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Board of director compensation in China: It pays to be connected☆

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ABSTRACT

We investigate the influence of board of director networks (network prominence) on the career outcomes of directors of Chinese public firms from 2005 to 2014. We find that higher network prominence leads to increased compensation for independent and executive directors. Network prominence increases turnover for independent directors, which facilitates access to better external opportunities, whereas network prominence reduces turnover for directors with positions in controlling firms, which protects these related directors from dismissal. Network prominence also leads to additional future directorships, but for non-independent non-executive directors, this effect only holds for related directors who hold positions in controlling firms. These findings are consistent with related directors acting in the interest of the controlling firm. Overall, higher network prominence both directly leads to higher compensation and indirectly leads to higher compensation through the channels of labor mobility and additional board seats.

1. Introduction

Boards of different firms are connected through common board members. These board connections form director networks. Director networks facilitate information transfer among boards, leading well-connected directors to be more informed. Through superior information, a well-connected director may serve as a better adviser or a more efficient monitor.[1] In addition, board connections of directors may reflect the managerial talent and past success that signal director quality (Fama and Jensen (1983); Renneboog and Zhao (2011); Intintoli et al. (2018)). Indeed, recent literature reflects these advantages by illustrating how highly connected individuals fare better in their careers. For example, Ferris et al. (2016) find that U.S. firms increase the compensation of directors with network connections. Renneboog and Zhao (2018) find that in the U.K. director networks provide directors with access to labor market information. As a result, well-connected directors are more likely to leave their current position for another firm.

Although director networks have received academic attention, most studies focus on directors from western boards. There is limited research on the role of board networks in the development of a director's career in China, where the ownership structure and

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[1] For example, Cai and Sevilir (2012) find that in the U.S. well-connected directors benefit firms in M&A transactions by providing private information about target firms. This information advantage allows acquiring firms to pay lower takeover premiums. Intintoli et al. (2018) find that the presence of well-connected independent directors improves financial reporting quality in U.S. firms.

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governance issues differ from those in the U.S. and U.K. (Jiang and Kim (2015)). This study examines how director networks affect director career outcomes in China. Our study addresses the following questions. How do board networks influence director compensation? How do director networks influence a director's job mobility? Are directors rewarded with additional future directorships for their network connections? We are interested in how the answers to these questions differ between Chinese and Western boards.

We answer these questions by studying the unique structure of board memberships in China. Because board networks may have different effects on career outcomes for each type of director, we separate the board members into independent directors, executive directors and non-independent non-executive directors.[2] In addition, we categorize non-independent directors into related directors and non-related directors based on whether a non-independent director holds a position in the controlling firms.[3] This classification isolates the effects of board networks on career outcomes between related directors and non-related directors. In our sample, 54.8% of non-executive non-independent directors are related directors. Related directors represent a institutional feature missing in the current social network literature about China.

To examine the influence of board networks on director career outcomes, our study requires measures of director connections. We borrow these measures from graph theory.[4] In graph theory, centrality measures the relative importance of each agent in a network. Since centrality measures are highly correlated, in our main results, we adopt eigenvector centrality to measure the influence of a director in a board network. Eigenvector centrality measures both the number of agent connections and the number of connections of an agent's connections. Following Koka and Prescott (2008), we name eigenvector centrality *network prominence*.

We first explore the influence of director networks on directorship level compensation. Following Chen and Keefe (2018), our compensation measures include both the propensity of a director to be paid in a firm and the level of compensation that a director receives from a firm in a given year. We find that independent and executive directors with higher network prominence receive higher compensation. Our findings regarding independent director compensation are consistent with the literature suggesting that board connections are positively priced in board compensation due to connections increasing director value.(Intintoli et al. (2018)). In addition, our results on executive director compensation are consistent with the literature suggesting that the information advantage gained through director networks grants executives managerial power, which helps executives increase their pay in compensation negotiation in China (Hallock (1997); Renneboog and Zhao (2011)).

We then examine whether director turnover increases with director network prominence. We find that well-connected board members experience more turnover. Our results are consistent with the literature arguing that director networks provide directors with information about better external directorship opportunities, leading to an increase in turnover (Renneboog and Zhao (2018)). In contrast, we find related directors experience less turnover than non-related directors.[5] The above results are consistent with the literature suggesting that in the U.S. and U.K. board connections grant non-independent directors managerial power which shields them from dismissal, leading more connected directors to have less turnover (Renneboog and Zhao (2011); Intintoli et al. (2018)). Overall, our study suggests a mixed effect of board networks on director job mobility. That is, board connections increase turnover for non-related directors to facilitate their access to better external opportunities, whereas board connections reduce turnover to protect related directors from dismissal. This finding is novel to the Chinese institutional setting.

We also investigate whether network prominence leads to directors obtaining future directorships. We find that well-connected directors receive more future directorships than less connected directors. This finding is consistent with the literature that well-connected directors are rewarded with additional directorships due to better advising, monitoring, or superior information about the labor market (Larcker and Tayan (2010); Cai and Sevilir (2012); Renneboog and Zhao (2014); Larcker et al. (2013); Fama and Jensen (1983); Ferris et al. (2003); Renneboog and Zhao (2018)). In addition, we find that related non-independent non-executive directors (holding positions in controlling firms) gain more future directorships than other non-independent non-executive directors (not holding positions in controlling firms). This effect is stronger when these related directors have more board connections. Overall, we find that network prominence rewards directors with more future directorships. However, for non-independent non-executive directors, network prominence only leads to more future board seats for directors who hold positions in controlling firms (related directors).

In addition to the direct effect of network prominence on compensation, network prominence may directly indirectly affect total director compensation through two channels. First, well connected independent directors may receive higher total compensation by navigating from lower-paid directorships to higher-paid directorships (director turnover channel). Second, well-connected independent directors receive higher total compensation by holding more board seats. We find support for both channels.

This paper is broadly related to literature that uses Chinese institutional differences to test financial outcomes. Chen et al. (2019) test the value of academic directors using Regulation 11, which prohibited academic board appointments. Hu et al. (2020) test financial outcomes due to the force resignation of political independent directors. Liu et al. (2015) find that family controlled firms tend to tunnel cash. Li and Cheng (2020) investigate the effect of sudden deaths of political directors on financing and government subsidies. Chen and Keefe (2020) show that firms with rookie independent directors tunnel less to controlling firms. In this paper, we find markedly different effects of social networks on independent versus related directors. Overall, our findings regarding the effect of social networks on independent directors is consistent with the prior literature using Western Boards whereas our findings regarding related directors is novel.

[2] See Section 3.1 for classification.

[3] See Appendix A for the definition of related directors.

[4] Graph theory is a mathematical discipline. It has been widely used to model network in economics.

[5] We define related directors as those who hold positions in controlling firms. See Appendix A for all variable definitions.

The remainder of the paper is organized as follows. Section 2 discusses relevant literature and develops the hypothesis. Section 3 presents sample and variables construction. Section 4 reviews the empirical testing approach and reports the main empirical results. Section 5 conducts robustness tests and tests how prominence influences the labor mobility and number of directorships for related directors. Section 6 concludes the paper.

2. Literature and hypothesis development

Prior literature suggests that well-connected directors improve firm decision making through access to superior information (Larcker and Tayan (2010); Renneboog and Zhao (2011)). For example, Cai and Sevilir (2012) show how director connections benefit acquiring firms in M&A transactions in the U.S.. They find that board connections to target firms provide the acquirers with private information about target firms. This information advantage deters competition from less-informed outside bidders (winner's curse) and allows acquirers to have greater bargaining power in merger negotiation. As a result, well-connected acquirers pay lower takeover premiums. Moreover, Renneboog and Zhao (2014) demonstrate that director networks facilitate takeover activity among firms in the U.K.. They observe that better networked firms are more active bidders in the takeover market and that board connections through interlocking directorships lead to higher takeover transaction success rates and shorter negotiation periods. Superior information gained through board connections may improve monitoring. For instance, Intintoli et al. (2018) find evidence that board connections of independent, elected audit committee members improve financial reporting quality in U.S. firms. Consistent with potential benefits from board connections, Larcker et al. (2013) demonstrate that in the U.S. well-connected firms are more profitable and have higher abnormal returns. If board connections benefit firms' decision making and corporate governance, firms will seek to hire well-connected directors, which leads to increased demand and higher director compensation. Furthermore, the relative position of a director in the network may reflect managerial talent and past success, which are signals of director quality (Fama and Jensen (1983); Renneboog and Zhao (2011); Intintoli et al. (2018)). This leads to a director with network power holding a strong position in compensation negotiation. Consistent with the idea connected directors are a scarce and valuable resource, Hallock (1997) finds that in the U.S. CEOs reciprocally interlocked through directorships earn significantly higher compensation. Renneboog and Zhao (2011) find that in the U.K. well-connected CEOs earn higher compensation. Although not tested in China, the prior literature suggests that in China director compensation increases with director network power. Therefore, our hypothesis is:

H1. Directors with higher network prominence are more likely to be paid and receive higher compensation, ceteris paribus.

Renneboog and Zhao (2011) argue that a director network grants directors managerial power, which shields them from dismissal, predicting that better-connected directors have less turnover. Consistent with this view, Intintoli et al. (2018) find that, following misconduct, highly connected audit committee members are less likely to experience turnover than less- connected audit committee members. In contrast, an information advantage gained through director networks may provide new employment opportunities to directors. Thus, director networks might facilitate a director's departure from the current position to an outside option. Consistent with this view, Renneboog and Zhao (2018) find that better-connected directors experience higher turnover in the U.K.. Following Renneboog and Zhao (2018), we construct the hypothesis:

H2. Directors with higher network prominence have higher labor mobility (measured by turnover), ceteris paribus.

A well-connected director may receive more compensation if the labor mobility is from a lower-paid to a higher-paid directorship. This leads to our next hypothesis:

H2B. Labour mobility of directors with high network prominence leads to higher total compensation, ceteris paribus.

Prior literature suggest that board connections improve firms' decision making and corporate governance (Larcker and Tayan (2010); Renneboog and Zhao (2011); Cai and Sevilir (2012); Renneboog and Zhao (2014); Intintoli et al. (2018); Larcker et al. (2013)). Fama and Jensen (1983) argue that director effort may be rewarded in the labor market with additional future directorships. Consistent with Fama and Jensen (1983), Ferris et al. (2003) find that directors acquire additional directorships after firm performance improvement. Likewise, Renneboog and Zhao (2018) suggest that director networks facilitate director access to labor market information. Thus, by accessing superior information in the labor market, a well-connected director is more likely to gain additional directorships. Thus, directors with high network prominence are more likely to gain additional directorships in the future, leading to the hypothesis:

H3A. Directors with high network prominence gain further board seats, ceteris paribus.

Additional directorships provide additional compensation and therefore increase the director total compensation in a given year. Therefore:

H3B. Additional board seats gained through network prominence leads to higher total com- pensation, ceteris paribus.

Fig. 1 demonstrates these hypotheses regarding network prominence and director com- pensation. H1 posits a direct effect of network prominence on directorship level compensation. H2 posits an indirect effect of network prominence on total compensation through labor mobility. H3 posits an indirect effect when network prominence leads to service on more boards, which leads to higher total compensation.

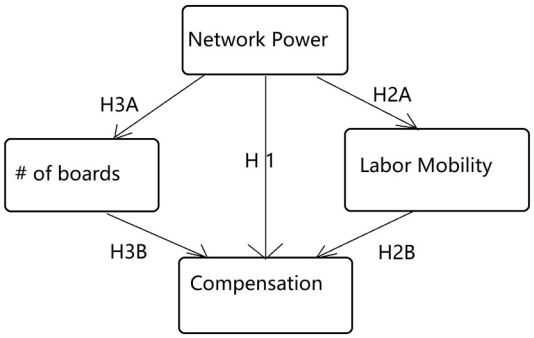


Fig. 1. Hypothesis of network power on director compensation.

3. Sample and variable construction

3.1. Sample

Our sample consists of all firms listed on the Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE) from 2005 to 2014. We start the sample from 2005 since directors' compensation information is not reported at the individual level until 2005.[6] We collect the director profile, board profile and firm's ownership structure and accounting data from CSMAR (the Chinese Listed Firms Research Series database).[7] We categorize our sample into independent directors and non-independent directors using the classification from the CSMAR database. In addition, we define executive directors as non-independent directors who hold executive positions in the firms and non-independent non-executive directors as non-independent directors who do not hold any executive positions in the firms. The director profile contains information on director compensation, turnover record, number of directorships and other director characteristics, such as the director's tenure, gender, age, political background, shareholding and relationship to the large shareholders. The board profile contains information on board size, duality, ratio of independent directors, CEO compensation and number of board meetings. To minimize the influence of outliers, we winsorize firms' accounting data at the top and bottom 0.5% percentiles.

Our final sample consists of 118,286 director-firm-year and 96,399 director-year observations. Out of 118,286 directors, 47,313 are independent directors and 70,973 are non-independent. Out of the 70,973 non-independent directors, 25,729 hold executive positions and 45,244 don't hold executive positions. In our sample, the number of firms ranges from 1,374 in 2005 to 2,652 in 2014. In the following sections, we construct all variables. Appendix A defines all variables.

3.2. Dependent variables

3.2.1. Directorship level compensation

We follow Chen and Keefe (2018) and measure the directorship level compensation by both the propensity to be paid and the level of compensation. To measure the propensity to be paid, we use the variable $Paid(0/1)_t$ as the dependent variable. A value of 1 is assigned if a director receives compensation from a firm in a given year and 0 otherwise. Table 4 shows that 94.8% of independent directors, 98.2% of executive directors and 46% of non-independent non-executive directors are paid. To measure the level of compensation, we use the variable $Ln(Comp+1)_t$ as the dependent variable. $Ln(Comp+1)_t$ is the natural logarithm of compensation that a director receives from a firm in a given year. Table 4 shows that the average annual compensation is 61,277 CNY (equivalent to 9,011 USD with the exchange rate of 6.8 CNY/USD) for an independent director, 530,525 CNY (equivalent to 78,018 USD with the exchange rate of 6.8 CNY/USD) for an executive director and 174,061 CNY (equivalent to 25,597 USD with the exchange rate of 6.8 CNY/USD) for a non-independent non-executive director.

3.2.2. Total director compensation

We measure the total director compensation by $Ln(Total\ comp\ +\ 1)_t$, which is the natural logarithm of the aggregated compensation that a director collects from all firms that he or she serves in a given year. Table 4 shows that the average total compensation is 64,979 CNY (equivalent to 9,556 USD with the exchange rate of 6.8 CNY/USD) for an independent director, 535,700 CNY (equivalent to 78,779 USD with the exchange rate of 6.8 CNY/USD) for an executive director and 175,856 CNY (equivalent to 25,861 USD with the exchange rate of 6.8 CNY/USD) for a non-independent non executive director. As expected, the total

[6] Chen and Keefe (2018) suggest that the improved reporting is a result of the regulation by the China Securities Regulatory Commission, which requires all listed firms to report compensation for each board of director beginning in 2005.

[7] The CSMAR database is widely regarded as the most comprehensive and authoritative database to study corporate finance and corporate governance in Chinese listed firms. According to a report issued by ShenZhen GTA, the CSMAR database has been used in papers published in a dozen leading international journals including *Journal of Finance*, *Journal of Financial Economics*, *Journal of Financial and Quantitative Analysis* and *Review of Financial Studies*.

compensation is higher than the directorship level compensation for independent directors. However, the difference between total compensation and directorship level compensation for executive directors and non-independent non-executive directors is small.[8]

3.2.3. Director turnover

Following David (2005), we measure director turnover by $Turnover(0/1)_t$, which is set to 1 for an observation in the year t if a director does not appear in the annual report in the year $t+1$ and 0 otherwise. We exclude observations from delisted firms. We also exclude observations from directors leaving the board in year 6 or year 7 since there is term limit regulation in China. Table 4 shows that 15.3% of independent, 7% of executive and 14.6% of non-independent non-executive directors in the year t leave their boards in the year $t+1$.

3.2.4. Directors' future directorship

To measure directors' ability to gain future directorships, we use the variable $Directorship_{t+1}$ as the dependent variable. $Directorship_{t+1}$ measures the number of directorships a director holds in the year t+1. To avoid double counting $Directorship_{t+1}$ for directors with multiple directorships, we collapse director-firm-year observations into director-year observations. We report the summary statistics of $Directorship_{t+1}$ in Table 4. On average, an independent director holds 1.53 directorships, an executive director holds 1.02 directorships and a non-independent non-executive director holds 1.11 directorships. In our sample, multiple directorships are common only for independent directors.

3.3. Network prominence measure

Social actors (such as individuals or organizations) often form ties to other social actors through personal and business associations. In the current work we focus on the implicit ties formed when two individuals sit on the same board of directors (Jackson, 2010). The sum total of these ties form the network shown in Fig. 2, which provides snapshots of the independent director network in China from 2005 to 2014. In 2005, firms in the central part of the network are well-connected. However, firms in the periphery of the network are isolated from the network center. The independent director network in China becomes very connected by 2014, where almost all firms are connected through the independent director network. Fig. 3 shows a similar evolution in the non-independent director network in China. In 2005, most firms are isolated from each other in the non-independent director network. By 2014, most firms are connected to each other in the central part of the network, but some firms in the periphery of the network are still isolated.

Table 1 reports pairwise correlations for the network centrality measures of betweeness, degree, and eigenvector. The table reports correlations constructed using the entire sample (denoted as overall), the independent director sample, and non-independent sample. Within each sample, the three measures are highly correlated. For example, in the overall sample the correlation coefficients between the three measures are 0.79 (Betweeness and Degree), 0.63 (Betweeness and Eigenvector), and 0.74 (Degree and Eigenvector). Also, the overall and independent subsample centrality measures tend to be highly correlated. For example, the correlation coefficients between the Eigenvector measures are 0.60 (Independent and Overall) and 0.52 (Non-independent and Overall). However, the correlations between the non-independent sample and other samples are low. For example, the correlation coefficient between the Eigenvector measure is -0.03 (Non-independent and Independent).

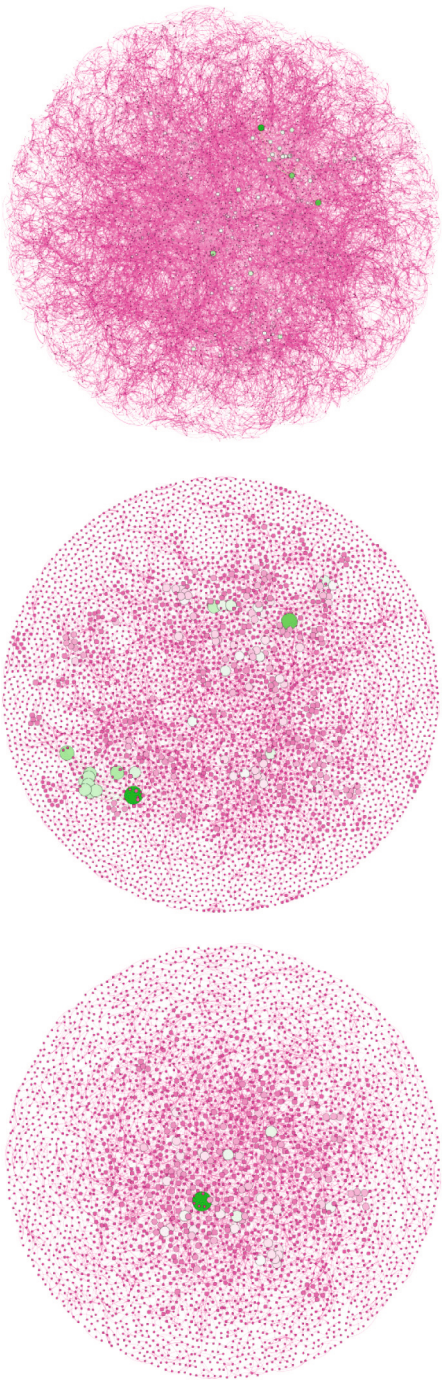
In networks of this type, researchers are often interested in how an individual's position affects outcomes of importance like performance (Shmargad and Watts, 2016). In the current work, we focus on measures of centrality and eigenvector centrality in particular given the measure's association with influence (Koka and Prescott, 2008; Watts and Koput, 2019)). To calculate such a measure, we construct an adjacency matrix comprised of 1s and 0s where a value of 1 indicates a tie between individuals. A transformation of an eigenvector of this matrix provides a measure of centrality for each individual that emphasizes both the number of ties and the importance of those ties. Those with high eigenvector centrality occupy a prominent position in the network by virtue of the number of associations and the importance of those they associate with. Following the research of Koka and Prescott (2008), Watts and Koput (2019) and others, we thus define $Prominence_t$ as equal to the eigenvector centrality of a director in the year t.[9] In our main tests, we use *Prominencet* for the entire network. In robustness tests, we use the centrality measure for either the independent or non-independent networks.

In Table 2, we tabulate a list of directors with the highest eigenvector centrality each year in our sample. Consistent with the fact that independent directors are generally more well-connected, seven of the ten most prominent directors are independent directors. Unsurprisingly, all these directors reside in Shanghai or Beijing, where most of the listed firms are located. Most of the directors in the list are academics from prestigious institutions in China. This finding is consistent with the frequency of academic directors in the Chinese independent directorship market. In addition, we find that network power coincides with both economic and political power. For example, in 2008 and 2009, the most prominent director LU Zhiqiang is a billionaire in China. In 2012 and 2013, the most prominent director ZHOU Qinye is the former vice president of Shanghai Stock Exchange.

To provide intuition about $Prominence_t$, Table 3 provides examples of independent directors in Panel A and non-independent

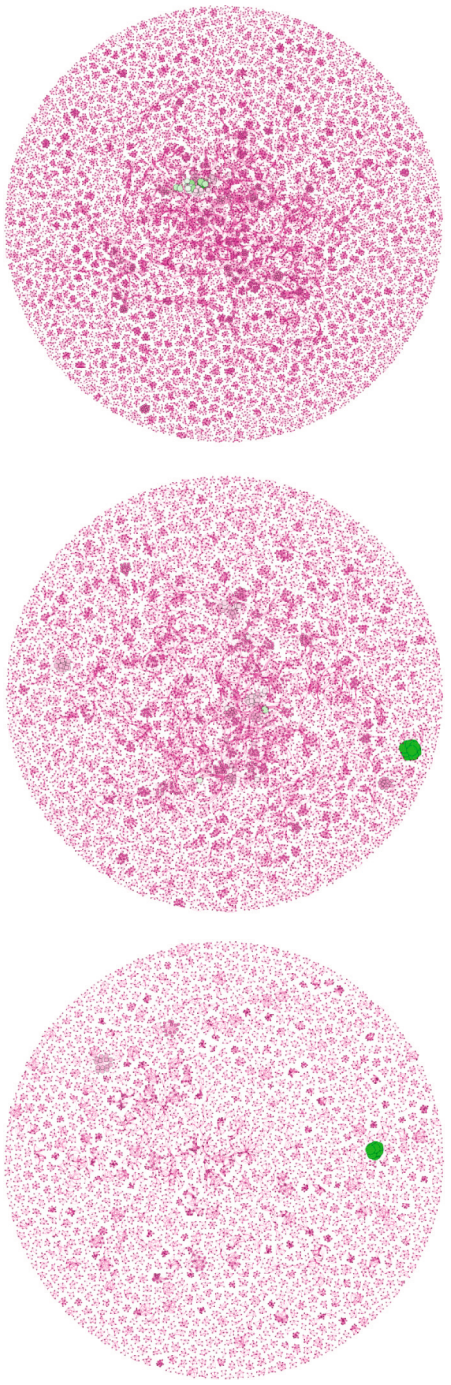
[8] This result is not surprising since in China multiple directorships are uncommon for executive directors and non-independent non-executive directors. In our sample, the average directorships that an executive and a non-independent non-executive director holds is 1.02 and 1.11 respectively.

[9] Other centrality measures like betweenness and degree centrality were also tested and the results are qualitatively the same. Eigenvector centrality was chosen for its theoretical relevance.



(a) Independent director network at 2005 (b) Independent director network at 2009 (c) Independent director network at 2014

Fig. 2. Independent director network from 2005 to 2014.



(a) Non-independent director network at 2005 (b) Non-independent director network at 2009 (c) Non-independent director network at 2014

Fig. 3. Non-independent director network from 2005 to 2014.

Table 1
Network centrality correlations.

This table provides pairwise correlations for betweeness, degree, and eigenvector network centrality measures. The table reports correlations constructed using the entire sample (denoted as overall), the independent director sample, and non-independent sample.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Betweeness Overall	1								
(2) Degree Overall	0.79	1							
(3) Eigenvector Overall	0.63	0.74	1						
(4) Betweeness Independent	0.71	0.6	0.44	1					
(5) Degree Independent	0.68	0.79	0.56	0.75	1				
(6) Eigenvector Independent	0.53	0.53	0.60	0.63	0.74	1			
(7) Betweeness Non-Independent	0.15	0.20	0.31	−0.05	−0.06	−0.03	1		
(8) Degree Non-Independent	0.32	0.52	0.52	−0.06	0	0	0.44	1	
(9) Eigenvector Non-Independent	0.07	0.17	0.52	−0.06	−0.06	−0.03	0.36	0.48	1

Table 2
Board of directors with most network prominence each year.

This table reports the names, number of directorships, network prominence and profile for the board of directors with most network prominence each year from 2005 to 2014.

Year	Director Name	Number Directorships	Network Prominence	Director Type	Director Profile
2005	WANG Fanghua	6	12.9	Independent	WANG Fanghua is the professor in marketing at Antai School of Finance and Economics, Shanghai Jiaotong University.
2006	LI Yang	5	9.6	Independent	LI Yang is the director of the Financial Research Institution, Chinese Academy of Social Sciences.
2007	ZHANG Jianwei	4	11.4	Non-independent	ZHANG Jianwei is the vice president of the Shanghai Jiushi Group, which is the shareholder of all listed firms where he sits at.
2008	LU Zhiqiang	3	9.7	Non-independent	LU Zhiqiang is a billionaire in China. At 2009, he is ranked the fifth richest person in China by Rupert Hoogewerf. He is the shareholder of all these three firms.
2009	LU Zhiqiang	3	12.9	Non-independent	LU Zhiqiang is a billionaire in China. At 2009, he is ranked the fifth richest person in China by Rupert Hoogewerf. He is the shareholder of all these three firms.
2010	GAO Peiyong	3	8.7	Independent	GAO Peiyong is the director of the National Academy of Economic Strategy, Chinese Academy of Social Sciences.
2011	WU Xiaoqiu	6	17.5	Independent	WU Xiaoqiu is a professor at the School of Finance, Renming University.
2012	ZHOU Qinye	6	8.0	Independent	ZHOU Qinye served as the vice president of the Shanghai Stock Exchange before 2012. Between 2011 and 2012, he served as the chief accountant of the Shanghai Stock Exchange.
2013	ZHOU Qinye	9	6.6	Independent	ZHOU Qinye served as the vice president of the Shanghai Stock Exchange before 2012. Between 2011 and 2012, he served as the chief accountant of the Shanghai Stock Exchange.
2014	LV Changjiang	7	7.2	Independent	LV Changjiang is the accounting professor at the School of Management, Fudan University

directors in Panel B. For each type of director the Table provides an example of directors with $Prominence_t$ at the mean and the mean plus and minus one standard deviation. Directors at the mean minus a standard deviation are in small networks (four connections) and are the most connected of the directors they connect with. These directors are relatively isolated and don't connect to other connected directors. Directors at the mean have more connections (seven and fifteen) and connect to a more important director with modest network prominence. Lastly, directors at the mean plus one standard deviation connect to connect to even more directors

Table 3
Director network prominence examples.

Panel A reports network prominence examples for independent directors. Panel B reports network prominence examples for non-independent directors. In each panel, the name, number of directorships, compensation and connections are reported for directors at the mean minus one standard deviation, the mean, and the mean plus one standard deviation.

	Mean-sd	Director Examples Mean	Mean + sd
Panel A: independent director			
Name	Tan Wen	Wang Zhexia	Sun Guangguo
Number of directorships	1	1	3
Total compensation(CNY)	16,000	40,000	161,000
Connected to important person?	In 2006, Mr. Tan Wen directly connects to *four* other directors. Among his connected directors, the most connected has a network prominence of 0.00047	In 2005, Mrs. Wang Zhexia directly connects to *seven* other directors. Among her connected directors, the most connected person is Mr. Chai Qiang, who has network prominence of 2.9. The highest network prominence value in 2005 is 12.9.	In 2014, Mr. Sun Guangguo directly connects to *thirty* other directors. Mr Sun Guangguao shares the same board with Mr Liu Yongzhe, who has a network prominence equaling to 6.3. The highest network prominence value in 2014 is 7.2
Panel B: Non-independent director			
Name	Xie Guosheng	Teng Baixing	Yang Yihui
Number of directorships	1	2	2
Total compensation(CNY)	0	7500	0
Connected to important person?	In 2005, Mr. Xie Guosheng directly connects to *four* other directors. Among his connected directors, he is the most connected director and has a network prominence equal to 0.0001287	In 2009, Mrs. Teng Baixing is directly connected to *fifteen* directors. Among her connected directors, Mr Liu Xiaobing has the highest network prominence of 0.51. The highest network prominence value in 2009 is 12.9	In 2008, Mr. Yang Yihui directly connects to *twenty-four* other people. The most connected director is Mrs Yang Yihui herself, who has network prominence equal to 1.32. The highest network prominence value in 2008 is 9.7.

(thirty and twenty) as well as connect to a director with relatively high network prominence.

3.4. Control variables

When studying the director compensation at directorship level, we control for director, board and firm features. The director level control variables include $Woman(0/1)_t$, Age_t, Age_t^2, $Tenure_t$, $Busy\ director(0/1)_t$, $Political\ background(0/1)_t$, $CEO/COB(0/1)_t$, $Related\ director(0/1)_t$ and $Ln(Shareholding+1)_t$. The board level control variables consist of $Ln(Board\ size)_t$, $Duality(0/1)_t$, $Board\ composition\ (ind\%)_t$, $Number\ of\ meetings_t$ and $Ln(CEO\ compensation)_t$.

The firm level controls include $State\text{-}owned(0/1)_t$, $Largest\ shareholder(\%)_t$, $Ln(Total\ Assets)_t$, $Book\ leverage(\%)_t$, $Cash\ holdings(\%)_t$, ROA_{t-1} and $Stock\ volatility_{t-1}$.

When investigating the total compensation at director level, we use a similar set of control variables from previous regressions on director compensation at directorship level. However, we merge all directorship level controls into director level controls since the dependent variable $Ln(Totalcomp+1)_t$ is aggregated at the director level.

In the regressions on director turnover, we use a similar set of control variables as previous regressions on director compensation. To model the effect of compensation on turnover, we include $Ln(comp+1)_t$ as a control variable. To study the director's ability to gain future directorships, we use the same set of control variables from previous regressions on director turnover since those factors affecting turnover are likely to influence future directorships as well. However, we use the average values of several director level variables and all board and firm level variables since we merge director-firm-year observations into director-year observations.

In Table 4, we report the summary statistics of control variables. In China, 14% of independent directors, 11.4% of executive directors and 10.1% of non-independent non-executive directors are female. In our sample, 29.4% of independent directors are busy directors and 41.6% of independent directors are politically connected. The average independent director is 53.5 years old and has 6.2 years of board experience. The average executive director is 47.5 years old and has 5.3 years of board experience. The average non-independent non-executive director is 50.5 years old and has 6 years of board experience. In our sample, 41.6% of in- dependent directors, 14.6% of executive directors and 23.2% of non-independent non-executive directors have political backgrounds. 18.9% of executive directors and 54.8% of non-independent non-executive directors hold another position in the controlling shareholders' firms.

Table 4
Summary statistics.

This table provides the summary statistics for all variables. Appendix A defines all variables. Panel A provides the summary statistics for independent directors. Panel B provides the summary statistics for executive directors. Panel C provides the summary statistics for non-independent non-executive directors. Panel D provides the summary statistics for board and firm characteristics in firm-year. All monetary terms are denominated in Chinese Yuan (CNY).

	Obs	Mean	SD	25th	Median	75th
Panel A. Independent director characteristics						
Paid$(0/1)_t$	45,687	0.947	0.224	1	1	1
Director compensation(*Thousands CNY*)$_t$	45,687	61.377	62.408	37	50	71.4
Total compensation(*Thousands CNY*)$_t$	29,721	64.742	110.889	38	50	70
Turnover$(0/1)_t$	41,055	0.139	0.346	0	0	0
Directorship$_{t+1}$	26,846	1.574	0.998	1	1	2
Prominence$_{t-1}$	45,687	0.729	0.951	0.157	0.396	0.942
Woman(0/1)$_t$	45,687	0.140	0.347	0	0	0
Busy director$(0/1)_t$	45,687	0.296	0.456	0	0	1
Tenure$_t$	45,687	6.200	3.297	3	6	8
Age$_t$	45,687	53.543	9.651	46	52	61
Political background$(0/1)_t$	45,687	0.417	0.493	0	0	1
Panel B. Executive director characteristics						
Paid$(0/1)_t$	24,700	0.981	0.135	1	1	1
Director compensation(*Thousands CNY*)$_t$	24,700	535.723	638.591	229.2	382.8	630
Total compensation(*Thousands CNY*)$_t$	22,335	530.372	625.314	221.8	380	628
Turnover$(0/1)_t$	22,655	0.066	0.248	0	0	0
Directorship$_{t+1}$	20,344	1.018	0.163	1	1	1
Prominence$_{t-1}$	24,700	0.334	0.411	0.110	0.219	0.402
Woman(0/1)$_t$	24,700	0.113	0.317	0	0	0
Tenure$_t$	24,700	5.448	3.270	3	4	7
Age$_t$	24,700	47.552	6.576	43	47	52
Political background$(0/1)_t$	24,700	0.144	0.352	0	0	0
Related director$(0/1)_t$	24,700	0.190	0.392	0	0	0
Share ownership(*Millions Shares*)$_t$	24,700	6.744	31.104	0	0	0.679
Panel C. Non-independent non-executive director characteristics						
Paid$(0/1)_t$	43,812	0.46	0.498	0	0	1
Director compensation(*Thousands CNY*)$_t$	43,812	175.481	482.363	0	0	178.7
Total compensation(*Thousands CNY*)$_t$	36,935	176.090	472.122	0	0	180
Turnover$(0/1)_t$	41,180	0.135	0.342	0	0	0
Directorship$_{t+1}$	33,326	1.120	0.431	1	1	1
Prominence$_{t-1}$	43,812	0.481	0.703	0.133	0.272	0.564
Woman(0/1)$_t$	43,812	0.101	0.301	0	0	0
Tenure$_t$	43,812	6.086	3.534	3	5	9
Age$_t$	43,812	50.55	7.799	45	50	56
Political background$(0/1)_t$	43,812	0.233	0.422	0	0	0
Related director$(0/1)_t$	43,812	0.553	0.497	0	1	1
Share ownership(*Millions Shares*)$_t$	43,812	4.298	32.477	0	0	0
Panel D. Board and firm characteristics						
Number of meetings$_t$	12,840	9.307	3.774	7	9	11
CEO compensation(*Thousands CNY*)$_t$	12,840	565.062	719.272	202.051	403.164	686.001
Board size$_t$	12,840	8.997	1.922	8	9	9
Duality$(0/1)_t$	12,840	0.211	0.408	0	0	0
Board composition(*ind%*)$_t$	12,840	0.369	0.054	0.333	0.333	0.4
State-owned$(0/1)_t$	12,840	0.480	0.5	0	0	1
Largest shareholder$(\%)_t$	12,840	0.357	0.155	0.233	0.337	0.468
Total assets(*Billions CNY*)$_t$	12,840	10.877	30.742	1.256	2.675	6.659
Book leverage$(\%)_t$	12,840	0.474	0.234	0.3	0.475	0.639
Cash holdings$(\%)_t$	12,840	0.175	0.309	0.067	0.123	0.227
ROA_t	12,840	0.036	0.060	0.012	0.033	0.063
Stock volatility$_t$	12,807	0.129	0.051	0.095	0.119	0.151

In China, the average board has 9 members and 36.9% of them are independent directors. In 23% of Chinese boards, the CEO and chairman are the same person. The average board meeting frequency is 9.2 per year. In our sample, 45.1% of firms are state-owned and the largest shareholder on average holds 35.9% of the shares of the listed firm. The average firm has total book assets of 10.3 billion CNY (equivalent to 1.51 billion USD with the exchange rate of 6.8 CNY/USD), book leverage of 46% and cash holding of 17.6%. On average, the ROA of Chinese listed firms is 3.9% and the annual stock volatility is 13.4%.

Table 5 provides a correlation matrix of key variables from regressions on director compensation. Panel A provides the pairwise correlation coefficients for independent directors. Panel B provides the pairwise correlation coefficient for executive directors. Panel C provides the pairwise correlation coefficient for non-independent non-executive directors. The correlation matrix denotes a positive

Table 5
Cross correlations of network prominence and board of director compensation.

This table provides the correlation matrix of key variables from regressions on directors' compensation. Panel A reports the correlation matrix for independent director compensation. Panel B reports the correlation matrix for executive director compensation. Panel C reports the correlation matrix for non-independent non-executive director compensation. Appendix A provides all variable definitions. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Panel A: Independent director	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1)*Paid*$(0/1)_t$	1							
(2)*Director compensation*(*Thousands CNY*)$_t$	0.263**	1						
(3)*Prominence*$_{t-1}$	0.0064	0.147**	1					
(4)*Directorship*$_t$ (5)*Woman(0/1)*$_t$	0.0217**	0.041**	0.506**	1				
	−0.00735	−0.0251**	−0.072**	−0.0474**	1			
(6)*Age*$_t$	−0.00199	0.0985**	0.0446**	−0.00995*	−0.095**	1		
(7)*Tenure*$_t$	0.104**	0.0621**	0.0098	0.0615**	−0.0224**	0.137**	1	
(8)*Political background*$(0/1)_t$	0.0021	0.0494**	0.15**	0.193**	−0.0567**	0.253**	0.0494**	1

Panel B: Executive director	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1)*Paid*$(0/1)_t$	1										
(2)*Director compensation*(*Thousands CNY*)$_t$	0.107**	1									
(3)*Prominence*$_{t-1}$	−0.0271**	0.254**	1								
(4)*Directorshipt* (5)*Woman(0/1)*$_t$	−0.0353** 0.0192**	0.0484**	0.246**	1							
		−0.0234**	−0.0318**	−0.0164**	1						
(6)*Age*$_t$	−0.0077	0.125**	0.078**	0.0298**	−0.061**	1					
(7)*Tenure*$_t$	0.038**	0.097**	0.027**	0.078**	−0.033**	0.279**	1				
(8)*Political background*$(0/1)_t$	−0.0092	0.0802**	0.055**	0.0684**	−0.0215**	0.132**	0.0546**	1			
(9)*CEO/COB*$(0/1)_t$	0.0011	0.124**	0.004	0.0384**	−0.142**	0.129**	0.0962**	0.16**	1		
(10)*Related director*$(0/1)_t$	−0.085**	0.029**	0.013	0.0454**	−0.027**	0.082**	0.088**	0.089**	0.184**	1	
(11)*Ln*(*Shareholding* + 1)$_t$	0.088**	0.075**	−0.073**	−0.027**	0.0138*	0.0569**	−0.0037	0.065**	0.039**	−0.034**	1

Panel C: Non-executive director	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1)*Paid*$(0/1)_t$	1										
(2)*Director compensation*(*Thousands CNY*)$_t$	0.385**	1									
(3)*Prominence*$_{t-1}$	−0.086**	0.012*	1								
(4)*Directorship*$_t$ (5)*Woman(0/1)*$_t$	−0.096** 0.006	−0.055**	0.44**	1							
		−0.03**	−0.027**	−0.025**	1						
(6)*Age*$_t$	0.0366**	0.095**	0.056**	0.0202**	−0.111**	1					
(7)*Tenure*$_t$	0.086**	0.144**	−035	0.025**	−0.0413**	0.286**	1				
(8)*Political background*$(0/1)_t$	0.035**	0.086**	0.092**	0.118**	−0.048**	0.179**	0.049**	1			
(9)*CEO/COB*$(0/1)_t$	0.177**	0.259**	−0.043**	−0.024**	−0.093**	0.126**	0.146**	0.172**	1		
(10)*Related director*$(0/1)_t$	−0.289**	−0.112**	0.094**	0.061**	−0.0069	0.0028	0.052**	0.023**	0.076**	1	
(11)*Ln*(*Shareholding*+1)$_t$	0.261**	0.227**	−0.094**	−0.091**	0.017**	0.0999**	0.116**	0.048**	0.188**	−0.186**	1

correlation between network prominence and compensation for all kinds of directors. The correlations matrix shows high correlations between the number of directorships and network prominence. In particular, the correlation between $Prominence_t$ and $Directorship_{t+1}$ is 50.6%, 24.6%., and 44.0% for independent, executive, and non-executive directors, respectively. These high correlations suggest in our robustness tests where we control for the number of directorships finding statistical significance is challenging. Also, for all director types the correlations between $Prominence_t$ and both Age_t and $Political\ background(0/1)_t$ are positive whereas the correlation between $Prominence_t$ and $Woman(0/1)_t$ is negative.

4. Testing approach and results

4.1. Director network and directorship level compensation

In this section, we explore whether network prominence increases directorship level compensation. The regressions control for year, industry, number of directorships effects. The unit of observation is the director-firm-year. We estimate

$$Compensation_{i,f,t} = \alpha + \lambda Prominence_{i,f,t-1} + \mathbf{X}\beta + \delta_t + \delta_j + \delta_n + \varepsilon_{i,f,t} \quad (1)$$

where i denotes the director, f the firm, and t represents the year. The dependent variable is either $Paid(0/1)_t$ or $Ln(Comp+1)_t$. The variable of interest is $Prominence_{i,f,t-1}$. $\mathbf{X}$ is a matrix of control variables previously described in Section 3.4. δ_t, δ_j , and δ_n denote year, industry, and number of directorships effects, respectively. $E_{i,f,t}$ is the error term. To control for potential serial correlation, we use robust standard errors adjusted for firm-level clustering and heteroskedasticity.

Table 6 reports results of regressions investigating how network prominence affects directorship level compensation. We separate the sample of non-independent directors into executive director and non-executive director sub-samples. In Columns (1) and (2), we study the influence of network prominence on independent director compensation. In Columns (3) and (4), we investigate the influence of network prominence on non-independent executive director compensation. In Columns (5) and (6), we study the influence of network prominence on non-independent non-executive director compensation. In Columns (1), (3), and (5) the dependent variable is $Paid(0/1)_t$. In Columns (2), (4), and (6) the dependent variable is $Ln(Comp+1)$. In Table 6, the regressions include year, industry and number of directorships fixed effects.

In Column (1), the coefficient associated with $Prominence_{t-1}$ is positive and statistically significant at the less than 1% level in explaining the propensity to receive compensation for independent directors. In Column (2), the coefficient associated with $Prominence_{t-1}$ is positive and statistically significant at the less than 1% level in explaining the level of compensation. The above results support Hypothesis 1 that independent directors with higher network prominence are more likely to be paid and receive higher compensation. In Column (3), the coefficient associated with $Prominence_{t-1}$ is statistically no different than zero in explaining the propensity to receive compensation for an executive director. In Column (4), the coefficient associated with $Prominence_{t-1}$ is positive and statistically significant at the less than 1% level in explaining the level of compensation of executive directors. The above results suggest that Hypothesis 1 partly holds for executive directors. In Columns (5) and (6), the coefficients associated with $Prominence_{t-1}$ is statistically no different than zero in explaining the propensity to receive compensation and level of compensation for non-executive directors. These results suggest that the positive relationship between director network and compensation does not apply to non-executive directors.

Our evidence regarding the economic importance is mixed. First, we estimate the economic importance of $Prominence_{t-1}$ on being paid. Importantly, in our sample 95% of the independent directors are paid. Using the estimated LPM in Column (1) of Table 6, we find a one standard deviation increase in $Prominence_{t-1}$ only implies an increase of 0.76% in the probability of being paid. In untabulated results, we estimated a logistic model and due to the non-linearity of the model we estimate the effect at different levels of $Prominence_{t-1}$. Although the influence of $Prominence_{t-1}$ on the probability of being paid increases at lower levels, the effect is still modest. Second, we estimate the economic importance of $Prominence_{t-1}$ on the level of compensation. Using the estimated equation in Column (2) of Table 6, we find a one standard deviation increase in $Prominence_{t-1}$ implies a 13.57% increase in the natural log of 1 plus compensation or a 75% increase from mean independent director compensation of 61.37.[10] Overall, prominence is much more important in influencing the level of compensation than whether the independent director is paid.[11]

4.2. Director network and director turnover

In this section, we estimate linear probability models regarding the effects of network prominence on director turnover. The regressions control for year, industry, number of directorships effects. The unit of observation is a director-firm-year. Our estimation equation is:

$$Turnover_{i,f,t} = \alpha + \lambda Prominence_{i,f,t} + \mathbf{X}\beta + \delta_t + \delta_j + \delta_n + \varepsilon_{i,f,t} \quad (2)$$

where i represents the director, f the firm, t represents the year, j the industry, n the number of directorships, respectively. The

[10] At mean independent director compensation the $\ell n(61.37 + 1) = 4.133$. The implied increase is $4.133 * 1.1357 = 4.685$ or compensation of $exp(4.685) - 1 = 107.31$, which represents an approximate 75% increase in compensation from the mean.

[11] In robustness tests, we find our results in Column (4) of Table 6 are sensitive to the network in which the network measure is drawn. As a result, we don't estimate economic importance.

Table 6
Compensation through network prominence.

This table reports the coefficients associated with $Prominence_{t-1}$ in explaining director compensation. In columns (1), (3) and (6), the dependent variable is $Paid(0/1)_t$, a dummy variable that equals to 1 if a board of director receives zero compensation at year t and 0 otherwise. In columns (2), (4) and (6), the dependent variable is $Ln(Comp+1)_t$, the logarithm of compensation for a director in a firm at year t. Appendix A provides all variable definitions. The regressions control for year, industry, and number of directorships fixed effects. In parentheses are *t*-statistics based on standard errors adjusted for heteroskedasticity. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

		Independent director	Non-independent director			
			Executive director		Non-executive director	
	$Paid(0/1)_t$	$Ln(Comp+1)_t$	$Paid(0/1)_t$	$Ln(Comp+1)_t$	$Paid(0/1)_t$	$Ln(Comp+1)_t$
Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)
$Prominence_{t-1}$	0.763***	13.569***	−0.461	9.769**	−0.310	−3.754
	(5.72)	(8.78)	(−1.39)	(2.16)	(−0.82)	(−0.83)
$Woman(0/1)_t$	−0.003	−0.048	0.008***	0.057*	0.016**	0.143*
	(−0.95)	(−1.40)	(3.45)	(1.81)	(2.22)	(1.66)
Age_t	0.003***	0.049***	0	0.046**	−0.012***	−0.111***
	(2.63)	(3.59)	(0.25)	(2.48)	(−5.06)	(−3.87)
Age_t^2	−0***	−0***	−0	−0**	0***	0.001***
	(−3.13)	(−3.97)	(−0.64)	(−2.46)	(5.09)	(3.90)
$Tenure_t$	0.005***	0.045***	0.001**	0.016***	0.009***	0.123***
	(7.64)	(6.14)	(2.43)	(3.96)	(13.18)	(14.53)
$Busy\ director(0/1)_t$	−0.007	−0.080				
	(−0.58)	(−0.61)				
$Political\ background(0/1)_t$	−0.005**	−0.055**	−0.002	−0.009	0.012**	0.150**
	(−2.26)	(−2.23)	(−0.58)	(−0.27)	(2.26)	(2.43)
$CEO/COB(0/1)_t$			−0.007***	0.196***	0.218***	3.259***
			(−3.17)	(7.05)	(39.47)	(46.97)
$Related\ director(0/1)_t$			−0.021***	−0.204***	−0.242***	−3.010***
			(−7.90)	(−5.75)	(−52.16)	(−54.48)
$Ln(Shareholding+1)_t$			0.001***	0.016***	0.011***	0.159***
			(6.53)	(9.69)	(28.31)	(32.83)
$Ln(Board\ size)_t$	0.024***	0.337***	−0.001	−0.075	−0.006	−0.035
	(3.56)	(4.49)	(−0.10)	(−0.93)	(−0.48)	(−0.23)
$Duality(0/1)_t$	−0.003	−0.031	−0.012***	−0.132***	0.005	0.060
	(−0.95)	(−0.98)	(−5.36)	(−4.35)	(0.70)	(0.76)
$Board\ composition(ind\%)_t$	0.120***	1.906***	−0.034*	−0.499*	0.109**	1.473**
	(6.14)	(8.74)	(−1.74)	(−1.90)	(2.23)	(2.48)
$Number\ of\ meetings_t$	0	0.001	−0	0.005	0.004***	0.044***
	(0.14)	(0.32)	(−0.63)	(1.24)	(6.20)	(6.06)
$Ln(CEO\ compensation)_t$	0.002***	0.023***	0.011***	0.190***	0.004***	0.049***
	(5.63)	(7.56)	(15.08)	(19.45)	(7.69)	(8.83)
$State\text{-}owned(0/1)_t$	−0.008***	−0.191***	−0.007***	−0.123***	−0.125***	−1.575***
	(−3.23)	(−6.87)	(−3.40)	(−4.32)	(−23.68)	(−25.02)
$Largest\ shareholder(\%)_t$	0.026***	0.226***	0.010*	−0.142*	−0.216***	−2.541***
	(3.69)	(2.86)	(1.70)	(−1.71)	(−14.27)	(−14.13)
$Ln(total\ Assets)_t$	−0.005***	0.089***	−0.003**	0.206***	0.005**	0.185***
	(−5.16)	(7.67)	(−2.44)	(13.95)	(2.19)	(7.05)
$Book\ leverage(\%)_t$	0.013**	0.032	−0.013*	−0.370***	−0.015	−0.299**
	(2.15)	(0.49)	(−1.89)	(−4.09)	(−1.14)	(−2.01)
$Cash\ holdings(\%)_t$	0.008**	0.158***	−0.026***	−0.189*	−0.047**	−0.497*
	(2.23)	(3.10)	(−6.85)	(−1.89)	(−2.04)	(−1.84)
ROA_{t-1}	0.082***	1.172***	0.046*	2.889***	0.226***	3.284***
	(3.79)	(4.98)	(1.75)	(8.65)	(5.52)	(6.98)
$Stock\ volatility_{t-1}$	0.007**	0.089**	−0.009	−0.100	−0.034***	−0.414***
	(2.34)	(2.56)	(−1.38)	(−1.10)	(−3.67)	(−3.81)
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of directorships effects	Yes	Yes	Yes	Yes	Yes	Yes
$_R2$	0.013	0.020	0.085	0.175	0.204	0.241
Observations	45,687	45,687	24,700	24,700	43,812	43,812

dependent variable is $Turnover(0/1)_t$. The variable of interest is $Prominence_{i,f,t}$. **X** is a matrix of control variables previously described in Section 3.4. δ_t, δ_j , and δ_n denote year, industry, and number of directorships effects, respectively. $\varepsilon_{i,f,t}$ is the error term. To control for potential serial correlation, we use robust standard errors adjusted for firm-level clustering and heteroskedasticity.

Table 7
Labor mobility through network prominence.

This table reports the coefficients associated with *Prominence*$_t$ in explaining director turnover. The dependent variable is *Turnover*$(0/1)_t$, a dummy variable that equals to 1 for a director in year t if he or she does not appear in the annual report in year t + 1 and 0 otherwise. Appendix A provides all variable definitions. The regressions control for year, industry, and number of directorships fixed effects. In parentheses are *t*-statistics based on standard errors adjusted for heteroskedasticity. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Dependent variable = *Turnover*$(0/1)_t$

	Independent director	Non-independent director	
		Executive director	Non-executive director
Explanatory variables	(1)	(2)	(3)
Prominence$_t$	5.107***	5.688***	6.183***
	(16.39)	(8.69)	(14.09)
Woman(0/1)$_t$	−0.008*	−0.020***	0.003
	(−1.79)	(−3.84)	(0.59)
Age$_t$	−0.008***	−0.006**	0.002
	(−4.53)	(−2.41)	(1.01)
Age$_t^2$	0***	0***	−0
	(4.61)	(3.44)	(−0.12)
Tenure$_t$	0.063***	0.003***	0.009***
	(60.35)	(5.88)	(17.40)
Busy director$(0/1)_t$	−0.267***		
	(−8.84)		
Political background$(0/1)_t$	−0.007**	−0.004	−0.001
	(−2.18)	(−1.00)	(−0.30)
Ln$(comp + 1)_t$	−0.016***	−0.011***	−0.007***
	(−24.84)	(−9.04)	(−21.03)
Number of meetings$_t$	0.003***	0.001***	0.002***
	(7.49)	(2.93)	(5.39)
CEO/COB$(0/1)_t$		−0.078***	−0.101***
		(−23.78)	(−29.25)
Related director$(0/1)_t$		−0.031***	−0.189***
		(−8.88)	(−49.03)
Ln$(Shareholding + 1)_t$		−0.001***	−0.002***
		(−4.52)	(−7.90)
Ln$(Board\ size)_t$	−0.087***	−0.084***	−0.122***
	(−9.19)	(−7.25)	(−11.95)
Duality$(0/1)_t$	0.003	−0.021***	−0.016***
	(0.60)	(−5.46)	(−3.04)
Board composition$(ind\%)_t$	−0.171***	0.097***	0.190***
	(−5.69)	(2.64)	(5.00)
State-owned$(0/1)_t$	−0.025***	0.008**	0.029***
	(−6.89)	(2.06)	(7.28)
Largest shareholder$(\%)_t$	0.037***	0.001	−0.001
	(3.52)	(0.06)	(−0.11)
Ln$(Total\ Assets)_t$	−0.009***	−0.010***	−0.009***
	(−5.41)	(−5.48)	(−5.68)
Book leverage$(\%)_t$	−0.014*	0.023**	0.022**
	(−1.65)	(2.18)	(2.37)
ROA$_t$	−0.047	−0.089**	−0.110***
	(−1.50)	(−2.29)	(−3.22)
Year effects	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes
Number of directorships effects	Yes	Yes	Yes
$_R2$	0.161	0.065	0.117
Observations	41,055	22,655	41,180

Table 7 reports results of regressions investigating how network prominence affects director turnover. In Column (1), we examine the influence of network prominence on independent director turnover. In Column (2), we study the influence of network prominence on executive director turnover. In Column (3), we examine the impact of network prominence on non-independent non-executive director turnover. In Table 7, the regressions include year, industry and number of directorships fixed effects. In Columns (1), (2) and (3), the coefficients associated with *Prominence*$_t$ are positive and statistically significant at the less than 1% level in explaining *Turnover*$(0/1)_t$ for all directors. The above results support Hypothesis H2A that directors with higher network prominence have higher labor mobility.

The effect of network prominence on turnover is economically important. The magnitudes of the coefficients associated with network prominence are similar in Table 7, ranging from 5.107 In column (1) to 6.183 in column (3). These coefficients imply a one standard deviation increase in prominence leads to a 2.3%, 5.1%, and 4.76% increase in turnover for specifications in columns (1) through (3), respectively. These increases in turnover represent 32%, 35%, and 33% changes from mean turnover for independent, executive non-independent, and non-executive non-independent directors[12]

4.3. Director network and future directorships

In this section, we investigate whether network prominence improves directors' ability to gain future directorships. The regressions control for year fixed effects. The unit of observation is a director-year. Our estimation equation is as follows:

$$Directorships_{i,t+1} = \alpha + \lambda Prominence_{i,t} + \mathbf{X}\beta + \delta_t + \varepsilon_{i,t} \quad (3)$$

where i represents the director and t the year. The dependent variable is $Directorship_{t+1}$. The variable of interest is $Prominence_{i,t}$. $\mathbf{X}$ is a matrix of control variables previously described in Section 3.4. δ_t denotes year fixed effects. $\varepsilon_{i,t}$ is the error term. To control for potential serial correlation, we use robust standard errors adjusted for director-level clustering and heteroskedasticity.

Table 8 reports results of regressions investigating how network prominence affects directors' ability to gain more future directorships. In Column (1), we study the impact of network prominence on independent directors' ability to gain more future directorships. In Column (2), we examine the influence of network prominence on non-independent executive directors' ability to gain more future directorships. In Column (3), our studies investigate the impact of network prominence on non-independent non-executive directors' ability to gain more future directorships. In Table 8, the regressions include year fixed effects. In Columns (1), (2) and (3), the coefficients associated with $Prominence_t$ are positive and statistically significant at the less than 1% level in explaining $Directorship_{t+1}$. The above results support Hypothesis H3A that directors with higher network prominence gain further board seats.

The effect of network prominence on future directorships is economically important, especially for independent and non-executive non-independent directors. For independent directors, the coefficient associated with prominence in Column (1) of Table 8 is 20.052. This coefficient implies a one standard deviation increase in prominence leads to 15.13% ($\frac{dy}{dx}dx = \frac{dy}{dx}\sigma_x = (20.052)(.007544) = 0.15127$) in the number of directorships the following year. This represents a 9.75% $\left(\frac{.15127}{1.55}\right)$ increase from the mean. The effect of network prominence for executive non-independent directors on future directorships represents a 2.4% increase from the mean whereas the effect of network prominence for non-executive non-independent directors on future directorships is a 19.04% increase from the mean. Overall, these findings suggest executive directors likely hold board seats due their position as executives; implying their network is relatively less important in obtaining non-independent board seats.

4.4. Network prominence, labor mobility, and compensation

In this section, we investigate whether network prominence increases total director compensation through the channel of labor mobility. The unit of observation is a director-year since we calculate the total compensation by aggregating director compensation for each firm that they serve in a given year. In regressions, we control for year and director fixed effects. We estimate:

$$TotalCompensation_{i,t} = \alpha + \lambda_1 Prominence_{i,t-1} + \lambda_2 Turnover_{i,t-1} + \lambda_3 Directorships + \lambda_4 (Prominence_{i,t-1} * Turnover_{i,t-1}) + \delta_i + \delta_t + \varepsilon_{it} \quad (4)$$

where i represents the director and t the year. The dependent variable is $Ln(Total\ comp + 1)_t$. The variables of interest are $Directorship_t$, $Turnover(\%)_{t-1}$, $Prominence_{t-1}$ and its interaction term. A positive (negative) interaction term between $Turnover(\%)_{t-1}$ and $Prominence_{t-1}$ tests hypothesis H2B that network prominence in the year t-1 increases total compensation in the year t through director turnover in the year t-1. The coefficient associated with $Directorship_t$ tests hypothesis H3B that network prominence leads to higher total compensation through more board seats. $\mathbf{X}$ is a matrix of control variables previously described in Section 3.4. δ_t and δ_i denote year and director fixed effects, respectively. ε_{it} is the error term. To control for potential serial correlation, we use robust standard errors adjusted for director-level clustering and heteroskedasticity.

Table 9 reports results of regressions investigating whether network prominence increases total compensation through director turnover. In Column (1), the coefficient associated with $Turnover(\%)_{t-1}$ is negative and statistically significant at the less than 1% level in explaining total compensation for independent directors. This result suggests that an independent direc- tor receives less total compensation in the year t if he or she experiences turnover in the year t-1. In Column (1), the coefficient associated with $Prominence_{t-1}$ is positive and statistically significant at the less than 1% level in explaining total compensation for independent directors, suggesting that network prominence decreases the negative effect of turnover for independent directors. In Column (1), the coefficient associated with the interaction term between $Prominence_{t-1}$ and $Turnover(\%)_{t-1}$ is positive and statistically significant at the less than 1% level in explaining total compensation for independent directors. The result from the interaction term supports hypothesis H2B that the network prominence of independent directors increases their total compensation through director turnover. Moreover, in Column (1), the coefficient associated with $Directorship_t$ is positive and statistically significant at the less than 10% level in explaining

[12] For example, a 2.3% increase in turnover for an independent director represents a 2.3/7.1 = 32% increase from the mean of independent director turnover.

Table 8
Future directorships through network prominence.

This table reports the coefficients associated with *Prominencet* in explaining board of directors' ability to gain future directorships. The dependent variable is $Directorship_{t+1}$, the number of directorships a director gains at year t+1. Appendix A provides all variable definitions. The regressions control for year fixed effects. In parentheses are *t*-statistics based on standard errors adjusted for heteroskedasticity. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

	Dependent variable = $Directorship_{t+1}$		
	Independent director	Non-independent director	
		Executive director	Non-executive director
Explanatory variables	(1)	(2)	(3)
$Prominence_t$	20.052***	6.025***	34.158***
	(14.41)	(7.02)	(19.55)
$Woman(0/1)_t$	−0.022**	0.006	−0.024***
	(−2.07)	(1.28)	(−3.99)
Age_t	0.029***	−0.002	−0.003
	(8.42)	(−0.95)	(−1.32)
Age_t^2	−0***	0	0
	(−10.36)	(0.93)	(0.97)
$Tenure_t$	−0.015***	0.002***	0.002***
	(−7.05)	(5.65)	(2.81)
$Busy\ director(0/1)_t$	1.958***		
	(86.91)		
$Political\ background(0/1)_t$	0.140***	0.023***	0.082***
	(15.63)	(4.51)	(12.88)
$Ln(comp\ +\ 1)_t$	0.032***	−0	0
	(24.63)	(−0.31)	(0.10)
$Number\ of\ meetings_t$	−0.003***	0.001	−0.001
	(−2.97)	(1.60)	(−1.35)
$CEO/COB(0/1)_t$		−0	−0.032***
		(−0.11)	(−6.50)
$Related\ director(0/1)_t$		−0.009***	0.033***
		(−3.53)	(6.63)
$Ln(Shareholding\ +\ 1)_t$		−0.001***	−0.003***
		(−4.61)	(−10.22)
$Ln(Board\ size)_t$	−0.314***	−0.048***	−0.401***
	(−13.22)	(−5.44)	(−19.88)
$Duality(0/1)_t$	0.019**	0.009***	0.021***
	(1.98)	(2.99)	(3.25)
$Board\ composition(ind\%)_t$	−0.294***	−0.067***	−0.374***
	(−4.12)	(−3.06)	(−8.59)
$State\text{-}owned(0/1)_t$	0.029***	−0.007***	0.009
	(3.35)	(−2.63)	(1.64)
$Largest\ shareholder(\%)_t$	0.104***	−0.002	−0.022
	(4.27)	(−0.22)	(−1.54)
$Ln(Total\ Assets)_t$	−0.016***	−0	−0.004*
	(−4.73)	(−0.16)	(−1.66)
$Book\ leverage(\%)_t$	0.062***	−0.003	−0.016*
	(3.41)	(−0.54)	(−1.66)
ROA_t	0.268***	0.068***	0.197***
	(4.00)	(3.23)	(5.59)
Year effects	Yes	Yes	Yes
$_R2$	0.589	0.020	0.192
Observations	26,846	20,344	33,326

total compensation for independent directors. This result is consistent with hypothesis H3B that network prominence increases total compensation through more board seats.

Using the coefficients in Column (1), we solve for the value of prominence where turnover increases compensation as follows:

$$\frac{\partial}{\partial Turnover} ln(1 + Compensation) = -1.226 + 34.019 Prominence > 0$$

$$34.019 Prominence > 1.266$$

$$Prominence > 0.036$$

Thus, total compensation increases with turnover when $Prominence_{t-1}$ is greater than 0.036. This value occurs at approximately the 98% of the empirical distribution, which implies prominence overcomes the negative influence of turnover on compensation only

Table 9
Compensation: Labor mobility through network prominence.

This table reports the coefficients associated with the interaction term between $Prominence_{t-1}$ and $T\ urnover(\%)_{t-1}$ in explaining aggregated director compensation. The dependent variable is $Ln(total\ comp+1)_t$, the logarithm of aggregated compensation that a director collects from all firms at year t. Appendix A provides all variable definitions. The regressions control for year and director fixed effects. In parentheses are *t*-statistics based on standard errors adjusted for heteroskedasticity and director clustering. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

	Dependent variable = $Ln(total\ comp+1)_t$		
	Independent director	Non-independent director	
		Executive director	Non-executive director
Explanatory variables	(1)	(2)	(3)
$T\ urnover(\%)_{t-1}$	−1.226***	−4.552***	−0.469
	(−5.37)	(−2.80)	(−0.89)
$Prominence_{t-1}$	8.669***	−6.716	−11.438**
	(2.86)	(−1.12)	(−2.25)
$Prominencet\text{-}1 * Turnover(\%)_{t-}$	34.019***	148.904	11.093
	(2.94)	(1.64)	(0.28)
$Directorship_t$	0.070**	−0.551**	1.139***
	(2.19)	(−2.53)	(6.59)
Age_t	0.244*	0.046	−0.032
	(1.90)	(0.37)	(−0.20)
Age_t^2	−0.002***	−0	−0
	(−3.22)	(−0.45)	(−0.24)
$Tenure_t$	−0.087***	−0.008	0.025
	(−4.87)	(−0.09)	(0.31)
$Political\ background(0/1)_t$	−0.197	0.167	0.371
	(−0.45)	(1.03)	(0.38)
$Ln(CEO\ compensation)_t$	0.010*	0.064***	0.006
	(1.69)	(3.53)	(0.76)
$CEO/COB(0/1)_t$		0.970***	1.514***
		(6.94)	(7.92)
$Related\ director(0/1)_t$		−0.533***	−0.578***
		(−3.39)	(−5.77)
$Ln(Shareholding\ +\ 1)_t$		0.030***	0.034*
		(2.78)	(1.72)
$Ln(Board\ size)_t$	0.509**	0.155	0.366
	(2.20)	(0.56)	(1.03)
$Duality(0/1)_t$	−0.040	−0.030	0.085
	(−0.53)	(−0.27)	(0.66)
$Board\ composition(ind\%)_t$	2.027***	−0.406	−0.680
	(3.34)	(−0.63)	(−0.70)
$Number\ of\ meetings_t$	−0.005	−0.016*	−0.001
	(−0.65)	(−1.68)	(−0.16)
$Ln(CEO\ compensation)_t$	0.010*	0.064***	0.006
	(1.69)	(3.53)	(0.76)
$State\text{-}owned(0/1)_t$	−0.064	−0.144	−0.396*
	(−0.59)	(−0.69)	(−1.66)
$Largest\ shareholder(\%)_t$	0.334	−0.537	0.765
	(1.21)	(−0.90)	(1.22)
$Ln(total\ Assets)_t$	−0.038	0.278***	0.402***
	(−0.85)	(2.69)	(3.86)
$Book\ leverage(\%)_t$	0.059	−0.179	0.363
	(0.36)	(−0.54)	(1.13)
$Cash\ holdings(\%)_t$	0.001	−0.012	−0.049
	(0.01)	(−0.47)	(−0.15)
ROA_{t-1}	0.021	1.602***	0.906*
	(0.05)	(3.30)	(1.85)
$Stock\ volatility_{t-1}$	−0.020	−0.205	−0.275
	(−0.23)	(−0.87)	(−1.40)
Year effects	Yes	Yes	Yes
Director effects	Yes	Yes	Yes
$_R2$	0.587	0.711	0.914
Observations	29,722	22,335	36,935

Table 10
Robustness: Director compensation using firm and director fixed effects.

This table reports the coefficients associated with $Prominence_{t-1}$ in explaining director compensation when firm or director fixed effects are included. In columns (1), (3) and (6), the dependent variable is $Paid(0/1)_t$, a dummy variable that equals to 1 if a director receives zero compensation in year t and 0 otherwise. In columns (2), (4) and (6), the dependent variable is $Ln(Comp + 1)_t$, the logarithm of compensation for a director in a firm at year t. In panel A, the regressions control for firm, year, industry, and number of directorships fixed effects. In panel B, the regressions control for director, year, industry, and number of directorships fixed effects. This table shares the same control variables as those in Table 6. Appendix A provides all variable definitions. In parentheses are *t*-statistics based on standard errors adjusted for heteroskedasticity and firm or director clustering. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

	Independent director		Non-independent director			
			Executive director		Non-executive director	
	$Paid(0/1)_t$	$Ln(Comp+1)_t$	$Paid(0/1)_t$	$Ln(Comp+1)_t$	$Paid(0/1)_t$	$Ln(Comp+1)_t$
Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Firm fixed effects						
$Prominence_{t-1}$	1.107***	15.061***	−0.683	−4.149	0.037	0.381
	(6.31)	(7.60)	(−1.39)	(−0.61)	(0.08)	(0.07)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of directorships effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes	Yes	Yes
$_R2$	0.199	0.213	0.285	0.394	0.583	0.577
Observations	45,687	45,687	24,700	24,700	43,812	43,812
Panel B. Director fixed effects						
$Prominence_{t-1}$	1.473***	20.970***	−0.639*	−4.394	−1.167***	−11.635**
	(6.00)	(7.06)	(−1.77)	(−0.91)	(−2.60)	(−2.32)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of directorships effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Director effects	Yes	Yes	Yes	Yes	Yes	Yes
$_R2$	0.331	0.348	0.678	0.728	0.882	0.890
Observations	45,687	45,687	24,700	24,700	43,812	43,812

at very high levels of prominence. Overall, our evidence shows that turnover is costly, but that network power reduces this cost.

5. Discussion and robustness

5.1. Firm and director effects

In this section, we test if our prior results are robust to within firm or within director fixed effects. First, we re-estimate Eq. (1) including either firm or director fixed effects. Table 10 reports results of regressions on director compensation when firm and director fixed effects are included. In Panel A, the firm fixed effect controls for any time-invariant firm-specific factors that affect director compensation. In Panel B, the director fixed effects control for any time-invariant director-specific factors that affect director compensation. In Columns (1) and (2), the coefficients associated with $Prominence_{t-1}$ are positive and statistically significant at the less than 1% level in explaining $Paid(0/1)_t$ and $Ln(Comp+1)_t$ for independent directors. In addition, in Column (4), the coefficient associated with $Prominence_{t-1}$ is positive and statistically significant at the less than 1% level in explaining $Ln(Comp+1)_t$ for executive directors. The above results suggest that our previous findings on network prominence on director com- pensation are robust to firm and director fixed effects.

Second, we re-estimate Eq. (2) including either firm or director fixed effects. Table 11 reports results of regressions on director turnover when firm and director fixed effects are included. In Columns (1) , (2) and (3), the coefficients associated with $Prominence_t$ are positive and statistically significant at the less than 1% level in explaining $Turnover(0/1)_{t-1}$. Therefore, the positive relationship between network prominence and director turnover is robust to firm and director fixed effects.

Third, we re-estimate Eq. (3) including either firm or director fixed effects. Table 12 reports results of regressions on directors' ability to gain more future board seats when director fixed effects are included. In Columns (1) and (3), the coefficients associated with $Prominence_t$ are positive and statistically significant at the less than 5% level in explaining $Directorship_{t+1}$. In Columns (2), the coefficient associated with $Prominence_t$ is statistically no different than zero in explaining $Directorship_{t+1}$. Thus, the positive relationship between network prominence and directors' ability to gain further board seats is robust to director fixed effects for the independent director and non-independent not executive directors.

Table 11
Robustness: Director turnover using firm and director fixed effects.

This table reports the coefficients associated with *Prominence*$_t$ in explaining director turnover when firm or director fixed effects are included. The dependent variable is *Turnover*(0/1)$_t$, a dummy variable that equals to 1 for a director in year t if he or she does not appear in the annual report in year t+1 and 0 otherwise. In Panel A, the regressions control for firm, year, industry, and number of directorships fixed effects. In Panel B, the regressions control for director, year, industry, and number of directorships fixed effects. This table shares the same control variables as those in Table 7. Appendix A provides all variable definitions. In parentheses are *t*-statistics based on standard errors adjusted for heteroskedasticity and firm or director clustering. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

	Dependent variable = *Turnover*(0/1)$_t$		
	Independent director	Non-independent director	
		Executive director	Non-executive director
Explanatory variables	(1)	(2)	(3)
Panel A. Firm fixed effects			
Prominence$_t$	5.680***	6.830***	6.707***
	(12.10)	(7.12)	(7.77)
Control variables	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Number of directorships effects	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes
$_R$2	0.247	0.198	0.207
Observations	41,055	22,655	41,180
Panel B. Director fixed effects			
Prominence$_t$	7.069***	5.997***	8.064***
	(9.84)	(5.78)	(8.36)
Control variables	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Number of directorships effects	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes
Director effects	Yes	Yes	Yes
$_R$2	0.429	0.602	0.602
Observations	41,055	22,655	41,180

Table 12
Robustness: Future directorships using director fixed effects.

This table reports the coefficients associated with *Prominence*$_t$ in explaining directors' ability to gain future directorships when director fixed effects are included. The dependent variable is *Directorship*$_{t+1}$, the number of directorships a director gains at year t+1. Appendix A provides all variable definitions. The regressions control for year and director fixed effects. This table shares the same control variables as those in Table 8. In parentheses are *t*-statistics based on standard errors adjusted for heteroskedasticity and director clustering. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

	Dependent variable = *Directorship*$_{t+1}$		
	Independent director	Non-independent director	
		Executive director	Non-executive director
Explanatory variables	(1)	(2)	(3)
Prominence$_t$	2.122*	1.139	3.545***
	(1.65)	(1.47)	(3.59)
Control variables	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Director effects	Yes	Yes	Yes
$_R$2	0.836	0.774	0.857
Observations	26,847	20,344	33,326

5.2. Endogeneity

Our results may be subject to endogeneity issues. For example, it is possible that high skill individuals are more demanded and likely located in a more central position in the board network. If these individuals are positively priced by their skill or capability, there will be a positive relationship between network prominence and compensation. To lessen the possible of an endo- geneity issue,

Table 13
Robustness: Instrumental variables estimation.

In this table, we re-estimate the Eq. (1) with the instrument variable 2SLS method. Our instrument variable $Ln(Number\ of\ firm)_{t-1}$ is the logarithm of 1 + number of firms that is located in the same province as an individual in the year $t-1$. In Columns (1) to (3), we provide estimation results of the first-stage of 2SLS regressions. In Columns (4) to (9) we provide estimation results of the second-stage of 2SLS regressions. The Appendix provides variable definitions. The control variables are identical to the controls in Table 6. All regressions control for year and industry fixed effects. In parentheses are *t*-statistics based on standard errors adjusted for heteroskedasticity and director clustering. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

				Independent director		Non-independent director			
						Executive director		Non-executive director	
	First stage of 2SLS regressions			Second stage of 2SLS regressions					
	$Prominence_{t-1}$			$Paid(0/1)_t$	$Ln(Comp+1)_t$	$Paid(0/1)_t$	$Ln(Comp+1)_t$	$Paid(0/1)_t$	$Ln(Comp+1)_t$
Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$Ln(Number\ of\ firm)_{t-1}$	0.0005***	0.0001***	0.0011***						
	(5.35)	(2.59)	(10.64)						
$\widehat{Prominence}_{t-1}$				0.7656***	13.5926***	−0.4609	9.7636*	−0.3096	−3.7491
				(4.86)	(6.86)	(−1.20)	(1.83)	(−0.45)	(−0.46)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
$_R2$	0.392	0.400	0.250	0.011	0.019	0.081	0.174	0.188	0.223
Observations	45,684	24,698	43,810	45,684	45,684	24,698	24,698	43,810	43,810

we use director fixed effects to control for time-invariant director characteristics such as skill and ability.

To further mitigate endogeneity concerns, we re-estimate our compensation regressions with the IV-2SLS approach. To qualify as a valid instrument, a variable needs to be strongly correlated with the instrumented regressors (the validity requirement) but uncorrelated with the error term (the exclusion restriction). We construct an instrumental variable $Ln(Number\ of\ firm)_{t-1}$, which is the logarithm of one plus the number of firms that are located in the same province as this individual in the year *t*-1. Social networks are constrained by geographic distance. Directors are more likely to form their connections through a local network. Therefore, the number of firms in the same province may plausibly predict the network prominence of an individual. However, the number of firms in the same province is not related to the skill or ability of an individual. In Columns (1) to (3) of Table 13, we estimate the first-stage regressions. We find that our instrument $Ln(Number\ of\ firm)_{t-1}$ satisfies the validity requirement since all coefficients are positive and statistically significant at the 1% level in explaining $Prominence_{t-1}$. In Columns (4) to (9), we estimate the second-stage regressions where the dependent variables are compensation measures $Paid(0/1)_t$ and $Ln(Comp+1)_t$ and the network prominence measure $Prominence_{t-1}$ is replaced by its predicted value from the first-stage regression. In Columns (4) and (5), the coefficients associated with $Prominence_{t-1}$ are positive and statistically significant at the less than 1% level in explaining $Paid(0/1)_t$ and $Ln(Comp+1)_t$ for independent directors. In addition, in Column (7), the coefficient associated with $Prominence_{t-1}$ is positive and statistically significant at the less than 10% level in explaining $Ln(Comp+1)_t$ for executive directors. The IV-2SLS approach supports our findings that network prominence increases director compensation. Overall, the IV-2SLS approach supports the idea $Prominence_{t-1}$ is not a proxy for time-varying director skill.

Chen et al. (2019) use Regulation 11 to show the value of academic directors in China. It is possible our results are correlated with a decrease in social network power from the forced resignation of academic directors under Regulation 11. We use two approached to investigate this possibility. First, all our results include year effects including the IV estimation shown in Table 13. Second, Table 14 provides IV estimation results in the years prior to the regulation (2005 through 2012). We find qualitatively similar results in the period prior to Regulation 11. Thus, our findings are robust to Regulation 11.

5.3. Related directors

Related directors are non-independent directors holding positions in both the listed firms and controlling firms.[13] Their relationship with controlling shareholders may influence their career outcomes.[14] The literature on related director's career outcomes is scant since related directors are uncommon in western countries. Related directors are very common in China, where 19% of executive directors and 54.86% of non-independent non-executive directors in our sample are related directors.

In this section, we test the influence of prominence through related directors on turnover and number of directorships. However,

[13] China Securities Regulatory Commission (CSRC) forbids an individual holding a position in a controlling firm from serving as an independent director in the listed firm. Thus, related directors can only hold non-independent directorships.

[14] For example, Lo et al. (2010) suspect but do not test that a related director is less likely to be paid and receives less compensation as controlling shareholders may pay part or all of director compensation. Chen and Keefe (2018) empirically test and find that in China related directors are less likely to be paid and receive less compensation.

Table 14
Robustness: Instrumental variables estimation before 2013 regulation.

In this table, we re-run the instrument variable 2SLS method with a sample from 2005 to 2012, which is before the 2013 regulation. Our instrument variable *Ln*(*Number of firm*)$t-1$ is the logarithm of 1 + number of firms that is located in the same province as an individual in the year $t-1$. In Columns (1) to (3), we provide estimation results of the first-stage of 2SLS regressions. In Columns (4) to (9) we provide estimation results of the second-stage of 2SLS regressions. The Appendix provides variable definitions. The control variables are identical to the controls in Table 6. All regressions control for year and industry fixed effects. In parentheses are t-statistics based on standard errors adjusted for heteroskedasticity and director clustering. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

				Independent director		Non-independent director			
						Executive director		Non-executive director	
	First stage of 2SLS regressions			Second stage of 2SLS regressions					
	$Prominence_{t-1}$			$Paid(0/1)_t$	$Ln(Comp+1)_t$	$Paid(0/1)_t$	$Ln(Comp+1)_t$	$Paid(0/1)_t$	$Ln(Comp+1)_t$
Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Ln(*Number of firm*)$_{t-1}$	0.0006***	0.0001	0.0012***						
	(4.98)	(1.50)	(8.43)						
$\widehat{Prominence}_{t-1}$				0.5102***	9.5343***	−0.1444	12.5882**	−0.1359	−2.2505
				(3.05)	(4.65)	(−0.38)	(2.44)	(−0.18)	(−0.26)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
$_R2$	0.367	0.404	0.254	0.009	0.021	0.110	0.215	0.181	0.216
Observations	28,537	15,014	28,519	28,537	28,537	15,014	15,014	28,519	28,519

as show in Table 4 only 46% of related non-executive directors are paid. We do not have data regarding related director compensation in the controlling firm. This measurement error makes it impossible to test the influence of prominence through related directors on compensation. In this section, we use either firm or director fixed effects.

5.3.1. Related directors and turnover

To understand how prominence might influence turnover of related directors we estimate.

$$Turnover_{i,f,t} = \alpha + \lambda_1 Prominence_{i,f,t} + \lambda_2 Related(0/1)i, f, t + \mathbf{X}\beta + \lambda_3 (Prominence_{i,f,t} * Related_{i,f,t}) f + \delta_i + \delta_f + \delta_t + \delta_n + \varepsilon_{i,f,t} \quad (5)$$

where i represents the director, f the firm, and t the year, n the number of directorships, respectively. The dependent variable is $Turnover(0/1)_t$. Table 15 reports estimation results of Eq. (5). Panel A includes firm firm fixed effects (δ_f is estimated) whereas Panel B include director fixed effects (δ_i is estimated).

In Columns (1) and (2), the coefficients associated with *Related director*$(0/1)_t$ are negative and statistically significant at the less than 1% level in explaining $Turnover(0/1)_t$, suggesting that non-independent directors holding another position in a controlling firms (related directors) are less likely to experience turnover. This result suggests that the relationship with controlling shareholders increases directors' job security. In addition, in Columns (1) and (2), the coefficients associated with the interaction term between *Related director*$(0/1)_t$ and $Prominence_t$ are negative and statistically significant at either the 1% or 5% level in explaining $Turnover(0/1)_t$, indicating that network connections increase job security for related directors.

5.3.2. Related directors and number of directorships

The above analysis suggests network prominence provides job security for related directors. To understand how prominence might influence the number of directorships of related directors we estimate

$$Directorships_{i,f,t+1} = \alpha + \lambda_1 Prominence_{i,f,t} + \lambda_2 Related(0/1)_{i,f,t} + \lambda 3 (Prominence_{i,f,t} * Related_{i,f,t}) + \mathbf{X}\beta + \delta_i + \delta_t + \delta n + \varepsilon_{i,f,t} \quad (6)$$

where i represents the director, f the firm, and t the year, n the number of directorships, respectively. The dependent variable is $Directorship_{t+1}$.

Table 16 reports estimation results of Eq. (6). Our variable of interest is in the interaction term between *Related director*$(0/1)_t$ and $Prominence_t$ in explaining $Directorship_{t+1}$ for non-independent directors. In Column (2), the coefficient associated with the interaction term between *Related director*$(0/1)_t$ and $Prominence_t$ is positive and statistically significant at the less than 5% level in explaining $Directorship_{t+1}$, indicating that network prominence increases the ability to gain further board seats for non-independent non-executive directors through controlling shareholders.

5.4. Network measure

In our main results, we use $Prominence_t$ measured using the overall director network, which includes both independent and non-independent directors. In this section, we re-estimate our tests using $Prominence_t$ from either the independent or non-independent network.

Table 15
Related directors: Turnover.

This table reports the coefficients associated with the interaction term between *Prominence*$_t$ and *Related director*(0/1)*t* in explaining non-independent director turnover. The dependent variable is *Turnover*(0/1)$_t$, a dummy variable that equals to 1 for a director in year t if he or she does not appear in the annual report in year t + 1 and zero otherwise. In Panel A, the regressions control for firm, year, industry, and number of directorships fixed effects. In Panel B, the regressions control for director, year, industry, and number of directorships fixed effects. This table shares the same control variables as those in Table 7. Appendix A provides all variable definitions. In parentheses are *t*-statistics based on standard errors adjusted for heteroskedasticity and firm or director clustering. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

	Dependent variable = *Turnover*(0/1)$_t$	
	Non-independent director	
	Executive director	Non-executive director
Explanatory variables	(1)	(2)
Panel A. Firm fixed effects		
Prominence$_t$	7.460***	13.700***
	(7.04)	(8.83)
Related director(0/1)$_t$	−0.030***	−0.175***
	(−3.47)	(−20.38)
Prominence$_t$ ∗ *Related director*(0/1)$_t$	−3.493**	−10.095***
	(−2.03)	(−7.63)
Control variables	Yes	Yes
Year effects	Yes	Yes
Number of directorships effects	Yes	Yes
Firm effects	Yes	Yes
R^2	0.199	0.214
Observations	22,655	41,180
		Panel B. Director fixed effects
Prominence$_t$	6.757***	13.294***
	(5.79)	(7.34)
Related director(0/1)$_t$	−0.072***	−0.267***
	(−4.63)	(−19.04)
Prominence$_t$ ∗ *Related director*(0/1)$_t$	−4.209**	−7.661***
	(−2.51)	(−4.43)
Control variables	Yes	Yes
Year effects	Yes	Yes
Number of directorships effects	Yes	Yes
Industry effects	Yes	Yes
Director effects	Yes	Yes
R^2	0.602	0.605
Observations	22,655	41,180

First, we estimate if the network used changes the influence of *Prominence*$_t$ on compensation. Our baseline results are shown in Table 6. Using *Prominence*$_t$ constructed from the independent director network, we re-estimate Eq. (1) and find qualitatively identical results to those shown in Columns (1) and (2). Next, using *Prominence*$_t$ constructed from the non-independent director network, we re-estimate Eq. (1) and find different results to those shown in Column (4). In our main results, the coefficient associated with *Prominence*$_t$ is positive and statistically significant at less than the 1% level in explaining compensation of non-independent executive directors in Column (4). When using *Prominence*$_t$ based on the non-independent director network this relationship is no longer statistically significant. Overall, this robustness test suggests that increased compensation for executive non-independent arises through access to information through connections to the overall Chinese director network and not the non-independent network.

Second, we estimate if the network used changes the influence of *Prominence*$_t$ on turnover. Our original baseline results are shown in Table 7. We re-estimate Eq. (2) using *Prominence*$_t$ constructed from the independent network in Column (1) and the non-independent network in Columns (2) and (3). We find qualitatively identical results.

Third, we estimate if the network used changes the influence of *Prominence*$_t$ on the number of directorships. Our original baseline results are shown in Table 8. We re-estimate Eq. (3) using *Prominence*$_t$ constructed from the independent network in Column (1) and the non-independent network in Columns (2) and (3). We find qualitatively identical results.

Fourth, we estimate if the network used changes the influence of *Prominence*$_t$ on the number of directorships. Our original baseline results are shown in Table 9. We re-estimate Eq. (4) using *Prominence*$_t$ constructed from the independent network in Column (1) and the non-independent network in Columns (2) and (3). We find qualitatively identical results.

Table 16
Related Directors: Future directorships.

This table reports the coefficients associated with the interaction term between *Prominencet* and *Related director*(0/1)*t* in explaining non-independent directors' ability to gain future directorships. The dependent variable is *Directorshipt* + 1, the number of directorships a director gains at year t + 1. Appendix A provides all variable definitions. The regressions control for year and director fixed effects. This table shares the same control variables as those in Table 8. In parentheses are *t*-statistics based on standard errors adjusted for heteroskedasticity and director clustering. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

	Dependent variable = $Directorship_{t+1}$	
	Non-independent director	
	Executive director	Non-executive director
Explanatory variables	(1)	(2)
$Prominence_t$	1.280	−0.127
	(1.54)	(−0.08)
$Related\ director(0/1)_t$	−0.003	0.020
	(−0.33)	(1.58)
$Prominence_t * Related\ director(0/1)_t$	−0.781	4.824**
	(−0.53)	(2.56)
Control variables	Yes	Yes
Year effects	Yes	Yes
Director effects	Yes	Yes
R^2	0.774	0.858
Observations	20,344	33,326

6. Conclusion

Through board networks, well-connected directors become more informed. Previous studies find that this information advantage benefits directors' careers on western boards. However, there is no research on whether this effect holds for the directors in China, where the ownership structure and governance issues differ from those in the U.S. and U.K. (Jiang and Kim (2015)). Therefore, our study of board networks on directors' career outcomes in China fills this gap.

Our study suggests that director networks are positively priced in independent and executive director compensation. Our findings on independent director compensation are consistent with the literature suggesting that board network prominence signals director quality. On the other hand, our results on executive director compensation support the literature suggesting that board networks grant executives managerial power in compensation negotiations.

Except for related directors, board networks increase director turnover. This result suggests that board networks provide directors more new employment opportunities, increasing their job mobility. In contrast, we find that related directors experience less turnover than non-related directors, suggesting that a relationship with controlling shareholders may shield directors from dismissal. Moreover, related directors with more board connections experience less turnover than those with fewer board connections, suggesting that board connections could increase job security for related directors. The mixed results of board connections on director turnover are not surprising. Through director networks, non-related directors could get more information on outside employment opportunities, and related directors could gain managerial power to protect them from dismissal.

Our study suggests that well-connected directors receive more future directorships. This finding supports the argument that well-connected directors are rewarded with more future directorships due to either their quality or superior information in the labor market (Larcker and Tayan (2010); Renneboog and Zhao (2011); Cai and Sevilir (2012); Renneboog and Zhao (2014); Intintoli et al. (2018); Larcker et al. (2013); Fama and Jensen (1983); Ferris et al. (2003); Renneboog and Zhao (2018)). Moreover, we find that related directors with more board connections receive more future directorships, suggesting that board connections could benefit related directors' careers.

Our study identifies channels where network prominence indirectly increases total compensation. For example, well-connected independent directors may receive higher total compensation through moving from low-paid directorships to high-paid directorships (turnover channel). In addition, they may increase total compensation from holding more board seats. Overall, we find that the board network directly increases directorship level compensation and indirectly leads to higher total compensation through labor mobility and additional board seats.

Appendix A. Appendix

The appendix provides variable definitions for dependent variables, variables of interest, and control variables.

Variable	Description
Dependent Variables	
$Paid(0/1)_t$	The dummy variable equals to 1 if a board of director is paid in a firm in the year t and 0 otherwise.
$Ln(Comp + 1)_t$	The logarithm of 1 + compensation that a board of director receives from a firm in the year t.
$Ln(Total\ comp + 1)_t$	The logarithm of aggregated 1 + compensation that a board of director collects from all firms in the year t.
$Turnover(0/1)_t$	The measure of director turnover activity in the year t, which is a dummy variable equals to 1 for an observation in year t if a board of director does not appear in the annual report in the year $t + 1$ and 0 otherwise.
$Directorship_{t+1}$	The number of directorships a board of director gains in the year $t + 1$.
Variables of interest	
$Prominence_t$	The eigenvector centrality of a board of director in the year t.
$Prominence_{t-1}$	The eigenvector centrality of a board of director in the year $t - 1$.
$Turnover(0/1)_{t-1}$	The measure of director turnover activity in the year $t - 1$, which is a dummy variable equals to 1 for an observation in the year $t - 1$ if a board of director does not appear in the annual report in the year t and 0 otherwise.
$Turnover(\%)_{t-1}$	The ratio of turnover in the year $t - 1$, which equals to $Turnover(0/1)_{t-1}$ scaled by the num- ber of directorships in the year $t - 1$.
$Ln(Number\ of\ firm)_{t1}$	The logarithm of 1 + number of firms that is located in the same province as an individual in the year $t - 1$.

Variable	Description
Control variables	
$Woman(0/1)_t$	The dummy variable equals to 1 if a board of director is female and 0 otherwise.
Age_t	The age of a board of director in the year t.
Age_t^2	The square of age of a board of director in the year t.
$Tenure_t$	The number of years that a board of director has served as a board of director in the year t.
$Busy\ director(0/1)_t$	dent director has more than two directorships in the year t and 0 otherwise.
$Political\ background(0/1)_t$	The dummy variable equals to 1 if if a board of director had or has an administrative ranking in the Chinese political system in the year t and 0 otherwise.
$Number\ of\ meetings_t$	The number of board meetings for a firm in the year t.
$Ln(CEO\ compensation)_t$	The logarithm of CEO compensation in the year t.
$CEO/COB(0/1)_t$	The dummy variable equals to 1 if a board of director is CEO or COB in the year t and 0 otherwise.
$Related\ director(0/1)_t$	The dummy variable equals to 1 if a board of director holds a position in the controlling firm in the year t and 0 otherwise.
$Ln(Shareholding + 1)_t$	The logarithm of a board of director's share holding plus one in the year t.
$Ln(Board\ size)_t$	The logarithm of the number of directors on board in the year t.
$Duality(0/1)_t$	The dummy variable equals to 1 if the CEO and chairman is the same person in the year t and 0 otherwise.
$Board\ composition(ind\%)_t$	The ratio of independent directors on board in the year t.
$State\text{-}owned(0/1)_t$	state-owned in the year t and 0 otherwise.
$Largest\ shareholder(\%)_t$	The percentage of share holding by the largest shareholders in the year t.

Variable	Description
$Ln(Total\ Assets)_t$	The logarithm of total assets in the year t.
$Book\ leverage(\%)_t$	The book value of total debts scaled by book value of total assets in the year t.
$Cash\ holdings(\%)_t$	The cash and marketable security divided by the book value of total assets in the year t.
ROA_{t-1}	The net income scaled by the book value of total assets in the year $t - 1$.
$Stock\ volatility_{t-1}$	The variance of monthly stock returns in the year $t - 1$.
$Ln(comp+1)_t$	The logarithm of 1 plus the compensation that a board of director receives from a firm in the year t.
ROA_t	The net income scaled by the book value of total assets in the year t.

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