	-0.2424***	-0.3288***
	(-5.6)	(-5.18)	(-2.4)	(-2.87)	(-4.49)
SIZE	7.5960***	8.3119***	4.1098***	5.1687***	6.2966***
	(17.15)	(18.82)	(9.03)	(11.2)	(15.73)
LEVERAGE	0.0219***	0.0363***	0.0074	0.0028	0.0171**
	(2.71)	(4.5)	(0.89)	(0.33)	(2.34)
TOBINQ	-0.3965***	-0.3707***	-0.3000***	-0.2450***	-0.3281***
	(-4.97)	(-4.66)	(-3.66)	(-2.95)	(-4.55)
FREECASH	2.3204***	2.3101***	1.7188***	0.9777*	1.8317***
	(4.38)	(4.37)	(3.16)	(1.77)	(3.82)
PFEMALE	-14.9376***	-19.5564***	-9.3521***	-11.7490***	-13.8988***
	(-4.78)	(-6.27)	(-2.91)	(-3.61)	(-4.92)
BOARDSIZE	-0.4804***	-0.1422	-0.3273***	0.1658	-0.1960**
	(-4.38)	(-1.3)	(-2.91)	(1.45)	(-1.98)
PINDEPENDENT	19.7886***	31.5558***	41.7408***	29.4919***	30.6443***
	(4.02)	(6.42)	(8.25)	(5.75)	(6.88)
N	5,453	5,453	5,453	5,453	5,453
Prob>chi2	0.2097	0.2306	0.1351	0.1414	0.2077

Panel B: Second-stage Regression

	Dependent variable: CAR (0, +5)				
	(1)	(2)	(3)	(4)	(5)
INTERCEPT	10.1926***	9.6519***	10.2290***	8.8963***	9.8742***
	(8.35)	(8.67)	(7.75)	(7.59)	(8.25)

Predicted Percentile_Degree	-0.0789***				
	(-2.68)				
Predicted Percentile_Closeness		-0.0810***			
		(-3.26)			
Predicted Percentile_Betweenness			-0.0958**		
			(-2.09)		
Predicted Percentile_Eigenvector				-0.0171	
				(-0.61)	
Predicted Percentile_All					-0.0754**
					(-2.34)
POLITICSINDEX	0.3706	0.3559	0.4286	-0.2002	0.2755
	(1.25)	(1.41)	(1.12)	(-0.85)	(0.94)
RELSIZE	-0.0036	-0.0043	-0.0118	-0.0334	-0.0124
	(-0.10)	(-0.13)	(-0.34)	(-1.00)	(-0.36)
CASH	-7.4295***	-7.3920***	-7.4204***	-7.3046***	-7.4055***
	(-19.49)	(-19.54)	(-19.35)	(-19.16)	(-19.43)
CONTROLCHG	1.7699***	1.7667***	1.7991***	1.8308***	1.7856***
	(5.71)	(5.71)	(5.81)	(5.91)	(5.76)
HIGHTECH	0.204	0.1839	0.155	0.1417	0.1782
	(0.65)	(0.59)	(0.5)	(0.45)	(0.57)
PUBLIC	-0.6642	-0.6938	-0.6216	-1.0068	-0.7029
	(-0.84)	(-0.89)	(-0.77)	(-1.28)	(-0.89)
ROA	-0.1635***	-0.1567***	-0.1495***	-0.1444***	-0.1538***
	(-4.99)	(-4.88)	(-4.67)	(-4.52)	(-4.77)
SIZE	0.6137**	0.6601***	0.4100*	0.1692	0.4982**
	(2.44)	(2.8)	(1.87)	(0.83)	(2.12)
LEVERAGE	-0.0016	-0.0004	-0.0028	-0.0035	-0.0022
	(-0.47)	(-0.1)	(-0.85)	(-1.06)	(-0.65)
TOBINQ	-0.0003	-0.0016	0.0075	0.0319	0.0085
	(-0.01)	(-0.05)	(0.22)	(0.97)	(0.25)
FREECASH	-0.1631	-0.1488	-0.204	-0.3486	-0.2181
	(-0.71)	(-0.66)	(-0.89)	(-1.6)	(-0.97)
PFEMALE	-0.9144	-1.3339	-0.5565	0.2269	-0.7358
	(-0.67)	(-0.96)	(-0.41)	(0.17)	(-0.54)
BOARDSIZE	-0.0943**	-0.0703	-0.0886*	-0.0523	-0.0723
	(-1.99)	(-1.55)	(-1.85)	(-1.16)	(-1.58)
PINDEPENDENT	2.5772	3.3881	5.2174*	1.7398	3.4038
	(1.25)	(1.61)	(1.89)	(0.8)	(1.54)
N	5,453	5,453	5,453	5,453	5,453
Adj R2	0.0924	0.0930	0.0920	0.0913	0.0922