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Rookie directors and firm performance: Evidence from China[1]

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ABSTRACT

This paper examines the benefits and costs associated with rookie independent directors (RIDs) in Chinese public companies from 2008 to 2014. We find that RIDs attend more board meetings. Boards with more RIDs tunnel less to controlling shareholders, suggesting that RIDs are efficient monitors. However, in state-owned firms, the presence of RIDs is negatively associated with investment efficiency, suggesting a potential cost of appointing RIDs. Overall, firms with more RIDs have higher operating performance, especially when tunneling is a more common issue, when board experience is less important and when monitoring costs are relatively low.

1. Introduction

Rookie directors are an important supply of talent to corporate boards. In 2013, rookie directors account for almost one-third of new directors who join corporate boards in the US.[2] Rookie directors are even more important in China where the director tenure is restricted.[3] From 2008 to 2014 in China, more than 26.8% of independent directors and 60% of newly appointed independent directors are rookie independent directors. Despite the common use of rookie directors on corporate boards, there is limited research on their influence on corporate governance and firm performance. The only notable study is Kang et al. (2016) who find that in the US rookie independent directors positively influence board functions and firm value. However, the aforementioned findings do not provide clear guidance in the case of China, where the ownership structure and governance issues differ from those in the US (Jiang and Kim, 2015). This study explores the influence of rookie independent directors on board functioning and firm performance in China.

Rookie independent directors lack a track record in the director labor market. Their performance as rookies builds their reputation for additional appointments as independent directors. Thus, the career concern model suggests that a rookie independent director is more motivated than a seasoned independent director to develop a reputation as a diligent director (Holmstrom, 1982).

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[2] Citation "Sees Spencer Stuart (2013)" has not been found in the reference list. Please supply full details for this reference.Sees Spencer Stuart (2013), “Recruiting the First-Time Director”, https://www.spencerstuart.com/

[3] In China, an independent director is allowed to serve a maximum of six years in a firm. Sees [?] for the detailed discussions on director tenure restriction in China.

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Consistent with the career concern model, Jiang, Jiang et al. (2015) document that in China young independent directors are more likely to vote against management. In addition, the management friendliness model proposes that over time independent directors maybe captured by management and become less effective monitors (Core et al., 1999; Vafeas, 2003). This theory predicts that rookie independent directors are better monitors than seasoned independent directors.

In contrast, the value of rookie independent directors could be compromised by their limited board experience. The shortage of board experience may hinder rookie directors from coordinating with management and thinking strategically, restricting their abilities to provide management guidance on the operation of the firm (Kor and Sundaramurthy, 2009; Kim et al., 2014). Consistent with this view, Ahern and Dittmar (2012) find that a female director quota decreases firm values in Norway, which is consistent with a positive relation between experience and ability.[4]

Given the benefits and costs associated with rookie independent directors, their net effect on board functioning and firm performance is an empirical question. Our study addresses the following questions. Are rookie independent directors more diligent directors? What is the overall impact of rookie independent directors on firm operating performance? What are the potential channels through which rookie independent directors affect firm performance? Are rookie independent directors rewarded more for their efforts? What kind of firms benefit more from rookie independent directors?

We first explore whether rookie independent directors are more diligent directors. Because board meeting attendance is one of the major responsibilities of independent directors, we investigate the board meeting attendance of rookie independent directors. In the prior literature, board meeting attendance is used as a primary measure of director commitment and monitoring effectiveness (Masulis et al., 2012; Cai et al., 2009). Following Kang et al. (2016), we define rookie independent directors as independent directors who have less than three years of boardroom experience.[5] We compare the board meeting attendance records of rookie independent directors to seasoned independent directors. We find that rookie independent directors are more likely than seasoned independent directors to attend board meetings. This evidence is consistent with the idea that career ambition motivates rookie independent directors to work harder than seasoned independent directors. In economic terms, the probability of rookie independent directors missing any board meeting is 1.3% lower than that of seasoned independent directors, which is equivalent to a 7.1% decrease from the average probability of a board meeting absence of 18.3%. Likewise, the board meeting absence rate of rookie independent directors is 0.5% lower than that of seasoned independent directors, which is equivalent to a 14.7% decrease from the average board meeting absence rate of 3.4%.

We then examine the influence of rookie independent directors on firm operating performance. We find that firms with rookie independent directors outperform their counterparts as measured by both return on sales (ROS) and return on assets (ROA). In economic terms, firms with a majority of rookie independent directors outperform firms with a minority of rookie independent directors by ROS of 2.1% and ROA of 0.5%, which represents a 34.4% increase from the mean ROS of 6.1% and a 13.5% increase from the mean ROA of 3.7%. In the robustness section, we replace the net income by EBITDA to calculate alternative measures of *ROS* and *ROA*. Our results are robust to these alternative measures.[6]

Next, we investigate the potential channels through which rookie independent directors affect firm operating performance. An important role of independent directors is to monitor management. Therefore, if they are more effective monitors, rookie independent directors may improve the firm operating performance. Ownership structure affects independent director responsibilities. For example, in the US and UK, ownership of listed firms is dispersed and the main agency conflict is between the managers and shareholders. Correspondingly, an important objective of independent directors is to hold managers accountable for performance. Consistent with this view, Kang et al. (2016) find that in the US rookie independent directors increase the pay-performance sensitivity of CEOs. In contrast, in China, the ownership of listed firms is highly concentrated and the main agency conflict is between minority and controlling shareholders. Thus, the main governance issue in China is controlling shareholder wealth expropriation from a firm's minority shareholders. In this institutional setting, the main monitoring function of independent directors in China is to protect minority shareholders from the wealth expropriation of the controlling shareholders, a phenomenon commonly referred as “tunneling” or “self-dealing” (Jiang et al., 2010).[7] We test the relation between the presence of rookie independent directors and tunneling to controlling shareholders. We find that the presence of rookie independent directors reduces tunneling to controlling shareholders. This evidence suggests that rookie independent directors are more effective monitors than seasoned independent directors. In economic terms, firms with a majority of rookie independent directors (relative to firms with a minority of rookie independent directors) decrease tunneling by 0.3% of total assets, a decrease is equivalent to 23 million CNY in dollar terms (3.38 million USD with the exchange rate of 6.8 CNY/USD).[8]

Another important role of the board of directors is to provide management guidance on the operation of the firms (Adams et al., 2010). Due to the limited board experience, rookie independent directors are expected to be less effective advisers than seasoned independent directors (Kor and Sundaramurthy, 2009; Kim et al., 2014; Ahern and Dittmar, 2012). Kim et al. (2014) suggest that investment policy is one of the main board advisory roles. We measure the advising performance of independent directors using

[4] Espen et al. (2018) find the results of Ahern and Dittmar (2012) statistical insignificance in a replication study.

[5] Sees Sections 3.3 for a detail discussion on constructing rookie independent director measure.

[6] In robustness testing, we find that our results hold using instrument variable regression.

[7] In 2001, when the independent director system was introduced to Chinese listed firms by CSRC, they explicitly stated that the primary and legally explicit responsibility of independent directors is to monitor large controlling shareholders on behalf of minority shareholders. Sees *Guidelines for Introducing Independent Directors to the Board of Directors of Listed Companies 2001*.

[8] A 0.3% decrease of *ORECTA(%)* from a firm with average total assets of 7.68 billion CNY equals 23 million CNY.

investment efficiency, which is the sensitivity of investment expenditures to investment opportunities (Chen et al., 2011; Liu et al., 2015; Kim et al., 2014). We find no evidence that the presence of rookie independent directors affects investment efficiency in the full sample. However, the presence of rookie independent directors is negatively associated with investment efficiency in state-owned firms. Our study documents the potential cost of appointing rookie independent directors in state-owned firms.

We then examine the potential benefits to rookie independent directors from their efforts. David, 2005suggests that retaining the current directorship is one of the major motivations for the board of directors to work hard. We find that, for all independent directors, board meeting absences reduce the likelihood of retaining current directorships in the next year. However, this negative effect of board meeting absences on the retention of current directorships is stronger for rookie independent directors than seasoned independent directors.

We investigate the characteristics of firms that benefit most from rookie independent directors. Prior literature finds that in China the tunneling to controlling shareholders is more common when firms are non-state-owned and when the ownership of the largest shareholder is relatively low (Jiang et al., 2010).[9] If rookie independent directors lessen tunneling to controlling shareholders, firms more vulnerable to tunneling (non-state-owned firms or firms with low ownership of the largest shareholder) should benefit more from the rookie independent directors. Consistent with this idea, we find that the presence of rookie independent directors is negatively associated with the tunneling to controlling shareholders and positively associated with firm ROS and ROA when firms are non-state-owned and when the largest shareholder's ownership is relatively low. Overall, when a firm is vulnerable to tunneling, rookie independent directors improve firm performance by reducing tunneling.

Another strand of the literature suggests that the value of rookie directors is less important in the complex firms in which experience and information resources of independent directors are more important (Coles et al., 2008; Kang et al., 2016). Consistent with this view, we find that, in China, the presence of rookie independent directors in non-complex firms is negatively associated with tunneling and positively associated with firm ROS and ROA.

Information asymmetry increases information acquisition costs, compromising the monitoring effectiveness of independent directors. Consistent with this argument, Liu et al. (2015) find that in China the value of independent directors decreases with the information acquisition costs. Compared to seasoned independent directors, rookie independent directors suffer more from the information asymmetry due to their limited board experience. Consistent with this argument, we find that, in China, when the firms have low information acquisition costs, the presence of rookie is negatively associated with tunneling and positively associated with firm ROS and ROA.

Our work is related to a growing literature exploring how the boardroom experience affects directors' monitoring and advising functions (Vafeas, 2003; Kim et al., 2014; Ahern and Dittmar, 2012; Espen et al., 2018; Kang et al., 2016). Most of these papers focus on the United States where ownership is dispersed and where state ownership is uncommon. We extend the literature to an emerging market where ownership is concentrated and where state ownership is frequent. We find that rookie independent directors play an important monitoring role when firms are non-state-owned and when the ownership of the largest shareholder is relatively low. Our findings emphasize the role of ownership structure in explaining the effect of boardroom experience on board monitoring functions.

Particularly related to our study is Kang et al. (2016) who find that in the US rookie independent directors increase the firm value through their effective monitoring of CEOs. In contrast, our paper documents that in China rookie independent directors advance firm operating performance by reducing tunneling to controlling shareholders. The work of Kang et al. (2016) investigates the role of rookie independent directors to address the conflicts between shareholders and management, which is a principal-agent problem. However, our work focus on the role of rookie independent directors to address the conflicts between controlling shareholders and minority shareholders, which is a principal-principal problem. In addition, we find that, in state-owned firms, rookie independent directors are less effective advisers than seasoned independent directors. Our findings highlight the potential cost of appointing rookie independent directors in state-owned firms.

Our paper is related to another strand of literature exploring how board independence affects board functions and firm performance in China (Liu et al., 2014; Liu et al., 2015; He and Luo, 2018). We extend the literature by providing the first empirical evidence that, in China, career concerns motivate rookie independent directors to fulfill their monitoring roles and therefore improve firm operating performance.

The remainder of the paper is organized as follows. Section 2 discusses relevant literature and develops the hypothesis. Section 3 provides sample and variables construction. Section 4 presents the empirical method for testing and reports the main empirical results. Section 5 presents the robustness tests. The final section concludes the paper.

2. Literature and hypothesis development

Rookie independent directors lack a track record in the independent directorial labor market. Their performance as rookie directors likely influences their future careers as independent directors. Thus, career concerns suggest that rookie independent directors have stronger incentives than seasoned independent directors to develop reputations as diligent directors (Holmstrom, 1982, David,

[9] Claessens et al. (2002) and Liu and Tian (2012) provide evidence that the tunneling to controlling shareholders is more common when the controlling shareholders have more voting rights than cash flow rights. Jiang et al. (2010) argue that in China the largest shareholders have effective control over the firms even with relatively low shareholdings. Thus, the tunneling problem is more severe when the ownership of the largest shareholder is relatively low. Jiang et al. (2010) document a decline in tunneling activities in Chinese listed firms with the ownership of the largest shareholders.

2005. Board meetings are the main channel for independent directors to collect information, monitor the management and make decisions (Adams and Ferreira, 2008; Masulis et al., 2012; Chou et al., 2013; Masulis and Mobbs, 2014). Prior literature considers board meeting attendance a primary measure of directors' commitment to their directorship responsibilities (Masulis et al., 2012; Cai et al., 2009; Masulis and Mobbs, 2014). If rookie independent directors are more motivated than seasoned independent directors to work as diligent directors, rookie independent directors are more likely to attend board meetings than seasoned independent directors. This leads us to the director-level hypothesis:

Hypothesis 1. Rookie independent directors are less likely to miss board meetings than seasoned independent directors, ceteris paribus.

In contrast, rookie independent directors have less board experience. This more limited board experience may restrict their ability to coordinate with management and think strategically, which compromises their ability to provide management guidance on the operation of the firm (Kor and Sundaramurthy, 2009; Kim et al., 2014). Consistent with a positive relation between experience and ability, Ahern and Dittmar (2012) find that a female director quota decreases the firm value in Norway. Given the possible benefits and costs associated with rookie independent directors, their net effect on overall board functioning and firm performance is an empirical question. Consistent with the reputation story, Kang et al. (2016) find that, in the US, rookie independent directors positively impact corporate governance and firm value. Their evidence leads us to conjecture that:

Hypothesis 2. Firms with more rookie independent directors have better performance than their counterparts, ceteris paribus.

In China, one of the main agency conflicts is between minority and controlling shareholders. An important governance issue is the wealth expropriation of controlling shareholders from the minority shareholders. Thus, minimizing tunneling to the controlling shareholders is considered one of the main responsibilities of independent directors. Consistent with this view, prior literature on China considers minimizing tunneling to controlling shareholders one of the primary measures of directors' commitment and monitoring efficiency (Liu et al., 2015; He and Luo, 2018). If rookie independent directors have more incentive than seasoned independent directors to work as diligent monitors, there should be a negative relation between the presence of rookie independent directors and firm tunneling. Therefore, our hypothesis is:

Hypothesis 3. Rookie independent directors decrease tunneling to controlling shareholders, ceteris paribus.

Advising is another important role of directors (Adams et al., 2010). Kim et al. (2014) suggest that over time an independent director may obtain firm-specific knowledge through participating in board meetings and interacting with management and other directors. This firm-specific knowledge improves the board advisory function by reducing information asymmetry between boards and management. Consistent with this view, Kim et al. (2014) document a positive correlation between the advising performance of independent directors and their board experience (measured by director tenure). Due to the limited board experience, rookie independent directors are expected to be less effective in advising than seasoned independent directors. Following Kim et al. (2014), we measure the advising performance of independent directors using investment efficiency. Therefore, our hypothesis is:

Hypothesis 4. Rookie independent directors decrease investment efficiency, ceteris paribus.

Prior literature suggests that independent directors are rewarded for their efforts by the internal markets (the firms) and the external directorial labor markets. For example, David (2005) finds that after a firm experiences high stock returns its independent directors are less likely to lose their current directorships and more likely to obtain additional directorships from other firms. Similarly, Jiang, Jiang et al. (2015) find that in China independent directors, who are diligent monitors, receive future additional directorships from other firms.[10] Consistent with these studies, our hypothesis is:

Hypothesis 5a. Directors who miss board meetings are more likely to lose their current directorships, ceteris paribus.

Furthermore, Kang et al. (2016) find the positive relationship between firm performance and the likelihood of obtaining additional directorships is stronger for rookie independent directors than seasoned independent directors. This evidence suggests that the marginal benefit of effort is higher for rookie independent directors than seasoned independent directors. This leads us to the hypothesis:

Hypothesis 5b. The positive relationship between board meeting absences and director turnover is stronger for rookie independent directors than seasoned independent directors, ceteris paribus.

3. Sample and variable construction

3.1. Sample

We collect the independent director profile, meeting attendance record, turnover record, board composition and financial data from the Chinese Listed Firms Research Series database (CSMAR).[11] The sample for this study consists of all firms listed on the

[10] Jiang, Jiang et al. (2015) measure the monitoring of independent directors by their voting dissent in board meetings.

[11] The CSMAR database is widely regarded as the most comprehensive and authoritative database to study corporate finance and corporate

Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE) for the period 2008–2014. We start the sample from 2008 since the political background data is available in CSMAR after 2008. Because the motivations of politically connected directors maybe different from non-politically connected directors, we use political connections as a control in all regressions.

Following the prior literature, we exclude firms from financial and public utility industries in our sample. We also exclude firm-year observations with negative equity or negative sales. Following Jiang, Jiang et al. (2015), we exclude firms that only issue B-shares. To minimize the influence of outliers, we winsorize all firm financial characteristics at the top and bottom 0.5% percentiles. The Appendix presents variable definitions. Our final sample consists of 42,608 director-firm years and 12,433 firm-year observations. The number of firms in our sample ranges from 1238 in 2008 to 2189 in 2014. In the following sections, we construct variables.[12]

3.2. Dependent variables

3.2.1. Board meeting attendance

In China, publicly listed firms are required to disclose the board meeting attendance of their independent directors in their annual reports. The meeting attendance record in China discloses: 1) the number of board meetings that an independent director is required to attend during a year; 2) the number of board meetings that an independent director attended during a year (both physical and teleconference attendance); 3) the number of board meetings that an independent director misses or authorizes a representative to attend during a year. Compared to the US, board meeting attendance data in China is more precise and comprehensive.[13] We classify both "misses a board meeting" and "authorizes a representative to attend a board meeting" as a board meeting absence because in both scenarios the director avoids the effort to attend the board meeting. Also, the previous literature finds that both "misses a board meeting" and "authorizes a representative to attend a board meeting" have similar outcomes on firm operations. For example, Chou et al. (2013) find that in Taiwan, the board of directors improve firm performance through the board meetings they attend, while this positive effect disappears when the directors miss or send a representative to attend the board meetings.

We use the variables *Meeting absence(0/1)* and *Meeting absence(%)* as our measures of independent director board meeting absence. *Meeting absence(0/1)* is a dummy variable that equals 1 if an independent director misses any board meeting during a year and 0 otherwise. *Meeting absence(%)* is the ratio of the number of board meetings missed scaled by the number of board meetings required during a year. *Panel A* of Table 1 shows that 18.3% of independent directors miss at least one board meeting with an average board meeting absence rate 3.4%. Compared to those in Chou et al. (2013), independent directors in Chinese listed firms exhibit relatively high board meeting attendance.[14]

3.2.2. Firm performance

Liu et al. (2014) suggest that neither return on equity (ROE) nor Tobin's Q are proper performance measures for Chinese listed firm.[15] Following Liu et al. (2014), we measure firm accounting performance using return on sales (ROS) and return on assets (ROA). We calculate *ROS* as net income divided by sales and *ROA* as net income divided by total assets. *Panel C* of Table 1 reports that the mean of *ROS* and *ROA* is 6.1% and 3.7% respectively.

3.2.3. Tunneling to controlling shareholders

Jiang et al. (2010) document that in China, controlling shareholders often divert corporate resources from listed firms to the controlling shareholders' other entities (most of which are unlisted) through inter-corporate loans. These inter-corporate loans are typically reported on the balance sheets of lending firms under the accounting item "Other receivables".[16] In practice, controlling shareholders incur no interest charge on these inter-corporate loans, and even worse, the controlling shareholders often fail to repay the principal (Jiang et al., 2010; He and Luo, 2018). Jiang et al. (2010) show that firms with high *ORECTA(%)* (other receivables scaled by total assets) are more likely to experience poorer operating performance and face financial distress in the future.

We follow Jiang et al. (2010) and construct *ORECTA(%)* as our measure of tunneling to controlling shareholders, where *ORECTA(%)* equals other receivables scaled by total assets. *Panel C* of Table 1 shows the mean *ORECTA(%)* of Chinese listed firms is

(*footnote continued*)

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*.

[12] Please sees the Appendix for a summary of variable definitions.

[13] The US data is limited since it only discloses whether a director attends more than 75% of board meetings or not.

[14] Chou et al. (2013) find that independent directors in Taiwan listed firms only attend 70.8% of board meetings by themselves.

[15] Liu et al. (2014) argue that, in China, return on equity (ROE) fails to correctly reflect firm financial performances since it is often manipulated to satisfy a seasonal equity offering requirement. In China, Tobin's Q is not considered a proper measure of firm financial performances since there are huge price gaps between tradable and non-tradable shares. Non-tradable shares are typical owned by the government and were acquired at prices substantially lower than the initial public offering prices. The non-tradable shares were not permitted to be traded in the secondary market before David, 2005. In David, 2005, listed firms were required to gradually convert their non-tradable shares into tradable shares due to the state ownership reform. The ownership reform was basically completed by 2007. However, there are still restrictions for the former non-tradable shareholders on trading their shares. For example, the percentage of shares permitted to be traded and the lockup period

[16] Unlike "Accounts receivables", "Other receivables" does not record ordinary business transactions.

Table 1
Summary statistics.

	Obs	Mean	SD	25th	Median	75th
Panel A. Independent director characteristics (director-year)						
Rookie director(0/1)	42,608	0.257	0.437	0	0	1
Woman(0/1)	42,608	0.146	0.354	0	0	0
Busy director(0/1)	42,608	0.26	0.439	0	0	1
Director age(Ten years)	42,608	5.303	0.972	4.6	5.1	6
Tenure in firm(Years)	42,608	3.263	1.974	2	3	5
Number of directorships	42,608	1.955	1.283	1	1	3
Director compensation(Thousands CNY)	42,608	55.383	51.25	33.6	50	64.6
Political backgrounds(0/1)	42,608	0.398	0.489	0	0	1
Meeting frequency	42,608	7.983	3.95	5	8	10
Meeting absence(0/1)	42,608	0.183	0.387	0	0	0
Meeting absence(%)	42,608	0.034	0.094	0	0	0
$Turnover(0/1)_{t+1}$	35,775	0.122	0.328	0	0	0
Panel B. Board characteristics (firm-year)						
Rookie director(%)	12,432	0.256	0.302	0	0.2	0.4
Rookie board(0/1)	12,432	0.183	0.387	0	0	0
Women director(%)	12,432	0.151	0.198	0	0	0.333
Busy director(%)	12,432	0.18	0.248	0	0	0.333
First term(%)	12,432	0.609	0.369	0.333	0.667	1
Political director(%)	12,432	0.389	0.284	0.236	0.333	0.667
Director age(Avg)	12,432	5.288	0.593	4.867	5.250	5.675
Board size	12,432	8.843	1.728	8	9	9
Duality	12,432	0.238	0.426	0	0	0
Independent director(%)	12,432	0.37	0.054	0.333	0.333	0.4
$Term\ limit\ retirement(\%)_{t-1}$	9379	0.073	0.26	0	0	0
$First\text{-}year\ director(\%)_{t-1}$	9379	0.149	0.09	0.09	0.132	0.192
Panel C. Firm characteristics (firm-year)						
State-owned(0/1)	12,432	0.436	0.496	0	0	1
Largest shareholder(%)	12,432	0.361	0.154	0.239	0.341	0.472
Foreign ownership(%)	12,432	0.02	0.083	0	0	0
Total assets(Billions CNY)	12,432	7.675	21.721	1.151	2.389	5.536
Sales growth	12,432	0.171	0.493	−0.020	0.086	0.252
Firm age(Years)	12,432	15.004	5.274	11	15	19
Book leverage	12,432	0.466	0.241	0.281	0.463	0.637
R&D(%)	12,432	0.003	0.014	0	0	0
ROA	12,432	0.037	0.061	0.012	0.035	0.065
ROS	12,432	0.061	0.212	0.02	0.06	0.125
ORECTA(%)	12,019	0.019	0.036	0.004	0.008	0.019
Investment expenditure	12,122	0.069	0.077	0.017	0.047	0.096
Tobin's Q	12,122	1.915	1.698	0.819	1.455	2.398
CFO	12,122	0.045	0.095	−0.005	0.043	0.095

This table provides the summary statistics of variables. The Appendix provides variable definitions. Panel A provides the summary statistics of independent director characteristics by director-year. Panel B provides the summary statistics of board characteristics by firm-year. Panel C provides the summary statistics of firm characteristics by firm-year. All monetary terms are denominated in Chinese Yuan (CNY).

1.9% from 2008 to 2014, which is lower than that in Jiang et al. (2010) but similar to that in Qian and Yeung (2015).[17] The decline of *ORECTA(%)* is possibly due to the new regulation. Since 2006, the Chinese Security Regulatory Committee (CSRC) requires firms to disclose the actual amount of inter-corporate loans by the controlling shareholders. Despite the regulation, Qian and Yeung (2015) find the number of firms with non-zero ORECTA keeps increasing. This suggests that although the regulation appears to have decreased the magnitude of tunneling, the practice remains common and continues to spread.

3.2.4. Investment expenditure

Following previous literature, we construct *Investment expenditure*, which is net cash flow for fixed assets, intangible assets, and other long-term assets scaled by total assets at the beginning of the year (Chen et al., 2011; Liu et al., 2015). *Panel C* of Table 1 reports that the mean *Investment expenditure* of Chinese listed firms is 6.9%, which is similar to Liu et al. (2015).[18]

3.2.5. Director turnover

Following David, 2005), our measure $Turnover(0/1)_{t+1}$ is a dummy variable equals 1 for an observation in year t if an

[17] Jiang et al. (2010) report that the average *ORECTA(%)* was 8.1% from 1996 to 2004. Qian and Yeung (2015) report that the average *ORECTA(%)* decreased to 2.18% in 2009

[18] Liu et al. (2015) reports that the average *Investment expenditure* of Chinese listed firms is 7.1% from 1999 to 2012.

independent director does not appear in the annual report in year $t + 1$ and 0 otherwise. We exclude observations from delisted firms. In China, independent directors are nominated by shareholders or management.[19] Then, independent directors are elected for three-year terms at the shareholder's general meeting. In China, An independent director can only serve for a maximum of two terms in a given company. Because of the term limit regulation, we exclude the directors leaving the board in the year 6 or year 7.[20] We drop observations from firms that violate the term limit regulation.[21] *Panel A* of Table 1 reports the average turnover rate of independent directors is 12.2%.

3.3. Variables of interest

Following Kang et al. (2016), we classify independent directors into rookie independent directors and seasoned independent directors based on their previous board experience. We define rookie independent directors as independent directors who have less than three years of boardroom experience and seasoned independent directors as independent directors who have three or more years of boardroom experience. The three year cutoff for rookies is from Kang et al. (2016). We calculate the board experience of an independent director in the year t by aggregating the previous board experience of this individual before year t. We do not distinguish between directorial experience as an independent director or as an inside director. In the calculation of cumulative board experience, we trace the directorial appointment data back to 1999, where CSMAR database starts to provide director level data. For example, if an individual sitting on board A from 2004 to 2007 (three years) has no board appointment between 2009 and 2011, this individual is classified as a seasoned director when he or she obtains a board seat in 2012.

In the directorship level analysis, we use *Rookie director(0/1)* to measure rookie independent directors. *Rookie director(0/1)* is a dummy variable that equals 1 if an independent director has less than three years of boardroom experience and 0 otherwise. *Panel A* of Table 1 shows that 25.7% of independent directors are rookie independent directors. In the firm level analysis, we use either *Rookie director(%)* or *Rookie board(0/1)* to measure the rookie board. *Rookie director(%)* is the ratio of rookie independent directors that serve on the board. *Rookie board(0/1)* is a dummy variable that equals 1 if the majority of independent directors are rookies and 0 otherwise. *Panel B* of Table 1 shows that for 18.3% of boards the majority of independent directors are rookies.

3.4. Control variables

In the directorship level regressions, which are used to study the board meeting attendance and director turnover, we control for the director, board and firm features. The directorship level control variables include *Woman(0/1)*, *Director age(Ten years)*, *Tenure in firm(Years)*, *Busy director(0/1)*, *Ln(Director compensation)*, *Political backgrounds(0/1)* and *Meeting frequency*. The board level control variables include *Ln(Board size)*, *Duality* and *Independent director(%)*. The firm level control variables include *State-owned(0/1)*, *Largest shareholder(%)*, *Ln(Total assets)*, *Book leverage* and *ROA*.

In the firm level regressions, which are used to study firm performance, tunneling and investment expenditure, we control for a wide array of firm characteristics including board composition, ownership structure and financial characteristics that prior literature has shown to be related to firm performance, tunneling and investment expenditure.[22] The board level control variables include *Women director(%)*, *Busy director(%)*, *Political director(%)*, *Director age(Avg)*, *First term(%)*, *Ln(Board size)*, *Duality* and *Independent director(%)*. The firm level control variables include *State-owned(0/1)*, *Largest shareholder(%)*, *Foreign ownership(%)*, *Ln(Total assets)*, *Sales growth*, *Ln(Firm age)*, *Book leverage*, *CFO*, *Ln(Tobin's Q)*, ROA_{t-1} and *R&D(%)*.

In Table 1, we report the summary statistics of control variables. In China, 14.6% of independent directors are female and 26% are busy directors.[23] In our sample, the average independent director is 53.03 years old, serves on the current firm for 3.26 years and has 1.96 directorships. The average annual independent director compensation is 55,383 CNY (equivalent to 8145 USD with the exchange rate of 6.8 CNY/USD), which is similar to that in Chen and Keefe (2018).[24] In our sample, 38.9% of independent directors have political backgrounds.[25] In China, the average board has eight board meetings each year.

On average, the Chinese boards have 8.8 members. In 23.8% of Chinese boards, the CEO and chairman are the same person. 37%

[19] In China, the board of directors, supervisory board members or the shareholder who holds not less than 1% of the shares in the listed company can nominate the candidate for independent directors. Sees Chen and Keefe (2018) for a detail discussion on the appointment process of independent directors.

[20] Director turnover due to the term limit regulation is mechanical. For example, an independent director appointed the board at the beginning of year 1 can only serve until the end of year 6. An independent director appointed to the board in the middle or end of year 1 can only serve until the middle or end of year 7. Therefore, we exclude the directors leaving the board in the year 6 if they are appointed at the beginning of year 1. We exclude the directors leaving the board in the year 7 if they are appointed in the middle or end of year 1.

[21] We delete 1733 of director-year observations due to the term limit violation. In an unreported table, we re-estimate *Turnover(0/1)t + 1* with the sample where the deleted sample (directors serving the board beyond the term limit) is included. The result remains unchanged.

[22] In the regressions on tunneling, we control for board composition and a similar set of control variables as in Jiang et al. (2010). Our regressions on investment expenditure share a similar set of control variable as in Liu et al. (2015).

[23] Giannetti et al. (2015) find that in China 16.2% of independent directors are busy directors from 1999 to 2009.

[24] Chen and Keefe (2018) find that, during David, 2005–2015, the average annual compensation for independent directors equals 57,654 CNY (equivalent to 8478 USD with the exchange rate of 6.8 CNY/USD).

[25] In our sample, 30.7% of rookie independent directors have a political background, while 42.8% of seasoned independent directors have a political background.

of board members are independent directors. In our sample, 43.6% of firms are state-owned. The largest shareholders on average own 36.1% of the shares of the listed firm. In our sample, the average foreign ownership is 2%, which is similar to Liu et al. (2015).[26] Chinese listed firms are relatively young, with an average firm age equals 15 years. The average firm has total book assets of 7.68 billion CNY (equivalent to 1.13 billion USD with the exchange rate of 6.8 CNY/USD), sales growth rate of 17.1%, book leverage of 46.6%, research and development expenditure of 0.3% and operating cash flow of 4.5%.[27] The Appendix provides a summary of variable definitions.

In Table 2, we report the correlation matrix of variables from the regressions on firm performance. Neither *Rookie director(%)* nor *Rookie board(0/1)* is highly correlated with any of the control variables. Specifically, the correlation coefficient between *Rookie director(%)* and *Busy director(%)* is −12.4%, indicating that the measure of rookie directors and busy directors is not a mechanical relationship.

4. Test approach and results

4.1. Are rookie independent directors more diligent directors?

In this section, we explore whether rookie independent directors are more diligent than seasoned independent directors. Following the prior literature, we measure diligence by board meeting attendance (Adams and Ferreira, 2008; Masulis et al., 2012; Chou et al., 2013; Cai et al., 2009). In our sample, about 15.9% of rookie independent directors and 19.3% of seasoned independent directors miss at least one board meeting. This difference of 3.4% is statistically significant at less than the 1% level. Similarly, the average board meeting absence rate for rookie independent directors is 3.0%, while the average board meeting absence rate for seasoned independent directors is 3.6%. That difference of 0.6% is statistically significant at less than the 1% level. These sample statistics are consistent with Hypothesis 1, which advances that rookie independent directors are less likely to miss board meetings than seasoned independent directors.

To control for possible confounding factors, we estimate several linear probability models to understand the board meeting attendance of rookie independent directors. The unit of observation is a director-firm-year. The regressions control for year, industry, firm, director and firm*year fixed effects. Our estimation equation is as follows:

$$Meeting\ \ Attendance_{i,f,t} = \alpha Rookie_{i,f,t} + \mathbf{X}\beta + \delta_t + \delta_j + \delta_f + \delta_i + \delta_{f,t} + \epsilon_{i,f,t} \quad (1)$$

where i represents the director, f the firm, t the year and j the industry. The dependent variable is either *Meeting absence(0/1)* or *Meeting absence(%)*. The variable of interest is *Rookie director(0/1)*. $\mathbf{X}$ is a matrix of control variables previously described in Section 3.4. δ_t, δ_j, δ_f, δ_i and δ_{ft} denote year, industry, firm, director and firm*year fixed effects respectively. ϵ_{ijt} is the error term. To control for potential serial correlation, we use robust standard errors adjusted for firm-level clustering and heteroskedasticity. We apply linear probability regressions to study *Meeting absence(0/1)* for two reasons. First, the marginal effects of linear probability regressions are easy to obtain and interpret.[28] Second, the marginal effects from logit and probit regressions can not be properly estimated when fixed effects are included.[29] We exclude observations in which an independent director has served on a board for less than a year.[30]

Table 3 reports estimation results of Eq. (1), which investigates the board meeting attendance of rookie independent directors. In Columns (1) to (4), the dependent variable is *Meeting absence(0/1)*. In Columns (5) to (8), the dependent variable is *Meeting absence (%)*. In Columns (1) and (5), we include year and industry fixed effects in our regressions. In Columns (2) and (6), we include year and firm fixed effects in our regressions. The firm fixed effects control for any time-invariant firm-specific factors that affect the board meeting attendance of independent directors. In Columns (3) and (7), we include year, industry and director fixed effects into our regressions. The director fixed effects control for any time-invariant director-specific factors that affect board meeting attendance of independent directors. In Columns (4) and (8), we include the firm*year fixed effects into our regressions. The regressions with firm*year fixed effects only allow variation of board meeting attendance among directors serving on the same board at the same time. Therefore, any found difference in board meeting attendance is due to the variation of director characteristics. For example, whether an independent director is a rookie or not.

In Column (1), the coefficient associated with *Rookie director(0/1)* is negative and statistically significant at the less than 5% level in explaining the probability of board meeting absences *Meeting absence(0/1)*. The above results support Hypothesis 1 that rookie independent directors are more diligent directors. The marginal effect of the coefficient associated with *Rookie director(0/1)* is −0.013, suggesting that rookie independent directors are 1.3% less likely to miss at least one board meeting than seasoned independent directors. A 1.3% decrease represents a 7.1% relative decrease from the average probability of board meeting absences of 18.3%.

[26] Following Liu et al. (2015), we measure foreign ownership by the percent of B-shares and H-shares issued by a firm.

[27] Following Liu et al. (2015), we calculate the sales growth rate by taking the average of sales growth rate over the last three years. Following Chen et al. (2011), we measure operating cash flow as net cash flow from operation scaled by total assets at the beginning of the year.

[28] In unreported tables, we estimate *Meeting absence(0/1)* using logit regressions with year, industry, firm, director and firm*year fixed effects. The results from logit regressions are similar to those from linear probability regressions.

[29] Simonetta and Simonetta and Alita (2015) suggest that, for logit regressions with fixed effects, marginal effects can only be estimated for the special case where the unobserved heterogeneity is zero (fixed effects equals zero). However, these marginal effects are of little value.

[30] After excluding those observations, board meeting attendance data in the remaining sample would have the same duration (one-year duration for all remaining observations).

Table 2
Cross correlations.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) *ROS*	1									
(2) *ROA*	0.733***	1								
(3) *Rookie director(%)*	0.0420***	0.0648***	1							
(4) *Rookie board(0/1)*	0.0575***	0.0719***	0.828***	1						
(5) *Women director(%)*	0.00795	−0.00475	0.0321***	0.0246**	1					
(6) *Busy director(%)*	0.0454***	0.0609***	−0.124***	−0.0871***	−0.0656***	1				
(7) *First term(%)*	0.0437	0.0605	0.328***	0.267***	−0.00749	0.162	1			
(8) *Director age(Avg)*	0.0238**	0.0191*	−0.153***	−0.126***	−0.0761***	0.0450***	−0.156***	1		
(9) *Political director(%)*	0.0289***	0.00596	−0.120***	−0.105***	−0.0567***	0.131***	−0.0375***	0.318***	1	
(10) *Ln(Board size)*	0.00124	0.0211*	−0.0280**	−0.0343***	−0.0544***	−0.0156	−0.0440***	0.0634***	0.0772***	1
(11) *Duality*	0.0367***	0.0500***	0.0756***	0.0841***	0.00963	0.0263**	0.0936***	−0.0492***	−0.0362***	−0.153***
(12) *Independent director(%)*	0.0121	−0.0207*	0.00226	−0.0201*	−0.0176*	0.0198*	0.00457	0.0382***	−0.0113	−0.420***
(13) *State-owned(0/1)*	−0.0708***	−0.136***	−0.122***	−0.120***	−0.0447***	−0.0457***	−0.172***	0.116***	0.0773***	0.253***
(14) *Largest shareholde r(%)*	0.104***	0.121***	0.0116	0.0202*	−0.0559***	0.0714***	0.0395***	0.127***	0.0633***	0.0163
(15) *Foreign ownership(%)*	−0.0361***	−0.0317***	−0.0407***	−0.0367***	−0.0284**	0.0448***	−0.0614***	0.0678***	0.0144	0.0780***
(16) *Ln(Total assets)*	0.0920***	0.0561***	−0.152***	−0.146***	−0.0620***	0.0866***	−0.166***	0.223***	0.118***	0.275***
(17) *Sales growth*	0.223***	0.265***	−0.0248**	−0.0177*	−0.0121	0.00246	0.0172*	−0.00304	0.00542	0.0220*
(18) *Ln(Firm age)*	−0.0819***	−0.124***	−0.171***	−0.172***	0.0217*	−0.0747***	−0.227***	0.0404***	−0.0170	0.00991
(19) *Book leverage*	−0.316***	−0.409***	−0.137***	−0.143***	−0.0258**	−0.0510***	−0.178***	0.0258**	0.0423***	0.125***
(20) *R&D(%)*	0.0624***	0.0226*	−0.00402	0.00361	0.00193	−0.00357	−0.00316	−0.0170	−0.0324***	−0.0466***

	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(1) *ROS*										
(2) *ROA*										
(3) *Rookie director(%)*										
(4) *Rookie board(0/1)*										
(5) *Women director(%)*										
(6) *Busy director(%)*										
(7) *First term(%)*										
(8) *Director age(Avg)*										
(9) *Political director(%)*										
(10) *Ln(Board size)*										
(11) *Duality*	1									
(12) *Independent director(%)*	0.0823***	1								
(13) *State-owned(0/1)*	−0.279***	−0.0453***	1							
(14) *Largest shareholder(%)*	−0.0533***	0.0588***	0.163***	1						
(15) *Foreign ownership(%)*	−0.0478***	0.00261	0.133***	0.0313***	1					
(16) *Ln(Total assets)*	−0.187***	0.0392***	0.353***	0.291***	0.143***	1				
(17) *Sales growth*	−0.00212	−0.000552	−0.0104	0.0669***	−0.0441***	0.112***	1			
(18) *Ln(Firm age)*	−0.107***	−0.0233**	0.165***	−0.159***	0.118***	0.0924***	−0.0455***	1		
(19) *Book leverage*	−0.165***	−0.0140	0.292***	0.0200*	0.103***	0.330***	0.0127	0.239***	1	
(20) *R&D(%)*	0.0498***	0.0154	−0.0539***	−0.0430***	−0.0256**	−0.0597***	0.00756	−0.0689***	−0.116***	1

This table provides the correlation matrix for variables from regressions on firm performance. The Appendix provides variable definitions. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Table 3
Rookie directors and board meeting attendance.

	Meeting absence(0/1)				*Meeting absence(%)*			
Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rookie director(0/1)	−0.013**	−0.016***	−0.015**	−0.016***	−0.005***	−0.006***	−0.004**	−0.006***
	(−2.51)	(−3.04)	(−2.30)	(−2.68)	(−3.44)	(−3.99)	(−2.49)	(−3.16)
Woman(0/1)	−0.006	−0.008		−0.014**	−0.001	−0.001		−0.002
	(−1.19)	(−1.44)		(−2.43)	(−0.81)	(−0.80)		(−0.97)
Director age(Ten years)	−0.006***	−0.006***	0.011	−0.007***	−0.002**	−0.001*	0.020	−0.001*
	(−2.95)	(−2.85)	(0.11)	(−2.92)	(−2.16)	(−1.88)	(0.59)	(−1.68)
Tenure in firm(Years)	0.006***	0.005***	0.009***	0.006***	0.002***	0.002***	0.002***	0.003***
	(4.83)	(4.07)	(6.14)	(4.23)	(4.67)	(4.85)	(5.24)	(5.00)
Busy director(0/1)	−0.001	0.000	0.008	0.000	−0.002*	−0.001	−0.001	−0.002
	(−0.21)	(0.09)	(0.90)	(0.08)	(−1.76)	(−1.01)	(−0.60)	(−1.05)
Ln(Director compensation)	0.002***	0.001	0.003***	0.001	−0.001**	−0.001**	−0.000	−0.000
	(3.48)	(0.78)	(3.41)	(1.13)	(−2.07)	(−2.57)	(−1.16)	(−0.60)
Political backgrounds(0/1)	0.004	0.003	−0.221***	0.003	0.001	0.000	−0.019	0.001
	(1.11)	(0.70)	(−3.59)	(0.67)	(0.78)	(0.35)	(−0.71)	(0.34)
Meeting frequency	0.008***	0.011***	0.010***	0.011***	−0.002***	−0.002***	−0.001***	−0.002***
	(15.70)	(17.73)	(15.08)	(10.36)	(−7.85)	(−6.57)	(−7.05)	(−4.58)
Ln(Board size)	0.164***	0.002	0.087***		0.037***	0.008	0.020***	
	(15.24)	(0.08)	(4.94)		(7.81)	(1.08)	(3.94)	
Duality	−0.002	0.001	−0.003		0.002	0.004	0.001	
	(−0.35)	(0.11)	(−0.46)		(0.96)	(1.43)	(0.60)	
Independent director(%)	0.141***	−0.109	0.083		0.046***	−0.015	0.035**	
	(3.91)	(−1.63)	(1.51)		(2.87)	(−0.71)	(2.25)	
State-owned(0/1)	0.035***	0.023	0.038***		0.007***	0.006	0.008***	
	(8.26)	(1.44)	(4.89)		(4.00)	(0.85)	(3.49)	
Largest shareholder(%)	−0.018	−0.036	−0.050**		−0.008	−0.009	−0.014**	
	(−1.40)	(−0.91)	(−2.29)		(−1.40)	(−0.71)	(−2.43)	
Ln(Total assets)	−0.000	−0.013**	−0.008**		0.001	−0.000	−0.001	
	(−0.04)	(−2.28)	(−2.32)		(1.10)	(−0.20)	(−0.68)	
Book leverage	0.038***	0.003	0.063***		0.010**	0.001	0.012***	
	(3.87)	(0.15)	(4.13)		(2.19)	(0.20)	(2.65)	
ROA	−0.004	0.020	0.082*		−0.007	−0.001	0.014	
	(−0.12)	(0.44)	(1.84)		(−0.52)	(−0.06)	(0.96)	
Year effects	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Industry effects	Yes	No	Yes	No	Yes	No	Yes	No
Firm effects	No	Yes	No	No	No	Yes	No	No
Director effects	No	No	Yes	No	No	No	Yes	No
Firm*year effects	No	No	No	Yes	No	No	No	Yes
R^2	0.030	0.186	0.345	0.412	0.022	0.151	0.364	0.354
Observations	42,608	42,608	42,608	42,608	42,608	42,608	42,608	42,608

This table provides estimation results of Eq. (1), which investigates the board meeting attendance of rookie independent directors. In Columns (1) to (4), the dependent variable is *Meeting absence(0/1)*, a dummy variable that equals 1 if an independent director absents any board meetings and 0 otherwise. In Columns (5) to (8), the dependent variable is *Meeting absence(%)*, the ratio of board meeting absences. The measure of rookie independent director is *Rookie director(0/1)*, a dummy variable that equals 1 if an independent director has less than three years board experience and 0 otherwise. The Appendix provides variable definitions. The regressions control for year, industry, firm, director and firm*year fixed effects. In parentheses are t-statistics based on standard errors adjusted for heteroskedasticity and firm clustering. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

In Column (5), the coefficient associated with *Rookie director(0/1)* is negative and statistically significant at the less than 1% level in explaining the board meeting absence rate *Meeting absence(%)*. The above result suggests that rookie independent directors have a lower board meeting absence rate than seasoned independent directors. In Column (5), the coefficient associated with *Rookie director (0/1)* is −0.005, suggesting that the board meeting absence rate of rookie independent directors is 0.5% lower than that of seasoned independent directors. A 0.5% decrease represents 14.7% relative decrease from the average board meeting absence rate of 3.4%. In Columns (2) to (4) and Columns (6) to (8), the coefficients associated with *Rookie director(0/1)* are negative and statistically significant at the less than 5% level in explaining *Meeting absence(0/1)* and *Meeting absence(%)*. Therefore, our results are robust to year, industry, firm, director and firm*year fixed effects.

4.2. Rookie directors and firm performance

In this section, we examine the relationship between rookie independent directors and firm performance. We estimate regressions of firm performance against the presence of rookie independent directors. The unit of observation for the regression is a firm-year. We include the firm fixed effects to control for any time-invariant firm factors that relate to both firm performance and the presence of rookie independent directors. Our estimation equation is as follows:

Table 4
Rookie directors and firm performance.

	ROS(*NetIncome/Sales*)		*ROA*(*NetIncome/Assets*)	
Explanatory variables	(1)	(2)	(3)	(4)
Rookie director(%)	0.024***		0.007***	
	(2.90)		(3.66)	
Rookie board(0/1)		0.021***		0.005***
		(3.74)		(3.20)
Women director(%)	0.031	0.031	0.005	0.005
	(1.56)	(1.56)	(1.05)	(1.07)
Busy director(%)	−0.011	−0.012	−0.001	−0.001
	(−1.06)	(−1.17)	(−0.30)	(−0.43)
Political director(%)	−0.000	−0.000	−0.004	−0.004
	(−0.03)	(−0.03)	(−1.01)	(−1.06)
Director age(Avg)	0.008	0.007	0.003	0.002
	(0.99)	(0.89)	(1.26)	(1.00)
First term(%)	0.008	0.007	0.003*	0.002
	(1.30)	(1.21)	(1.93)	(1.45)
Ln(Board size)	−0.016	−0.015	−0.001	−0.000
	(−0.53)	(−0.50)	(−0.07)	(−0.03)
Duality	0.006	0.006	0.003	0.003
	(0.62)	(0.60)	(1.24)	(1.23)
Independent director(%)	0.018	0.022	−0.014	−0.012
	(0.25)	(0.32)	(−0.76)	(−0.68)
State-owned(0/1)	−0.038	−0.039	−0.023***	−0.023***
	(−1.26)	(−1.29)	(−3.36)	(−3.39)
Largest shareholder(%)	0.159**	0.158**	0.061***	0.061***
	(2.38)	(2.36)	(3.46)	(3.46)
Foreign ownership(%)	0.341	0.341	0.037	0.035
	(1.34)	(1.35)	(0.55)	(0.53)
Ln(Total assets)	0.034***	0.035***	0.004	0.004
	(3.17)	(3.18)	(1.55)	(1.57)
Sales growth	0.110***	0.110***	0.035***	0.035***
	(9.31)	(9.31)	(18.23)	(18.20)
Ln(Firm age)	−0.002	−0.002	−0.000	−0.000
	(−0.91)	(−0.90)	(−0.83)	(−0.94)
Book leverage	−0.452***	−0.452***	−0.136***	−0.136***
	(−10.39)	(−10.40)	(−14.90)	(−14.92)
R&D(%)	−0.263*	−0.260*	−0.121**	−0.122**
	(−1.72)	(−1.71)	(−2.23)	(−2.26)
Year effects	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes
R^2	0.129	0.130	0.195	0.195
Observations	12,432	12,432	12,432	12,432

This table provides estimation results of Eq. (2), which investigates the relationship between rookie independent directors and firm performance. We use both *Rookie director(%)* and *Rookie board(0/1)* to proxy the presence of rookie independent directors. *Rookie director(%)* is the ratio of rookie independent directors. *Rookie board(0/1)* is a dummy variable that equals 1 if the majority of independent directors are rookies. In Columns (1) and (2), the firm performance is measured by *ROS*. In Columns (3) and (4), the firm performance is measured by *ROA*. The Appendix provides variable definitions. All regressions control for year and firm fixed effects. In parentheses are t-statistics based on standard errors adjusted for heteroskedasticity and firm clustering. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

$$Firm\ \ Performance_{f,t} = \alpha Rookie_{f,t} + \mathbf{X}\beta + \delta_t + \delta_f + \epsilon_{f,t} \tag{2}$$

where f represents the firm and t the year. In regressions, the dependent variable is either *ROS* (return on sales) or *ROA* (return on assets). The variable of interest is either *Rookie director(%)* or *Rookie board(0/1)*. $\mathbf{X}$ is a matrix of control variables previously described in Section 3.4. δ_t and δ_f denote year and firm fixed effects respectively. ϵ_{ft} is the error term. To control for potential serial correlation, we use robust standard errors adjusted for firm-level clustering and heteroskedasticity.

Table 4 presents estimation results of Eq. (2). In Columns (1) and (2), the dependent variable is *ROS*. In Columns (3) and (4), the dependent variable is *ROA*. In Columns (1) and (3), we find that the coefficients associated with *Rookie director(%)* are positive and statistically significant at the less than 1% level in explaining *ROS* and *ROA*. In Columns (2) and (4), we find that the coefficients associated with *Rookie board(0/1)* are positive and statistically significant at the less than 1% level in explaining *ROS* and *ROA*. These results are consistent with Hypothesis 2, which advances that firms with more rookie independent directors perform better.

Columns (2) and (4) interpret the economic importance of our results. Column (2) shows that the *ROS* of firms with a majority of rookie independent directors is 2.1% higher than the firms without a majority of rookie independent directors, which is equivalent to an increase of 34.4% relative to the average *ROS* 6.1%. Column (4) shows that the *ROA* of firms with a majority of rookie independent directors is about 0.5% higher than their counterparts, which is equivalent to an increase of 13.5% relative to the average *ROA* of

3.7%.

4.3. What are the potential channels through which rookie independent directors affect firm performance?

Previous literature recognizes that monitoring and advising are two main functions of the board of directors. Therefore, we investigate whether rookie independent directors affect firm operating performance through monitoring and advising. In China, the main agency conflict is between minority and controlling shareholders. The corresponding monitoring focus of independent directors is to decrease tunneling to controlling shareholders. Thus, rookie independent directors may improve firm performance if they provide effective monitoring of tunneling. Another important function of the board of directors is to provide management guidance on the operation of the firms. Kim et al. (2014) suggest that one of the main focus of board advisory functions is to provide management guidance on investment policy. They measure the advising performance of independent directors using investment efficiency. Following Kim et al. (2014), we measure the advising functions of rookie independent directors through investment efficiency.

4.3.1. Rookie independent directors and tunneling

In this section, we estimate the presence of rookie independent directors on tunneling behavior of controlling shareholders. The unit of observation for the regressions is a firm-year. We include the year, industry and firm fixed effects. Our estimation equation is as follows:

$$ORECTA_{f,t} = \alpha Rookie_{f,t} + \mathbf{X}\beta + \delta_t + \delta_j + \delta_f + \epsilon_{f,t} \quad (3)$$

where f represents the firm, t the year and j the industry. In the regressions, the dependent variable is *ORECTA(%)*. The variable of interest is either *Rookie director(%)* or *Rookie board(0/1)*. **X** is a matrix of control variables previously described in Section 3.4. δ_t, δ_j and δ_f denote year, industry and firm fixed effects respectively. ϵ_{ft} is the error term. To control for potential serial correlation, we use robust standard errors adjusted for firm-level clustering and heteroskedasticity.

Table 5 presents the estimation results of Eq. (3), which investigates the relationship between rookie independent directors and tunneling to controlling shareholders. In Columns (1) and (2), we include year and industry fixed effects. In Columns (3) and (4), we include year and firm fixed effects. The firm fixed effects control for any time-invariant firm factors that relate to both the presence of rookie independent directors and tunneling to controlling shareholders.

In Column (1), the coefficient associated with *Rookie director(%)* is negative and statistically significant at the less than 5% level in explaining *ORECTA(%)*. Similarly, in Column (2), the coefficient associated with *Rookie board(0/1)* is negative and statistically significant at the less than 5% level in explaining *ORECTA(%)*. These results are consistent with Hypothesis 3 that rookie independent directors decrease tunneling to controlling shareholders. Column (2) shows that, in economic terms, the *ORECTA(%)* of firms with a majority of rookie independent directors is about 0.3% lower than that of the firms without a majority of rookie independent directors, a decrease of tunneling equaling to 15.8% relative decrease from the average *ORECTA(%)* of 1.9%. In dollar terms, this decrease of tunneling equals 23 million CNY (equivalent to 3.38 million USD with the exchange rate of 6.8 CNY/USD).

In Columns (3) and (4), which include firm fixed effects, the coefficient associated with *Rookie director(%)* is negative and statistically significant at the less than 5% level and the coefficient associated with *Rookie board(0/1)* is negative and statistically significant at the less than 1% level in explaining *ORECTA(%)*. Our results are robust to the inclusion of firm fixed effects.

4.3.2. Rookie independent directors and investment efficiency

Following previous literature, we measure firms' investment efficiency as the sensitivity of investment expenditures to investment opportunities (Chen et al., 2011; Liu et al., 2015). Our estimation equation of rookie independent directors on investment efficiency is as follows:

$$\begin{aligned} Investment\ \ Expenditure_{f,t} &= \alpha_1 Rookie_{f,t} + \alpha_2 Ln(Tobin's\,Q)_{f,t} \\ &+ \alpha_3 Rookie_{f,t} * Ln(Tobin's\,Q)_{f,t} + \mathbf{X}\beta + \delta_t + \delta_f + \epsilon_{f,t} \end{aligned} \quad (4)$$

where f represents the firm and t the year. The dependent variable is *Investment expenditure*. The main variable of interest is the interaction term between rookie indicators (*Rookie director(%)* or *Rookie board(0/1)*) and the measure of investment opportunities (*Ln(Tobin's Q)*, which is the natural logarithm of Tobin's Q). A positive (negative) interaction term between *Rookie director(%)* (or *Rookie board(0/1)*) and *Ln(Tobin's Q)* indicates that, if firms have more rookie independent directors on boards, their investment expenditures become more (less) sensitive to investment opportunities. **X** is a matrix of control variables previously described in Section 3.4. δ_t and δ_f denote year and firm fixed effects respectively. To control for potential serial correlation, we use robust standard errors adjusted for firm-level clustering and heteroskedasticity.

Table 6 reports the estimation results of Eq. (4). In Columns (1) and (2), the interaction terms between rookie indicators (*Rookie director(%)* or *Rookie board(0/1)*) and *Ln(Tobin's Q)* are statistically no different than zero in explaining *Investment expenditure* in our full sample. However, in Columns (3) and (4), the interaction terms between rookie indicators (*Rookie director(%)* or *Rookie board(0/1)*) and *Ln(Tobin's Q)* are negative and statistically significant at the less than 5% level in explaining *Investment expenditure* in state-owned firms. The above results suggest that, although the presence of rookie independent directors has no impact on investment efficiency in our full sample, it is negatively associated with investment efficiency in state-owned firms. Our findings indicate the potential cost of appointing rookie directors to state-owned firms.

Table 5
Rookie directors and tunneling.

	ORECTA(%)			
Explanatory variables	(1)	(2)	(3)	(4)
Rookie director(%)	−0.004**		−0.004**	
	(−2.32)		(−2.12)	
Rookie board(0/1)		−0.003**		−0.003***
		(−2.34)		(−2.76)
Women director(%)	−0.002	−0.002	−0.001	−0.001
	(−1.09)	(−1.12)	(−0.27)	(−0.28)
Busy director(%)	−0.001	−0.001	0.001	0.001
	(−0.81)	(−0.73)	(0.65)	(0.74)
Political director(%)	0.000	0.000	−0.002	−0.002
	(0.15)	(0.17)	(−0.79)	(−0.77)
Director age(Avg)	−0.001	−0.001	0.001	0.001
	(−1.08)	(−1.01)	(0.54)	(0.70)
First term(%)	−0.002**	−0.002*	−0.002**	−0.002*
	(−2.06)	(−1.79)	(−1.97)	(−1.93)
Ln(Board size)	−0.001	−0.002	−0.004	−0.004
	(−0.55)	(−0.61)	(−0.84)	(−0.87)
Duality	−0.001	−0.001	0.001	0.001
	(−0.92)	(−0.90)	(0.58)	(0.59)
Independent director(%)	0.006	0.006	0.006	0.006
	(0.79)	(0.71)	(0.47)	(0.42)
State-owned(0/1)	−0.003**	−0.003**	−0.006	−0.006
	(−2.18)	(−2.14)	(−0.69)	(−0.68)
Largest shareholder(%)	−0.017***	−0.017***	−0.018	−0.018
	(−5.42)	(−5.43)	(−1.28)	(−1.27)
Ln(Total assets)	−0.003***	−0.003***	−0.008***	−0.008***
	(−4.95)	(−4.96)	(−3.85)	(−3.87)
ROA_{t-1}	−0.075***	−0.075***	−0.041***	−0.041***
	(−7.38)	(−7.35)	(−2.96)	(−2.95)
Year effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	No	No
Firm effects	No	No	Yes	Yes
R^2	0.089	0.089	0.135	0.135
Observations	12,019	12,019	12,019	12,019

This table provides estimation results of Eq. (3), which investigates the relationship between rookie independent directors and tunneling to controlling shareholders. We use both *Rookie director(%)* and *Rookie board(0/1)* to proxy the presence of rookie independent directors. *Rookie director (%)* is the ratio of rookie independent directors. *Rookie board(0/1)* is a dummy variable that equals 1 if the majority of independent directors are rookies. We measure the tunneling behavior of controlling shareholders by *ORECTA(%)*, which is other receivables scaled by total assets. The Appendix provides variable definitions. The regressions control for year, industry and firm fixed effects. In parentheses are t-statistics based on standard errors adjusted for heteroskedasticity and firm clustering. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

4.4. Are rookie independent directors rewarded more for their efforts?

In this section, we examine the potential benefits to rookie independent directors from attending meetings. We estimate linear probability models regarding the effects of meeting attendance on director turnover.[31] The unit of observation for the regression is a director-firm-year. The regressions control for year, industry, firm, director and firm*year fixed effects. Our estimation equation is as follows:

$$Turnover_{i,f,t+1} = \alpha_1 Rookie_{i,f,t} + \alpha_2 Meeting\ \ Attendance_{i,f,t} + \alpha_3 Rookie_{i,f,t} * Meeting\ \ Attendance_{i,f,t} + \mathbf{X}\beta + \delta_t + \delta_j + \delta_f + \delta_i + \delta_{f,t} + \epsilon_{i,f,t} \quad (5)$$

where i represents the director, f the firm, t the year and j the industry. The dependent variable is $Turnover(0/1)_{t+1}$. The variables of interest are *Rookie director(0/1)*, *Meeting absence(0/1)* and its interaction term. The interaction term between *Rookie director(0/1)* and *Meeting absence(0/1)* isolates the sensitivity of rookie independent directors (*versus* seasoned independent directors) of board meeting attendance on director turnover. A positive (negative) interaction term between *Rookie director(0/1)* and *Meeting absence(0/1)* indicates that, if they miss a board meeting in year t, rookie independent directors are more (less) likely than seasoned independent directors to lose their current directorships in year $t + 1$. $\mathbf{X}$ is a matrix of control variables previously described in Section 3.4. δ_t, δ_j, δ_f, δ_i and δ_{ft} denote year, industry, firm, director and firm*year fixed effects respectively. ϵ_{ift} is the error term. To control for potential serial correlation, we use robust standard errors adjusted for firm-level clustering and heteroskedasticity.

[31] See discussion in Section 4.1 on the reasons for linear probability models.

Table 6
Rookie directors and investment efficiency.

	Investment expenditure					
	Full sample		State-owned		Non-state-owned	
Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)
Rookie director(%)	0.008***		0.000		0.011**	
	(2.80)		(0.08)		(2.50)	
Rookie board(0/1)		0.005**		−0.001		0.007*
		(2.29)		(−0.30)		(1.82)
Ln(Tobin's Q)	0.027***	0.026***	0.023***	0.022***	0.026***	0.026***
	(8.69)	(8.88)	(7.17)	(7.13)	(6.72)	(6.93)
*Rookie director(%)*Ln(Tobin's Q)*	−0.001		−0.009**		−0.000	
	(−0.49)		(−2.14)		(−0.07)	
*Rookie board(0/1)*Ln(Tobin's Q)*		−0.001		−0.008**		0.000
		(−0.29)		(−2.43)		(0.09)
Women director(%)	0.003	0.003	0.000	0.001	0.004	0.004
	(0.53)	(0.56)	(0.04)	(0.07)	(0.42)	(0.45)
Busy director(%)	0.003	0.003	0.003	0.002	0.004	0.003
	(0.87)	(0.76)	(0.52)	(0.47)	(0.71)	(0.61)
Political director(%)	−0.002	−0.002	−0.009	−0.009	0.005	0.004
	(−0.38)	(−0.40)	(−1.24)	(−1.26)	(0.71)	(0.65)
Director age(Avg)	−0.001	−0.002	−0.007*	−0.007*	0.001	−0.000
	(−0.53)	(−0.77)	(−1.80)	(−1.92)	(0.23)	(−0.01)
First term(%)	0.004**	0.003*	0.001	0.001	0.006**	0.004*
	(2.13)	(1.77)	(0.35)	(0.27)	(2.19)	(1.71)
Ln(Board size)	0.005	0.006	0.008	0.009	−0.002	−0.001
	(0.62)	(0.66)	(0.66)	(0.68)	(−0.17)	(−0.09)
Duality	0.002	0.002	−0.001	−0.001	0.003	0.003
	(0.74)	(0.73)	(−0.16)	(−0.16)	(0.87)	(0.83)
Independent director(%)	−0.007	−0.005	0.004	0.005	−0.006	−0.003
	(−0.32)	(−0.24)	(0.16)	(0.18)	(−0.17)	(−0.09)
State-owned(0/1)	−0.011*	−0.012*				
	(−1.71)	(−1.75)				
*Stateowned(0/1)*Ln(Tobin's Q)*	−0.005*	−0.005*				
	(−1.90)	(−1.88)				
CFO	0.026***	0.026***	0.027**	0.027**	0.027**	0.027**
	(2.91)	(2.90)	(2.34)	(2.32)	(2.17)	(2.16)
Book leverage	−0.014**	−0.014**	−0.009	−0.009	−0.016	−0.016
	(−1.96)	(−1.99)	(−0.78)	(−0.79)	(−1.60)	(−1.63)
Ln(Total assets)	0.032***	0.032***	0.027***	0.027***	0.034***	0.034***
	(10.54)	(10.55)	(6.35)	(6.33)	(7.94)	(7.95)
Ln(Firm age)	−0.104***	−0.104***	−0.046***	−0.047***	−0.115***	−0.116***
	(−8.25)	(−8.27)	(−2.73)	(−2.80)	(−7.30)	(−7.35)
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.121	0.121	0.088	0.088	0.147	0.147
Observations	12,122	12,122	5479	5479	6643	6643

This table provides estimation results of Eq. (4), which investigates the relationship between rookie independent directors and investment efficiency. We measure the investment efficiency as the sensitivity of investment expenditures to investment opportunities (measured by *Ln(Tobin's Q)*, which is the natural logarithm of Tobin's Q). We measure the investment expenditure by *Investment expenditure*, which is net cash flow for fixed assets, intangible assets, and other long-term assets scaled by total assets at the beginning of the year. We use both *Rookie director(%)* and *Rookie board(0/1)* to proxy the presence of rookie independent directors. *Rookie director(%)* is the ratio of rookie independent directors. *Rookie board(0/1)* is a dummy variable that equals 1 if the majority of independent directors are rookies. We control for a similar set of control variables as in previous literature (Chen et al., 2011; Liu et al., 2015). The Appendix provides variable definitions. All regressions control for year and firm fixed effects. In parentheses are t-statistics based on standard errors adjusted for heteroskedasticity and firm clustering. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Table 7 reports the estimation results of Eq. (5). In Column (2), we include year and firm fixed effects in our regressions. In Column (3), we include year, industry and director fixed effects into our regressions. In Column (4), we include the firm*year fixed effects in our regressions.[32] In Column (1), the coefficient associated with *Meeting absence(0/1)* is positive and statistically significant at the less than 1% level in explaining $Turnover(0/1)_{t+1}$, suggesting that missing board meetings reduces the likelihood of an independent director retaining a current directorship. This result is consistent with Hypothesis 5a that directors are more likely to secure their current directorships if they attend more board meetings. In Column (1), the interaction term between *Rookie director(0/*

[32] See discussion in Section 4.1 on fixed effects.

Table 7
Rookie directors and director turnover.

	Turnover(0/1)$_{t+1}$			
Explanatory variables	(1)	(2)	(3)	(4)
Rookie director(0/1)	−0.009**	−0.010**	0.012**	−0.028***
	(−2.24)	(−2.19)	(2.20)	(−5.12)
Meeting absence(0/1)	0.030***	0.031***	0.025***	0.042***
	(5.93)	(5.84)	(4.50)	(7.55)
Rookie director(0/1)**Meeting absence*(0/1)	0.031***	0.034***	0.015*	0.044***
	(3.73)	(3.90)	(1.70)	(4.48)
Woman(0/1)	−0.015***	−0.016***		−0.017***
	(−3.27)	(−3.04)		(−3.49)
Tenure in firm(Years)	0.070***	0.092***	0.085***	0.095***
	(51.07)	(62.53)	(43.97)	(57.38)
Director age(Ten years)	0.003*	0.004*	−0.123	0.005**
	(1.81)	(1.96)	(−0.92)	(2.53)
Busy director(0/1)	−0.075***	−0.098***	−0.113***	−0.087***
	(−19.72)	(−21.06)	(−17.44)	(−18.24)
Ln(Director compensation)	−0.004***	−0.003***	−0.006***	0.013***
	(−5.36)	(−3.22)	(−5.84)	(8.69)
Political backgrounds(0/1)	−0.004	−0.004	0.083	−0.003
	(−1.10)	(−0.88)	(0.82)	(−0.95)
Ln(Meeting frequency)	−0.125***	−0.171***	−0.158***	−0.163***
	(−34.07)	(−39.30)	(−36.81)	(−22.58)
Ln(Board size)	−0.057***	−0.129***	−0.126***	
	(−5.75)	(−4.74)	(−6.85)	
Duality	0.006	0.003	−0.007	
	(1.43)	(0.32)	(−1.05)	
Independent director(%)	−0.156***	−0.214***	−0.289***	
	(−5.02)	(−2.99)	(−5.41)	
State-owned(0/1)	−0.035***	0.003	−0.038***	
	(−9.01)	(0.16)	(−4.99)	
Largest shareholder(%)	0.027**	−0.107**	0.020	
	(2.44)	(−2.51)	(0.94)	
Ln(Total assets)	0.004***	0.020***	0.007**	
	(2.67)	(3.39)	(2.28)	
Book leverage	−0.038***	−0.051***	−0.035**	
	(−4.43)	(−2.60)	(−2.55)	
ROA	−0.151***	−0.074*	−0.156***	
	(−4.55)	(−1.70)	(−3.73)	
Year effects	Yes	Yes	Yes	No
Industry effects	Yes	No	Yes	No
Firm effects	No	Yes	No	No
Director effects	No	No	Yes	No
Firm*year effects	No	No	No	Yes
R^2	0.173	0.270	0.442	0.589
Observations	35,775	35,775	35,775	35,775

This table provides estimation results of Eq. (5), which investigates the relationship between meeting attendance and director turnover. We measure the director turnover by *Turnover(0/1)*$_{t+1}$, a dummy variable that equals 1 for an observation in year *t* if an independent director does not appear in the annual report in year *t* + 1 and 0 otherwise. The board meeting attendance measures is *Meeting absence(0/1)*, a dummy variable that equals 1 if an independent director absents any board meetings in year *t* and 0 otherwise. The measure of rookie independent director is *Rookie director(0/1)*, a dummy variable that equals 1 if an independent director has less than three years' board experience and 0 otherwise. The Appendix provides variable definitions. The regressions control for year, industry, firm, director and firm*year fixed effects. In parentheses are t-statistics based on standard errors adjusted for heteroskedasticity and firm clustering. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

1) and *Meeting absence(0/1)* is positive and statistically significant at the 1% level in explaining *Turnover(0/1)*$_{t+1}$. This result is consistent with Hypothesis 5b that the positive relationship between board meeting absences and director turnover is stronger for rookie independent directors. The above evidence emphasizes the importance of rookie independent directors attending board meetings.

In Columns (2) and (4), when firm fixed effects are controlled, the coefficients associated with *Meeting absence(0/1)* and interaction terms between *Rookie director(0/1)* and *Meeting absence(0/1)* are positive and statistically significant at the less than 1% level in explaining *Turnover(0/1)*$_{t+1}$. Therefore, our results are robust to the inclusion of firm fixed effects.

In Column (3), which controls for director fixed effects, the coefficient associated with *Meeting absence(0/1)* is positive and statistically significant at the less than 1% level in explaining *Turnover(0/1)*$_{t+1}$ and the interaction term between *Rookie director(0/1)* and *Meeting absence(0/1)* is positive and statistically significant at the less than 10% level in explaining *Turnover(0/1)*$_{t+1}$. Thus, our results are robust to within director variation.

Table 8
Rookie directors, tunneling and firm performance (State ownership).

	State-owned		Non-state-owned	
	(1)	(2)	(3)	(4)
Panel A: Dependent Variable = *ROS*(*NetIncome/Sales*)				
Rookie director(%)	0.008		0.023**	
	(0.85)		(2.25)	
Rookie board(0/1)		0.004		0.025***
		(0.56)		(3.22)
Control variables	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes
R^2	0.151	0.151	0.103	0.104
Observations	5417	5417	7015	7015
Panel B: Dependent Variable = *ROA*(*NetIncome/Assets*)				
Rookie director(%)	−0.002		0.011***	
	(−0.70)		(4.43)	
Rookie board(0/1)		−0.003		0.008***
		(−1.31)		(4.25)
Control variables	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes
R^2	0.246	0.246	0.165	0.165
Observations	5417	5417	7015	7015
Panel C: Dependent Variable = *ORECTA(%)*				
Rookie director(%)	−0.002		−0.003**	
	(−1.53)		(−2.06)	
Rookie board(0/1)		−0.001		−0.003**
		(−1.61)		(−2.56)
Control variables	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes
R^2	0.122	0.122	0.128	0.128
Observations	5609	5609	6410	6410

This table distinguishes the effects of rookie independent directors on tunneling and firm performance between state-owned and non-state-owned firms. In Columns (1) and (2), our subsample contains state-owned firms. In Columns (3) and (4), our subsample contains non-state-owned firms. In Panel A and Panel B, the dependent variables are firm performance measure (*ROS* or *ROA*) and the regressions share the same control variables as those in Table 4. In Panel C, the dependent variable is tunneling measure *ORECTA(%)* and the regressions include the same control variables as those in Table 5. We use both *Rookie director(%)* and *Rookie board(0/1)* to proxy the presence of rookie independent directors. The Appendix provides variable definitions. All regressions control for year and firm fixed effects. In parentheses are t-statistics based on standard errors adjusted for heteroskedasticity and firm clustering. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

4.5. What kind of firms benefit more from rookie independent directors?

In this section, we examine the characteristics of firms that benefit most from rookie independent directors. Motivated by prior literature, we posit that rookie independent directors improve firm performance when the firms are non-state-owned, when the ownership from the largest shareholder is low, when firms are non-complex and when information acquisition costs are low.

4.5.1. State ownership

Prior literature finds that tunneling to controlling shareholders is more common in the non-state-owned firms than state-owned firms (Jiang et al., 2010). If rookie independent directors provide effective monitoring on tunneling to controlling shareholders, they are expected to improve firm performance in the non-state-owned firms (more vulnerable to tunneling) rather than state-owned firms.

Table 8 presents the results from regressions investigating the influence of rookie independent directors on tunneling and firm performance between state-owned and non-state-owned firms. In Panel A, Columns (1) and (2) report that coefficients associated with rookie indicators (*Rookie director(%)* and *Rookie board(0/1)*) are statistically no different than zero in explaining *ROS* for state-owned firms. However, in Columns (3) and (4), the coefficients associated with rookie indicators (*Rookie director(%)* and *Rookie board (0/1)*) are positive and statistically significant at the less than 5% level in explaining *ROS* for non-state-owned firms. In Panel B, we change the firm performance measures from *ROS* to *ROA*. The results remain unchanged. Our results suggest that the presence of rookie independent directors increases firm performance in non-state-owned firms.

In addition, in Panel C, the coefficients associated with rookie indicators (*Rookie director(%)* and *Rookie board(0/1)*) are statistically no different than zero in explaining *ORECTA(%)* for state-owned firms but negative and statistically significant at the less than 5% in explaining *ORECTA(%)* for non-state-owned firms. The above evidence supports the prediction that in China rookie

Table 9
Rookie directors, tunneling and firm performance (Largest shareholder's ownership).

	High ownership		Low ownership	
	(1)	(2)	(3)	(4)
Panel A: Dependent Variable = *ROS*(*NetIncome/Sales*)				
Rookie director(%)	0.004		0.046***	
	(0.41)		(3.05)	
Rookie board(0/1)		0.010		0.030***
		(1.53)		(2.97)
Control variables	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes
R^2	0.126	0.126	0.136	0.135
Observations	5694	5694	6738	6738
Panel B: Dependent Variable = *ROA*(*NetIncome/Assets*)				
Rookie director(%)	0.002		0.011***	
	(0.83)		(3.33)	
Rookie board(0/1)		0.003		0.006**
		(1.47)		(2.26)
Control variables	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes
R^2	0.200	0.201	0.186	0.185
Observations	5694	5694	6738	6738
Panel C: Dependent Variable = *ORECTA(%)*				
Rookie director(%)	−0.001		−0.006**	
	(−0.60)		(−2.07)	
Rookie board(0/1)		−0.000		−0.005***
		(−0.09)		(−3.03)
Control variables	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes
R^2	0.128	0.128	0.133	0.133
Observations	5460	5460	6559	6559

This table distinguishes the effects of rookie independent directors on tunneling and firm performance between firms with high and low ownership of largest shareholder. A firm is classified into a high ownership group when the ownership of its largest shareholder (measured by *Largest shareholder(%)*) is greater than the annual average of *Largest shareholder(%)* and a low ownership group otherwise. In Columns (1) and (2), our subsample contains firms with high ownership group. In Columns (3) and (4), our subsample contains firms with low ownership group. In Panel A and Panel B, the dependent variables are firm performance measure (*ROS* or *ROA*) and the regressions share the same control variables as those in Table 4. In Panel C, the dependent variable is tunneling measure *ORECTA(%)* and the regressions include the same control variables as those in Table 5. We use both *Rookie director(%)* and *Rookie board(0/1)* to proxy the presence of rookie independent directors. The Appendix provides variable definitions. All regressions control for year and firm fixed effects. In parentheses are t-statistics based on standard errors adjusted for heteroskedasticity and firm clustering. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

independent directors improve firm performance in the non-state-owned firms by reducing tunneling to controlling shareholders.

4.5.2. Largest shareholder's ownership

Previous literature shows that tunneling is more common in a firm when the controlling shareholder has more control rights (voting rights) than ownership rights (cash flow rights) (Claessens et al., 2002; Liu and Tian, 2012). The intuition is straightforward: as the excess control right (control right minus ownership right) increases, the controlling shareholder receives more benefit from tunneling activities. Jiang et al. (2010) argue that in China the largest shareholders have effective control over the firms even when their shareholdings are relatively low. Therefore, firms are expected to have more severe tunneling problems when the economic stake (ownership) of the largest shareholder is relatively low. Consistent with this argument, Jiang et al. (2010) find that the severity of the tunneling problem in Chinese firms decreases with the ownership percentage of the largest shareholder. If rookie independent directors improve firm performance by reducing tunneling, firms are expected to benefit more when the largest shareholder has lower ownership (largest shareholder gains more from tunneling).

In Table 9, we investigate the influence of rookie independent directors on tunneling and firm performance among firms with different levels of the largest shareholder ownership. A firm is classified into a high ownership group when the ownership of its largest shareholder (measured by *Largest shareholder(%)*) is greater than the annual average of *Largest shareholder(%)* and a low ownership group otherwise.

In Panels A and B, Columns (1) and (2) report that the coefficients associated with *Rookie director(%)* and *Rookie board(0/1)* are statistically no different than zero in explaining *ROS* and *ROA* for firms in the high ownership group. However, in Columns (3) and (4), the coefficients associated with rookie indicators (*Rookie director(%)* and *Rookie board(0/1)*) are positive and statistically

significant at the less than 5% level in explaining *ROS* and *ROA* for firms in the low ownership group. The above results suggest that the presence of rookie independent directors is positively associated with firm performance when the percentage of shares outstanding held by the largest shareholder is low.

In Panel C, the coefficients associated with rookie indicators (*Rookie director(%)* and *Rookie board(0/1)*) are statistically no different than zero in explaining *ORECTA(%)* for firms with high ownership group but negative and statistically significant at the less than 5% in explaining *ORECTA(%)* for firms with low ownership group. Our results are consistent with the prediction that, when the largest shareholder has less of an economic stake in the firm, rookie independent directors improve firm performance through the effective monitoring on tunneling.

4.5.3. Firm complexity

Previous literature suggests that rookie directors lack enterprise-wide experience and board network connections (Kor and Sundaramurthy, 2009; Kim et al., 2014; Ahern and Dittmar, 2012; Kang et al., 2016). Board connections provide directors with the access of information, which could affect the effectiveness of their advising and monitoring functions.[33] Thus, the value of rookie directors to a firm likely decreases when experience and information resources of independent directors are needed. Coles et al. (2008) posit that firms with complex operations have greater demand for knowledge, expertise, and information resources from independent directors. Consistent with this argument, Kang et al. (2016) find that in US rookie independent directors increase the firm value more in non-complex firms than complex firms.

Table 10 presents the results from regressions investigating the influence of rookie independent directors on tunneling and firm performance between complex firms and non-complex firms. Following previous literature, we distinguish firm complexity by firm size. That is, a firm is classified into a complex firm when its firm size (measured by *Ln(Total assets)*) is bigger than the annual average firm size and a non-complex firm otherwise (Coles et al., 2008; Kang et al., 2016).[34]

In Panels A and B, Columns (1) and (2) report that the coefficients associated with *Rookie director(%)* and *Rookie board(0/1)* are statistically no different than zero in explaining *ROS* and *ROA* for complex firms (measured by firm size *Ln(Total assets)*). In contrast, Columns (3) and (4) report that the coefficients associated with *Rookie director(%)* and *Rookie board(0/1)* are positive and statistically significant at the less than 5% level in explaining *ROS* and *ROA* for non-complex firms. In Panel C, the coefficients associated with *Rookie director(%)* and *Rookie board(0/1)* are statistically no different than zero in explaining *ORECTA(%)* for complex firms but negative and statistically significant at the less than 10% in explaining *ORECTA(%)* for non-complex firms. Our findings suggest that rookie independent directors improve firm performance in non-complex firms through the effective monitoring of tunneling.

4.5.4. Information acquisition costs

When there exists high information asymmetry, the monitoring functions of independent directors may be compromised due to the rise of monitoring costs. Consistent with this argument, Liu et al. (2015) document that the benefits of independent directors in Chinese listed firms decrease with the information acquisition costs. Compared to seasoned independent directors, rookie independent directors face higher costs to acquire firm-specific information and expertise. Thus, the value of rookie independent directors is limited in a firm when the information acquisition costs are high.

In Table 11, we report the results from regressions investigating the influence of rookie independent directors on tunneling and firm performance among firms with different levels of information acquisition costs. Following Liu et al. (2015), we measure the information acquisition costs of a firm by its sales growth rate (*Sales growth*). A firm is classified into a high information acquisition cost group if its sales growth rate is higher than the annual average of sales growth rate and a low information acquisition cost group otherwise.

In Panels A and B, the coefficients associated with *Rookie director(%)* and *Rookie board(0/1)* are statistically no different than zero in explaining *ROS* and *ROA* for firms with high information acquisition costs but positive and statistically significant at the less than 5% level in explaining *ROS* and *ROA* for firms with low information acquisition costs. In Panel C, the coefficients associated with *Rookie director(%)* and *Rookie board(0/1)* are statistically no different than zero in explaining *ORECTA(%)* for firms with high information acquisition costs but negative and statistically significant at the less than 5% in explaining *ORECTA(%)* for firms with low information acquisition costs. The above evidence supports the prediction that rookie independent directors increase firm performance by reducing tunneling when the firm information acquisition costs are relatively low.

5. Discussion and robustness tests

5.1. Rookie independent directors and director busyness

Prior literature suggests that the influences of busy directors on firm performance is mixed. Consistent with a negative view, Core et al. (1999) find that firms with busy directors are more likely to overpay their CEOs. Adams and Ferreira (2008) find that directors

[33] For example, Cai and Sevilir (2012) document that in the US 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 US firms.

[34] In an unreported analysis, we measure firm complexity by leverage. A firm is classified into a complex firm when its leverage is higher than the annual average leverage and non-complex firm otherwise. Similar results are obtained.

Table 10
Rookie directors, tunneling and firm performance (Firm complexity).

	Complex firms		Non-complex firms	
	(1)	(2)	(3)	(4)
Panel A: Dependent Variable = *ROS(NetIncome/Sales)*				
Rookie director(%)	0.010		0.036**	
	(1.47)		(2.24)	
Rookie board(0/1)		0.006		0.032***
		(1.21)		(3.17)
Control variables	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes
R^2	0.098	0.097	0.146	0.146
Observations	5435	5435	6997	6997
Panel B: Dependent Variable = *ROA(NetIncome/Assets)*				
Rookie director(%)	0.000		0.013***	
	(0.19)		(3.65)	
Rookie board(0/1)		0.001		0.008***
		(0.39)		(3.02)
Control variables	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes
R^2	0.248	0.248	0.190	0.189
Observations	5435	5435	6997	6997
Panel C: Dependent Var iable = *ORECTA(%)*				
Rookie director(%)	0.000		−0.006*	
	(0.00)		(−1.90)	
Rookie board(0/1)		−0.001		−0.005**
		(−0.94)		(−2.52)
Control variables	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes
R^2	0.114	0.114	0.123	0.123
Observations	5587	5587	6432	6432

This table distinguishes the effects of rookie independent directors on tunneling and firm performance between complex firms and non-complex firms. Following previous literature, we differentiate firm complexity by firm size (Coles et al., 2008; Kang et al., 2016). That is, a firm is classified into a complex firm when its firm size (measured by *Ln(Total assets)*) is bigger than the annual average firm size and a non-complex firm otherwise. In Columns (1) and (2), our subsample contains complex firms. In Columns (3) and (4), our subsample contains non-complex firms. In Panel A and Panel B, the dependent variables are firm performance measure (*ROS* or *ROA*) and the regressions share the same control variables as those in Table 4. In Panel C, the dependent variable is tunneling measure *ORECTA(%)* and the regressions include the same control variables as those in Table 5. We use both *Rookie director(%)* and *Rookie board(0/1)* to proxy the presence of rookie independent directors. The Appendix provides variable definitions. All regressions control for year and firm fixed effects. In parentheses are t-statistics based on standard errors adjusted for heteroskedasticity and firm clustering. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

with multiple directorships are more likely to miss board meetings, suggesting that busy directors are less effective monitors. Fich and Shivdasani (2006) find that firms with a majority of busy directors exhibit lower market-to-book ratios, weaker profitability, and lower sensitivity of CEO turnover to firm performance. Consistent with a positive view, director busyness may signal director quality (Fama and Jensen, 1983). Ferris et al. (2003) find a positive relationship between firm performance and additional directorships acquired by a director. Perry and Peyer (2005) find that when a firm has fewer agency problems the market positively responds to events in which executives with multiple directorships accept an additional outside directorship. Field et al. (2013) argue that busy directors are better advisors due to their experience and connections. They find that busy directors increase firm value in newly public firms, where advising is more important than monitoring.

By our definition, rookie directors are likely to be non-busy directors. This negative correlation between rookie directors and busy directors raises the possibility that the positive effect of rookie directors on firm performance is driven by the presence of fewer busy independent directors rather than more rookie independent directors on board. However, Table 2 shows that the correlation coefficient between *Rookie director(%)* and *Busy director(%)* is −12.4%. Therefore, the measure of rookie directors and busy directors is not mechanically correlated. Moreover, Giannetti et al. (2015) and Liang et al. (2013) find that in China board busyness does not affect firm performance. We define *Busy director(0/1)* as an independent director who has more than two directorships. To explicitly control for director busyness, we include *Busy director(0/1)* in all director level regressions and *Busy director(%)* in all firm level regressions. Our results are robust to the inclusion of director busyness variables.

Table 11
Rookie directors, tunneling and firm performance (Information acquisition costs).

	High information		Low information	
	(1)	(2)	(3)	(4)
Panel A: Dependent Variable = *ROS*(*NetIncome/Sales*)				
Rookie director(%)	0.002		0.048**	
	(0.26)		(2.32)	
Rookie board(0/1)		−0.002		0.038***
		(−0.33)		(2.78)
Control variables	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes
R^2	0.087	0.087	0.128	0.128
Observations	5801	5801	6631	6631
Panel B: Dependent Variable = *ROA*(*NetIncome/Assets*)				
Rookie director(%)	−0.002		0.017***	
	(−0.63)		(3.89)	
Rookie board(0/1)		−0.003		0.011***
		(−1.11)		(3.31)
Control variables	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes
R^2	0.151	0.151	0.183	0.181
Observations	5801	5801	6631	6631
Panel C: Dependent Var iable = *ORECTA(%)*				
Rookie director(%)	−0.002		−0.007**	
	(−1.18)		(−2.03)	
Rookie board(0/1)		−0.001		−0.005**
		(−1.15)		(−2.05)
Control variables	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes
R^2	0.118	0.117	0.153	0.153
Observations	6028	6028	5991	5991

This table distinguishes the effects of rookies on tunneling and firm performance between firms with high and low information acquisition costs. Following Liu et al. (2015), we measure the information acquisition costs of a firm by its sales growth rate (*Sales growth*). A firm is classified into a high information acquisition cost group if its sales growth rate is higher than the annual average of sales growth rate and a low information acquisition cost group otherwise. In Columns (1) and (2), our subsample contains firms with high information acquisition costs. In Columns (3) and (4), our subsample contains firms with low information acquisition costs. In Panel A and Panel B, the dependent variables are firm performance measure (*ROS* or *ROA*) and the regressions share the same control variables as those in Table 4. In Panel C, the dependent variable is tunneling measure *ORECTA(%)* and the regressions include the same control variables as those in Table 5. We use both *Rookie director(%)* and *Rookie board(0/1)* to proxy the presence of rookie independent directors. The Appendix provides variable definitions. All regressions control for year and firm fixed effects. In parentheses are t-statistics based on standard errors adjusted for heteroskedasticity and firm clustering. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

5.2. Endogeneity tests on firm performance

Our results may be subject to endogeneity issues. More specifically, an endogeneity issue may arise when rookie independent directors are not randomly assigned to firms. The presence of rookie independent directors in a firm may be driven by factors related to the demand of the firm for rookie independent directors or the willingness of rookie independent directors to join the firm. If some of these factors are correlated with firm performance and not properly controlled in performance regressions, the measures of rookie independent directors could be correlated with the error terms of performance regressions, leading to a biased OLS coefficient. For example, it is possible that firms experiencing reconstruction lose their experienced directors and appoint more rookie directors to their boards. If firms improve performance through reconstruction, there will be a positive relationship between the presence of rookie independent directors and firm performance. Besides, firms with good performance may have better corporate governance. Therefore, these firms are more likely to follow the regulation on term limit and do not allow their independent directors to serve beyond the term limit, leading to more rookie directors on their boards.[35]

We apply several econometric methods to address endogeneity issues. The first method is firm fixed effects regressions. Firm fixed effects controls for any time-invariant firm-specific factors related to both firm performance and the presence of rookie independent directors. This method alleviates concerns relative to time-invariant omitted variables. Our results are robust to the firm fixed effects.

To further mitigate the endogeneity concerns, we re-estimate our firm performance regressions with the IV-2SLS approach. To

[35] Sees Section3.2.5 for a detail discussion on term limit of independent directors.

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 two instrumental variables. The first instrument *Term limit retirement(%)$_{t-1}$* is the percentage of a firm's independent directors leaving from the boards due to the term limit regulation in the year $t-1$. If a firm retires more independent directors in the year $t-1$, its demand for independent directors would increase in the year *t*. However, this increase of demand for independent directors is unlikely satisfied by the limited supply of experienced directors, leading the firms to appoint more rookie independent directors in the coming year. In the IV-2SLS regressions, we drop firms that allow their independent directors to serve beyond the term limit since the violation of term limit is a signal of poor corporate governance and firm under-performance. We delete 732 of firm-year observations due to the term limit violation. For violated firms, *Term limit retirement(%)$_{t-1}$* is potentially related to firm performance since firms with good performance and better corporate governance are more likely to have a higher *Term limit retirement(%)$_{t-1}$*.[36] Therefore, *Term limit retirement(%)$_{t-1}$* captures the demand of rookie independent directors for a specific firm in the year *t*. However, *Term limit retirement(%)$_{t-1}$* is the director turnover due to the term limit (similar to a forced turnover) and unlikely to directly influence firm performance.

Following the previous literature, we apply *First-year director(%)$_{t-1}$* as our second instrument variable (Knyazeva et al., 2013; Liu et al., 2015; Kang et al., 2016). *First-year director(%)$_{t-1}$* is the mean value of the percent of first-year directors of other firms headquartered in the same city at year $t-1$. The rationale behind *First-year director(%)$_{t-1}$* is that first-year directors from other firms in the same city at year $t-1$ are an important source of supply of rookie independent directors for firms at year *t*. *First-year director(%)$_{t-1}$* captures the local supply of rookie independent directors at year *t*. Similarly, *First-year director(%)$_{t-1}$* is a variable at the city level and unlikely to directly influence individual firm performance.

We confirm the suitability of our instruments by various identification tests reported in Table 12. In Columns (1) and (2), we estimate the first-stage regressions with a linear probability model where the dependent variable is either *Rookie director(%)* or *Rookie board(0/1)*. We find that our instruments *Term limit retirement(%)$_{t-1}$* and *First-year director(%)$_{t-1}$* satisfy the validity requirement since they are positive and statistically significant at the 1% level in explaining *Rookie director(%)* and *Rookie board(0/1)*. With two instruments and only one endogenous regressor, we conduct an over-identification test to examine whether the instruments satisfy the exclusion restriction. In Columns (3) to (6), the Hansen J statistic for the over-identification test is reported and all *p*-values are over 0.1. The Hansen over-identification test fails to reject the hypothesis that our instruments are exogenous.

In Columns (3) to (6) of Table 12, we estimate the second-stage regressions where the dependent variables are firm performance measures *ROS* and *ROA* and the indicator of rookie independent directors *Rookie director(%)* and *Rookie board(0/1)* are replaced by their instrumented values from the first-stage regressions. In our IV-2SLS approach, firm fixed effects are included and all the control variables are lagged for one period. Results presented in Columns (3) to (6) show that the coefficients associated with *Rookie director (%)* and *Rookie board(0/1)* are positive and statistically significant at the 5% level in explaining both *ROS* and *ROA*. The IV-2SLS approach supports our findings that the presence of rookie independent directors improves the firm operating performance.[37]

5.3. Is a critical mass of rookies required?

Prior literature suggests that a critical mass is required for directors with a specific feature to meaningfully impact firm performance (Liu et al., 2014; Liu et al., 2015).[38] We test whether there is a critical mass of rookie independent directors.

In Table 13, we re-estimate the regressions of rookie directors on firm performance by replacing rookie board measures *Rookie director(%)* and *Rookie board(0/1)* with a set of dummy variables. *One rookie* is a dummy variable that equals 1 if a firm has 1 rookie independent director in the year t and 0 otherwise. *Two or more rookies* is a dummy variable that equals 1 if a firm has 2 or more rookie independent directors in the year t and 0 otherwise. In Columns (1) and (2), the coefficients associated with *One rookie* are statistically no different than zero in explaining *ROS* and *ROA*, whereas the coefficients associated with *Two or more rookies* are positive and statistically significant at the less than 10% level in explaining *ROS* and *ROA*. In Column (3), the coefficient associated with *One rookie* is statistically no different than zero in explaining *ORECTA(%)*, whereas the coefficient associated with *Two or more rookies* is negative and statistically significant at the less than 1% level in explaining *ORECTA(%)*. The above evidence suggests that previous results of rookie independent directors on firm performance hold only if the critical mass of rookie independent directors is reached.

5.4. Reverse causality

Another endogeneity concern is the possible reverse causality between the presence of rookie independent directors and firm performance. It is possible that changes in firm performance drive the appointment of rookie independent directors. In the Online Appendix, Table B.1 examines whether firm characteristics at year $t-1$ predict the rookie independent director appointments at year

[36] In an unreported table, we re-estimate the IV-2SLS regressions with the sample where the deleted sample is included. The result remains unchanged.

[37] In untabulated results we use the same IV-2SLS approach to estimate our tunneling and investment efficiency tests. The results are qualitatively unchanged.

[38] For example, Liu et al. (2014) find that in China the positive effect of board gender diversity on firm performance is significant when firms have three or more female directors. Liu et al. (2015) find that in China the presence of independent directors is positively associated with firm performance when firms have two or more independent directors.

Table 12
Robustness check: The instrument variables 2SLS regressions.

	First stage of 2SLS regressions		Second stage of 2SLS regressions			
	Rookie director(%)	*Rookie board(0/1)*	*ROS*(*NetIncome/Sales*)		*ROA*(*NetIncome/Assets*)	
Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)
Term limit retirement(%)$_{t-1}$	0.271***	0.274***				
	(24.16)	(15.95)				
First-year director(%)$_{t-1}$	0.339***	0.372***				
	(18.19)	(14.05)				
Rookie director(%)			0.059**		0.012**	
			(2.46)		(2.05)	
Rookie board(0/1)				0.056**		0.012**
				(2.47)		(2.10)
Women director(%)	0.003	0.028	0.014	0.013	0.006	0.006
	(0.11)	(0.71)	(0.68)	(0.62)	(1.12)	(1.06)
Busy director(%)	−0.034**	−0.037*	−0.012	−0.012	−0.001	−0.001
	(−2.09)	(−1.73)	(−0.91)	(−0.90)	(−0.45)	(−0.44)
Political director(%)	−0.031	−0.034	0.010	0.011	−0.006	−0.006
	(−1.31)	(−1.14)	(0.66)	(0.67)	(−1.54)	(−1.54)
Director age(Avg)	−0.056***	−0.066***	0.018**	0.018**	0.004*	0.004*
	(−4.40)	(−4.07)	(2.10)	(2.15)	(1.77)	(1.81)
First term(%)	0.055***	0.025**	0.022***	0.020***	0.007***	0.007***
	(6.39)	(2.57)	(3.16)	(2.97)	(4.06)	(3.94)
Ln(Board size)	0.006	−0.019	−0.022	−0.021	−0.003	−0.003
	(0.14)	(−0.33)	(−0.75)	(−0.70)	(−0.45)	(−0.41)
Duality	0.011	0.015	−0.027***	−0.027***	−0.006***	−0.006***
	(0.85)	(0.87)	(−2.98)	(−3.01)	(−2.88)	(−2.90)
Independent director(%)	−0.074	−0.226	0.015	0.023	−0.011	−0.009
	(−0.65)	(−1.64)	(0.19)	(0.30)	(−0.56)	(−0.46)
State-owned(0/1)	−0.046**	−0.025	−0.024	−0.025	−0.021***	−0.021***
	(−2.09)	(−0.84)	(−1.27)	(−1.33)	(−4.49)	(−4.54)
Largest shareholder(%)	−0.067	0.029	0.130***	0.125**	0.037***	0.036***
	(−0.83)	(0.30)	(2.66)	(2.55)	(3.07)	(2.97)
Foreign ownership(%)	−1.201***	−0.683	−0.194	−0.225	−0.075	−0.081
	(−3.23)	(−1.51)	(−0.74)	(−0.86)	(−1.17)	(−1.27)
Ln(Total assets)	−0.010	−0.010	−0.037***	−0.037***	−0.015***	−0.015***
	(−0.93)	(−0.80)	(−5.41)	(−5.41)	(−9.13)	(−9.12)
Sales growth	−0.043***	−0.056***	0.008	0.009	0.011***	0.011***
	(−4.58)	(−4.79)	(1.19)	(1.27)	(6.18)	(6.22)
Ln(Firm age)	−0.035***	−0.041***	−0.012*	−0.011*	−0.003*	−0.002
	(−11.45)	(−10.66)	(−1.96)	(−1.67)	(−1.69)	(−1.44)
Book leverage	0.038	0.044	−0.095***	−0.094***	−0.029***	−0.029***
	(1.16)	(0.99)	(−4.48)	(−4.47)	(−5.52)	(−5.50)
R&D(%)	−1.480***	−1.883***	−0.140	−0.120	−0.008	−0.003
	(−3.45)	(−3.51)	(−0.45)	(−0.39)	(−0.10)	(−0.04)
First-stage F test statistics	66.27	39.77				
Over-identification test p-value			0.67	0.74	0.17	0.20
Year effects/Firm effects	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes
R^2	0.194	0.15	0.014	0.014	0.041	0.04
Observations	9379	9379	9313	9313	9313	9313

In this table, we re-estimate the regressions of rookie directors on firm performance with the instrument variable 2SLS method. Our instrument variables are *Term limit retirement(%)$_{t-1}$* and *First-year director(%)$_{t-1}$*. *Term limit retirement(%)$_{t-1}$* is the percentage of a firm's independent directors leaving from the boards due to the term limit regulation at year $t-1$. *First-year director(%)$_{t-1}$* is the mean value of the percentage of first-year directors of other firms headquartered in the same city at year t-1. We use both *Rookie director(%)* and *Rookie board(0/1)* to proxy the presence of rookie independent directors. In Columns (1) and (2), we provide estimation results of the first-stage of 2SLS regressions. In Columns (3) to (6) we provide estimation results of the second-stage of 2SLS regressions. In Columns (3) and (4), the firm performance is measured by *ROS*. In Columns (5) and (6), the firm performance is measured by *ROA*. The Appendix provides variable definitions. All regressions control for year and firm fixed effects. In parentheses are t-statistics based on standard errors adjusted for heteroskedasticity and firm clustering. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Table 13
Robustness check: The number of Rookie directors and firm performance.

Explanatory variables	*ROS*(*NetIncome/Sales*)	*ROA*(*NetIncome/Assets*)	*ORECTA(%)*
	(1)	(2)	(3)
One rookie	0.004	0.001	−0.001
	(0.76)	(1.20)	(−1.39)
Two or more rookies	0.009*	0.004***	−0.003***
	(1.69)	(2.63)	(−2.88)
Women director(%)	0.031	0.005	−0.001
	(1.59)	(1.07)	(−0.29)
Busy director(%)	−0.011	−0.001	0.001
	(−1.06)	(−0.26)	(0.60)
Political director(%)	−0.001	−0.004	−0.002
	(−0.10)	(−1.07)	(−0.88)
Director age(Avg)	0.006	0.002	0.001
	(0.73)	(1.03)	(0.60)
First term(%)	0.004	0.002	−0.002**
	(0.63)	(1.37)	(−2.26)
Ln(Board size)	−0.017	−0.001	−0.004
	(−0.54)	(−0.12)	(−0.83)
Duality	0.007	0.003	0.001
	(0.66)	(1.27)	(0.63)
Independent director(%)	0.016	−0.015	0.007
	(0.23)	(−0.81)	(0.58)
State-owned(0/1)	−0.039	−0.023***	−0.006
	(−1.27)	(−3.36)	(−0.77)
Largest shareholder(%)	0.162**	0.061***	−0.018
	(2.42)	(3.49)	(−1.42)
Foreign ownership(%)	0.328	0.034	
	(1.29)	(0.50)	
Ln(Total assets)	0.034***	0.004	−0.008***
	(3.17)	(1.55)	(−4.25)
Sales growth	0.109***	0.035***	
	(9.27)	(18.16)	
Ln(Firm age)	−0.003	−0.001	
	(−1.17)	(−1.09)	
Book leverage	−0.454***	−0.137***	
	(−10.44)	(−14.97)	
R&D(%)	−0.277*	−0.124**	
	(−1.79)	(−2.28)	
ROA_{t-1}			−0.041***
			(−3.28)
Year effects	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes
R^2	0.129	0.195	0.135
Observations	12,432	12,432	12,019

In this table, we re-estimate the regressions of rookie directors on firm performance. We replace rookie board measures *Rookie director(%)* and *Rookie board(0/1)* with a set of dummy variables. *One rookie* equals 1 if a firm has 1 rookie independent director in the year t and 0 otherwise. *Two or more rookies* equals 1 if a firm has 2 or more rookie independent directors in the year t and 0 otherwise. In Column (1), the firm performance is measured by *ROS*. In Column (2), the firm performance is measured by *ROA*. The Appendix provides variable definitions. All regressions control for year and firm fixed effects. In parentheses are t-statistics based on standard errors adjusted for heteroskedasticity and firm clustering. Superscripts *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

t. We find that the firm accounting return in the year $t-1$ does not predict the rookie independent director appointments in the year *t*. Thus, our findings are unlikely to be driven by reverse causality.[39]

5.5. Alternative measure of ROS and ROA

In the Online Appendix, we conduct a robustness check on the measure of firm performance *ROS* and *ROA*. In Table B.2, we redefine *ROS* and *ROA* as EBITDA divided by sales and EBITDA divided by assets respectively. We re-estimate the regressions in Table 4 where the dependent variables are the redefined *ROS* and *ROA*. The results are reported in Table B.2. In Columns (1) to (4), we find that the coefficients associated with *Rookie director(%)* and *Rookie board(0/1)* are positive and statistically significant at the less than 5% level in explaining both *ROS* and *ROA*. Therefore, our results are robust to the alternative measure of *ROS* and *ROA*.

[39] The online Appendix can be found at https://sites.google.com/site/mockeefe/Data.

5.6. Last-year director

The career concern model suggests that directors near their retirement age are less motivated. In China, an independent director is allowed to serve a maximum of six years in a firm. Therefore, in China, directors may be less motivated when they are near their tenure limit (year 6 or year 7). To test whether previous results of board meeting attendance is driven by these less motivated directors, we include a variable *Last-year director(0/1)* into board meeting attendance regression, where *Last-year director(0/1)* is a dummy equals 1 if an independent director is in his term limit (year 6 or year 7) and 0 otherwise.

In the Online Appendix, Table B.3 reports the results from regressions investigating the board meeting attendance when *Last-year director(0/1)* is included. In Columns (1) to (8), we find that the coefficients associated with *Last-year director(0/1)* are positive and statistically significant at the less than 1% level in explaining *Meeting absence(0/1)* and *Meeting absence(%)*. This result is consistent with the idea that directors serving in their term limit are less motivated. Moreover, we find that the coefficients associated with *Rookie director(0/1)* are negative and statistically significant at the less than 5% level in explaining *Meeting absence(0/1)* and *Meeting absence(%)*. Therefore, previous results of board meeting attendance are unchanged after *Last-year director(0/1)* is included.

5.7. Newly-appointed director

Board meetings provide firm-specific information, which reduces the information asymmetry between new arrival directors (directors in their first year to a board) and incumbent directors. Therefore, new arrivals may attend more board meetings in their first year simply because they need firm-specific information (a learning hypothesis). To test whether previous results of board meeting attendance is driven by this learning hypothesis, we include a variable *New-appointed director(0/1)* into board meeting attendance regression, where a dummy variable equals 1 if an independent director is newly appointed to a board in the year t and 0 otherwise.

In the Online Appendix, Table B.4 reports the results from regressions investigating the board meeting attendance when *New-appointed director(0/1)* is included. In Columns (1) to (8), we find that the coefficients associated with *New-appointed director(0/1)* are statistically no different than zero in explaining *Meeting absence(0/1)* and *Meeting absence(%)*. This result suggests that new arrivals do not attend more board meetings than incumbent directors. Furthermore, the coefficients associated with *Rookie director(0/1)* are negative and statistically significant at the less than 5% level in explaining *Meeting absence(0/1)* and *Meeting absence(%)*. Therefore, previous results of board meeting attendance are robust to the inclusion of *New-appointed director(0/1)*.

6. Conclusion

Rookie directors are an important source of labor for corporate boards. Despite the popularity of rookie directors on corporate boards, research on their impact on corporate governance and firm performance is limited in general and unstudied in China, where the ownership structure and governance issues differ from those in the US. Our study of rookie independent directors in China fills this gap.

Our study suggests that in China firms with rookie independent directors exhibit significantly better operating performance. This complements the existing finding that rookie independent directors increase the firm value in the US. However, the potential channel through which rookie independent directors improve the firm performance is different in China than the US. In the US, rookie independent directors add value to the firm through effective monitoring of CEOs. However, in China, rookie independent directors improve firm performance through their monitoring of tunneling to controlling shareholders.

If the presence of rookie independent directors lessens the tunneling to controlling shareholders, those firms more vulnerable to tunneling benefit more from the rookie independent directors. Prior literature finds that the tunneling to controlling shareholders is more common when firms are non-state-owned and when the ownership of the largest shareholder is relatively low. Consistent with this view, we find that, in China, rookie independent directors improve firm performance most when firms are non-state-owned and when the ownership from the largest shareholder is relatively low.

We document that the benefits of rookie independent directors are maximized in non-complex firms in which experience, expertise and information resources of independent directors are less important. In addition, information acquisition costs compromise the monitoring effectiveness of independent directors. Consistent with this argument, we find that rookie independent directors provide effective monitoring on tunneling and improve firm performance when the firms have low information acquisition costs.

In China, the presence of rookie independent directors is negatively associated with investment efficiency in state-owned firms. This is consistent with the prior literature suggesting that rookie independent directors are not effective advisers due to their limited board experience. Our findings highlight the potential cost of appointing rookie independent directors in state-owned firms.

Appendix A. Appendix

Table A.1
The Appendix provides variable definitions for dependent variables, variables of interest, and control variables.

Variable	Description
Dependent variables	
Meeting absence(0/1)	The dummy variable equals 1 if an independent director absents any board meetings in the year t and 0 otherwise.
Meeting absence(%)	The ratio of board meeting absences, which equals the number of board meeting absented scaled by the total number of board meeting in the year t.
ROA	The net income scaled by the book value of total assets in the year t.
ROS	The net income scaled by the sales in the year t.
ORECTA(%)	The other receivables scaled by total assets in the year t.
Turnover(0/1)$_{t+1}$	The dummy variable measures whether an independent director loses one of his or her directorships in the year $t + 1$. This dummy variable equals 1 for an observation in year t if an independent director does not appear in the annual report in year $t + 1$ and 0 otherwise.
Investment expenditure	The net cash flow for fixed assets, intangible assets, and other long-term assets in the year t scaled by total assets at the beginning of year t.
Variables of interest	
Rookie director(0/1)	The dummy variable equals 1 if an independent director has less than three years of directorship experience in the year t and 0 otherwise.
Rookie director(%)	The number of rookie independent directors scaled by the number of independent directors in the year t.
Rookie board(0/1)	The dummy variable equals 1 if more than 50% of independent directors are rookie directors in the year t and 0 otherwise.
Term limit retirement(-%)$_{t-1}$	The percentage of a firm's independent directors leaving from the boards due to the term limit regulation in the year $t - 1$. In China, An independent director can only serve for a maximum of two terms (6 years) in a given company.
First-year director(%)$_{t-1}$	The mean value of the percentage of first-year directors of other firms headquartered in the same city in the year $t - 1$.
One rookie	The dummy variable equals 1 if a firm has 1 rookie independent director in the year t and 0 otherwise.
Two or more rookies	The dummy variable equals 1 if a firm has 2 or more rookie independent directors in the year t and 0 otherwise.
Control variables	
Woman(0/1)	The dummy variable equals 1 if an independent director is female and 0 otherwise.
Women director(%)	The number of female directors scaled by the number of independent directors in the year t.
Busy director(0/1)	The dummy variable equals 1 if an independent director has more than two directorships in the year t and 0 otherwise.
Busy director(%)	The number of busy directors scaled by the number of independent directors in the year t.
Political backgrounds(-0/1)	The dummy variable equals 1 if an independent director has political background in the year t and 0 otherwise.
Political director(%)	The number of political directors scaled by the number of independent directors in the year t.
Director age(Ten years)	The age of an independent director scaled by 10 in the year t.
Director age(Avg)	The mean value of the age of independent directors on board in the year t.
First term(%)	The number of independent directors serving at the first-term scaled by the number of independent directors in the year t.
Tenure in firm(Years)	The number of years that an independent director has served in a firm in the year t.
Ln(Director compensation)	The natural logarithm of annual independent director compensation plus one in the year t
Ln(Number of directorships)	The natural logarithm of the number of directorships that an independent director holds in the year t.
Ln(Meeting frequency)	The natural logarithm of the number of board meeting that an independent director is required to attend in the year t.
Ln(Board size)	The natural logarithm of the number of directors on the board in the year t.
Independent director(-%)	The ratio of independent directors on the board in the year t.
Duality	The dummy variable equals 1 if the CEO and chairman is the same person in the year t and 0 otherwise.
State-owned(0/1)	The dummy variable equals 1 if the firm is state-owned in the year t and 0 otherwise. A firm is defined as state-owned if its ultimate controlling shareholder is the government or a quasi-state institution (such as another state-owned company). We identify the ultimate controlling shareholder by the equity control chain from the CSMAR database.
Largest shareholder(%)	The percentage of share is holding by the largest shareholder in the year t.
Foreign ownership(%)	The percentage of B-shares and H-shares issued by a firm in the year t.
Total assets(Billions C-NY)	The book values of total assets in the year t.
Ln(Total assets)	The natural logarithm of total assets in the year t.
Ln(Tobin's Q)	The natural logarithm of Tobin's Q in the year t.
Sales growth	The mean value of sales growth rate over the past three years in the year t.
CFO	The net operating cash flow in the year t scaled by total assets at the beginning of year t.
Ln(Firm age)	The natural logarithm of firm age in the year t.
Book leverage	The book value of total debts scaled by book value of total assets in the year t.
R&D(%)	The development expenses scaled by the sales in the year t.

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