

## To What Extent did Independent Directors Help Firms' Recovery during the COVID-19 Pandemic? Evidence from China

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### Abstract

To what extent did independent directors help firms' recovery during the COVID-19 pandemic? In this paper, we answer this question by investigating whether independent directors contribute to Chinese listed firms' operation income growth during the first and second quarters of the year 2020. By employing a triple difference-in-differences (DDD) estimation strategy, we show that firms located in more pandemic-affected regions experienced a more pronounced operating recovery if they receive more independent directors' opinions and have fewer female and busy directors. The possible reason is that those female and busy directors were likely to be distracted during the pandemic outbreak. We also provide evidence that firms paying higher remunerations to independent directors tend to recover quicker. Moreover, independent directors' age and education level positively contribute to firms' recovery. Our work is among the first to study independent directors' role in shaping firms' operation performance under the COVID-19.

**Keywords:** COVID-19; Independent Directors; Director Distraction; Firms' Recovery.

**JEL Codes:** G30; G34

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## 1. Introduction

Independent directors have widely been recognized to play an essential role in moderating the agency problems that occurred when firms' management is separate from shareholder ownership (Fama & Jensen, 1983). Although independent directors are assumed to protect shareholder value, there are factors such as board structure, information asymmetry, CEO involvement, or monetary incentives to restrain independent directors' function (Shivdasani & Yermack, 1999; Ryan & Wiggins, 2004; Adams & Ferreira, 2007). Moreover, existing empirical findings of the independent directors' value on firm performance are still mixed. For example, some show a positive association between independent board's independence and corporate performance (*e.g.*, Dahya *et al.*, 2008; Duchin *et al.*, 2010). Others find an undetermined or even harmful relationship (*e.g.*, De Andres & Vallelado, 2008). Hermalin & Weisbach (1998) point out the potential reason for the mixed findings that the board of directors is endogenously affected by firm performance and value.

Notably, the literature regarding the impact of board independence on firm value in crisis times is also burgeoning. On the one hand, independent directors are more likely to devote their talents during a crisis period to prevent them from being financially distressed or going bankrupt (Fich & Shivdasani, 2007). Specifically, Jenwittayaroje & Jiraporn (2019) report a positive effect of independent directors on firm value during the 2008 financial crisis period. Similarly, Giraldez & Hurtado (2014) also argue that independent directors protected shareholders' value during the global financial crisis and mitigated the negative association between firm value and larger board size or board ownership. On the other hand, the above favorable independent directors' effect under crisis periods may be reversed (Francis *et al.*, 2012). For example, Erkens *et al.* (2012) find that firms with more independent directors performed worse in the 2008 financial crisis because independent board members were likely to encourage managers to raise more capital in avoidance of regulatory intervention, capital

inadequacy, and bankruptcy risk. This is very costly and may lead to a wealth transfer from existing shareholders to debtholders (Myers, 1977).

Owing to the importance of independent directors during stressful periods, it is also necessary to understand how independent directors are affected by a crisis. A crisis may cause independent directors to perform poorer, as they receive a higher likelihood of personal and professional distractions (Masulis & Zhang, 2019). The recent Coronavirus (COVID-19) outbreak might provide an ideal setting to investigate to what extent do independent directors help firms' recovery during the pandemic. In general, the disease's spread cast an unpredictable destructive impact on the corporate world (Hassan *et al.*, 2020).

Thus, the board of directors bears the brunt of the COVID-19 and could induce distractions from all aspects, and independent directors are no exception. The independent directors sitting on multiple boards are more likely to be distracted from performing their duties than other directors due to their outside executive roles (Stein & Zhao, 2019). In other words, when the pandemic requires a more intensive board activity and monitoring quality, such effectiveness decreases as busy directors are distracted. Besides, mental distractions arisen from the uncertainty about exposure to the disease could also reduce productivity, especially among women (Favieri *et al.*, 2020). The more significant vulnerability of females in psychological status may adversely affect the performance of independent directors. As a result, it is intriguing to ask the empirical question of whether independent directors can aid firms and contribute to firm value under the spike of COVID-19.

In this study, we investigate whether independent directors helped their listed firms' recovery under the COVID-19. We choose Chinese listed companies as our sample of interest because China is among the first countries to detect the COVID-19, lift the national blockades, and resume normal operations. Consequently, it is the best scenario to study independent directors' impact on resuming corporate activities in China's context.

Our empirical identification relies on the outbreak of COVID-19 as an exogenous shock to Chinese independent directors. As Hubei province had the highest death and confirmed cases in China, we use independent directors from Hubei companies as the treatment group. We adopt a triple difference-in-differences (DDD) identification strategy to examine whether and how independent director involvement and distraction would help firm recovery after the COVID-19 outbreak.

First, we document that the operating net income growth rate during the first two quarters of 2020 for Hubei firms fell 231.3 percentage points compared to those from other regions. Then, we identify three independent directors' characteristics (number of opinions, female directors' percentage, and busy directors' percentage) that might help or harm Hubei firms' operating performance recovery. Our main finding shows that one more independent director opinion report could lead to 16.6 percentage points more in Hubei firms' operating performance recovery. Besides, Hubei firms with higher female independent directors and busy directors' percentages suffer more during the pandemic.

We further explore the economic channel of the impact of independent directors' distraction on firm's recovery. Our finding indicates that independent directors with more female or busy director percentages are less likely to provide opinions during the pandemic periods. This result implies that independent directors acted less in supervision and monitoring when they were distracted, and this distraction could harm the firms' operating performance recovery. Our main findings are robust when we adopt the propensity score matching (PSM) method, alternative proxies of dependent and independent variables. Finally, we also show that independent directors' additional features such as compensation, age, and education level could positively impact the recovery of firms' operating performance, consistent with the studies.

Our work relates and contributes to the following three strands of literature. First, our study complements the works of the impact of the COVID-19 on firms (Hasson *et al.*, 2020), and

especially from the corporate governance perspective (Amore *et al.*, 2020; Xiong *et al.*, 2020). Our study is one of the first to examine the value of independent directors on corporate recovery under the COVID-19 crisis. Thus, this paper also complements Erkens (2012) and Jenwittayaroje & Jiraporn (2019) and sheds light on independent directors' monitoring and supervision roles in crisis periods.

Second, this paper associates with the vast literature regarding the value of independent directors (*e.g.*, Nguyen & Nielsen, 2010; Jenwittayaroje & Jiraporn, 2019), especially how independent directors' attention impacts corporate governance effectiveness (Masulis & Zhang, 2019; Stein & Zhao, 2019). While previous studies emphasize the distractions originated from interlocking board network (Falato *et al.*, 2014; Hauser, 2018) or employment obligations (Stein & Zhao, 2019), our paper propose that a pandemic could be a new cause of director distraction.

Third, our study extends the recent busy director literature. Concretely, the effect of busy directors on firm value is mixing in the related studies. For instance, Field *et al.* (2013) find a positive effect of buy directors among IPO firms because of their professional experience and contacts, which arguably make them excellent advisors. Masulis & Zhang (2019) show a negative effect due to the declining engagement of firm-specific activities and a reduced board commitment. Our findings generate fresh insights and support the pessimistic view that busy directors are detrimental to firms' recovery in the recent pandemic.

This paper is structured as follows. Section 2 presents hypothesis development. Section 3 explains the data source, summary statistics, and research methodologies. Section 4 shows the main results, economic mechanism, and robustness check. Section 5 provides some additional discussions, and Section 6 concludes.

## 2. Hypothesis Development

Independent directors serve an indispensable role in a corporate environment where controls and ownership are explicitly separate (Fama & Jensen, 1983). There are two reasons. First, the appointed independent directors are commonly perceived as experts in some specialized fields (*i.e.*, accounting, finance, or executive expertise) and thus are more likely to dissent and provide more constructive opinions. For instance, DeFond *et al.* (2005) find a positive market reaction to accounting-related experts' appointment as the board of directors since investors perceive that their accounting-based financial skills are more likely to ensure high-quality financial reporting. Besides, Fich & Shivdasani (2006) argue that independent directors with CEO experience are conducive for an active board by providing superior managerial talent and unique expertise. Moreover, independent directors who work in academia are also found to positively influence firm performance through external knowledge spillover and result in more effective monitoring and better counseling service (Francis *et al.*, 2012).

Second, independent directors are more easily to dissent to protect the value of the minority shareholders. Concretely, Tang *et al.* (2013) provide direct evidence on the effectiveness of independent directors who are more likely to propose negative opinions regarding board decisions when minority shareholders' interests are potentially exploited by controlling shareholders. Consistent with this argument, Bronson *et al.* (2009) find that firms under financial distress are more likely to receive more opinions and initiate fewer directors' dismissals after receiving any disagreement. Thus, it is reasonable to assume that firms receiving intensive directors' suggestions are more likely to make prudent corporate decisions, address potential corporate issues, and achieve better performance.

The outbreak of the COVID-19 has evolved into a global pandemic, with significant disruptions to the world population's health and economic order. After the breakout, firms' independent directors need to ensure that firms react quickly to restore normal business

operations. For example, independent directors can reduce uncertainty created by the economic environment and help the firm achieve a better competitive position by utilizing their professional knowledge and critical thinking (Hillman *et al.*, 2000). Similarly, Chen & Church (1996) provide evidence supporting the information value of directors' opinions. Therefore, we posit our first hypothesis.

*Hypothesis 1: More opinions issued by independent directors would result in a quicker firm recovery under the COVID-19.*

A growing stream of the literature investigates the causal relationship between female independent directors and firm consequences, and the empirical findings are still inconclusive. On the one hand, firms with more females in senior management or on boards of directors have higher firm value (Carter *et al.*, 2003), better earnings quality (Krishnan & Parsons, 2008), and more significant economic gains (Campbell & Mínguez-Vera, 2008). The reason could be that firms with more female executives and directors tend to make more prudent and conservative financial reporting decisions. In other words, those firms are more likely to smooth earnings and avoid loss and thus achieve better earnings performance (Krishnan & Parsons, 2008). Importantly, Papangkorn *et al.* (2019) suggest that female directors' presence on the board contributes to corporate performance during the 2008 crisis period through higher internal corporate governance and reputation.

On the other hand, many works find no significant or negative effect. For example, Farrell & Hersch (2005) report a little market reaction to women directors' announcement because the increased female appointments on the U.S. board are driven by the calls for greater diversity rather than as a response to the incremental value for female directors' positions. Besides, Du Rietz & Henrekson (2000) do not find a significant association between the presence of women

directors and Swedish firms' real performance in terms of profitability, employment, or order growth. Moreover, Adams & Ferreria (2008) report a negative relationship between female directors and firm performance, as gender-diverse boards increase the excessive monitoring activities and worsen companies' values.

Female independent directors' effect on corporate recovery is intriguing under the COVID-19 crisis. Unlike the past recessions, this pandemic puts unprecedented challenges from the economy's swaths to health and social aspects. The unemployment rate is reversely higher among women than men after the pandemic outbreak (Alon *et al.*, 2020).<sup>2</sup> A detailed analysis conducted by Amano-Patiño *et al.* (2020) on economists' research productivity shows the detrimental effects of lockdowns on home office productivities and particularly female economists at the mid-career level. At a corporate level, Fairlie (2020) investigates the impact of the most recent COVID-19 on the female business owners and finds that they were overly affected (25 percent drop in business activity) than their male counterparts. Similarly, women in top positions such as board of directors could also be psychologically affected and distracted by the COVID-19.<sup>3</sup>

*Hypothesis 2: More female independent directors' proportion would lead to a slower firm recovery under the COVID-19.*

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<sup>2</sup> Evidences from historical crises indicate that recessions may influence the labor market participation differently on men and women, especially hit male-dominated sectors (*e.g.* Hoynes *et al.*, 2012; Rubery & Rafferty, 2013). For example, Hoynes *et al.* (2012) document that males experience more employment loss compared to their female counterpart, as females are more likely to work in less-cyclical industries such as public administration during the Great Depression in the United States during the 1930s. The disproportionate negative impact on male employment was also found in the 2008 financial crisis (Rubery & Rafferty, 2013).

<sup>3</sup> For instance, Favieri *et al.* (2020) analyze the psychological impact of the COVID-19 outbreak in Italy and report a higher occurrence of low psychological well-being among women. Specifically, they find those female respondents are more uncertain about their exposure to the disease, thereby reducing their physical activity with increased entertainment such as films, cookhouse time, and social media at home to lower the infection risks.



The COVID-19 has erupted and unfolded great economic uncertainty to businesses worldwide, especially the massive interruptions in business operations (Baker *et al.*, 2020). The impact of the resulting social distancing policies on the entire business world has outweighed any historical disruption, such as the 9/11 terrorist attack or the 2008 financial crisis (Hill, 2020). The pandemic in China was effectively under control in March. The national lockdown restrictions, initiated from the city of Wuhan, were extensively lifted. Schools, restaurants, and factories gradually resumed normal operations. Thus, corporate directors have to attend intensive meetings to arrange specific work resumption, production schemes, and social distancing measures. In other words, all firms will simultaneously require their boards a considerable investment of time for such arrangements. Thus, when intensive board activities and monitoring quality are required amid the pandemic, board of directors who sit on multiple boards may be more likely to be distracted from performing their duties than other directors due to their outside executive roles (Stein & Zhao, 2019).

A similar argument was pointed out by Masulis & Zhang (2019) that major corporate events distractions (such as mergers and acquisitions, divestitures, CEO illness or injuries, and CEO turnover) from other firms would demand substantial busy directors' attention and distract them. In other words, directors who sit on multiple boards are more likely to miss one board meeting when facing distracting events arisen from other boards. Consequently, board monitoring effectiveness decreases as busy directors are distracted. In other words, the simultaneous external demands on directors' time and attention are likely to reduce board monitoring quality and subsequently decrease firm value. Therefore, we posit our second hypothesis as follows:

*Hypothesis 3: Firms with more busy independent directors would experience slower recovery during the COVID-19 outbreak.*

### 3. Data and Methodology

#### 3.1 Data source and summary statistics

Our sample data is from the China Stock Market and Accounting Research (CSMAR) database. We focus on A-share firms listed in Shanghai and Shenzhen Stock Exchanges and exclude all financial and special treatment (ST) companies. Our sample period is the first two quarters of the year 2019 and 2020, as we are mainly interested in the firm's operation income recovery rate after the COVID-19. After precluding firms with missing control variables specified below, our initial sample contains 2,593 firms. Since the paper's main focus is the independent directors, we next obtain their related variables from CSMAR, and our final sample contains 1,990 listed firms with non-missing independent director characteristics. To relieve the concern of extreme values, we winsorize all firm's variables at the 5th and 95th percentile.

Our final sample in the baseline analysis includes 3,980 firm-year observations, among which 1.3% of them are located in Hubei province.<sup>4</sup> The average firms' operating net income growth rate between the first and second quarters is 77.8%, and the average sales growth rate is 127.6%. Regarding the board characteristics, each firm has approximately 22.4% independent directors on their boards, with an average age of nearly 54 and a master's degree. The proportions of female and busy independent directors account for 18.5% and 9.4%, and their annual compensation is 73,378 RMB (roughly equals 11,334 USD). The average number of independent directors' opinion reports is around 11 in our sample period. Table 1 lists the summary statistics of our key variables, and Appendix Table 1 shows the definitions of these variables.

[Insert Table 1 here]

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<sup>4</sup> Our original firm-quarter observations are collapsed to firm-year, as we calculate the growth rate between the first and second quarter for each year. We would discuss it in details in Section 3.2.

### 3.2 Empirical Methodologies

To assess the impact of independent directors on firms' operating performance recovery, we employ a triple Difference-in-Differences (DDD) identification strategy. Concretely, we exploit the time differences (before and after the pandemic outbreak), location differences (Hubei and non-Hubei firms), and director characteristics' differences. Regarding the time differences, we treat the first and the second quarter of the year 2020 as the post-shock period while the corresponding 2019 year as the pre-shock period.<sup>5</sup> For location differences, as Hubei province had the highest death and confirmed cases in China, we dichotomize the full sample into Hubei and non-Hubei firms. For directors' differences, we proxy the independent directors' involvement or distraction by their opinions, the proportion of female independent directors, and the proportion of busy directors, respectively. Thus, our DDD model is as follows:

$$OI\ Growth_{it} = \beta_0 + \varphi_i + \beta_1 (Post_t \times Hubei_i) + \beta_2 (Post_t \times \varphi_i) + \beta_3 (Hubei_i \times \varphi_i) + \beta_4 (Post_t \times Hubei_i \times \varphi_i) + Firm\ Control_{i,t-1} + Firm\ FE + Year\ FE + \varepsilon_{it} \quad (1)$$

where  $OI\ Growth_{it}$  is the net operating income growth rate of firm  $i$  from its first and second-quarter financial report in year  $t$ .  $Post_t$  is an indicator variable and equals one if the financial data is from the year 2020 and zero otherwise.  $Hubei_i$  is a dummy variable and equals to one if the listed firm  $i$  is from Hubei province and zero otherwise.  $\varphi_i$  is independent directors' characteristics such as *Opinion*, *Female* and *Busy director*.

Following Nguyen & Nielsen (2010), we control for  $Firm\ Control_{i,t-1}$ , a vector of firm  $i$ 's one-year lagged firm and board characteristics. To be more precise, we control factors commonly used in the related literature affecting firms' operating performance. First,

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<sup>5</sup> As we are mainly interested in the firm's operation income recovery rate after the COVID-19, we need the first and second quarter of the year 2020 to calculate the growth rate of firm's operation income. To implement the difference-in-differences estimation (*i.e.*, compare the growth rate in the same period in the year of 2019), we choose the corresponding the data from the 1st and 2nd quarter. For the sake of seasonality bias, we omit the last two quarters of 2019.

independent directors' cash compensation is controlled. This is because independent directors could receive incentive-based compensation and thus have a financial stake in the firm performance. In other words, their interests could be in line with shareholder wealth maximization through compensation (Ryan & Wiggins, 2004). We also include institutional ownership because Lin & Fu (2017) suggest that institutional ownership concentration improves firm performance by attracting analysts and reducing insider ownership.

The leverage ratio is also included, which is defined as the long-term debt divided by total assets at the end of the previous year. Compared with lower-leveraged firms, higher leverage firms tend to enjoy more substantial firm operation growth (Tsuruta, 2015). Following Adams *et al.* (2010), we further control for some corporate governance characteristics (big ten auditing firm, board ownership, board meeting, CEO duality, and top three shareholders' ownership) and financial status (Tobin's Q, R&D expenditure, and firm size).

We also include the firm and year fixed effects to control the unobserved time-invariant firm characteristics and macroeconomic shock that affect all firms, respectively. Note that  $Post_t$  and  $Hubei_i$  are absorbed by the Year FE and the Firm FE respectively, and thus are omitted in Eq. (1). The standard error is clustered at the firm level to account for the possible serial correlations. Our coefficient of interest,  $\beta_4$ , is the impact of the directors' involvement or distraction on firm  $i$ 's operating performance recovery for Hubei firms comparing to firms in other regions.

## **4 Main Results and Robustness Check**

### **4.1 Main Results**

Column (1) of Table 2 compares the firm's operating income growth rate before and after the pandemic outbreak among Hubei and non-Hubei firms. Our main results show that Hubei firms' operating income growth rate was adversely affected relative to non-Hubei firms, and the

effects were economically and statistically significant. Quantitatively, it indicates that Hubei firms' operating income growth rate drop by 231.3 percentage points compared with that of non-Hubei firms. We then present the DDD estimation results of Eq. (1) in Columns (2) to (4).

The coefficient of Column (2) suggests that the operating income growth rate increases by approximately 16.6 percentage points among Hubei firms if an additional opinion report is issued from independent directors. This finding supports *Hypothesis 1* that more opinions generated from independent directors could effectively recover firms' operating performance in the severe pandemic-affected regions. Column (3) of Table 2 implies that a percentage point increase in the proportion of female independent directors slightly reduces the growth rate of Hubei firms' operating income by 0.3 percentage points. This finding confirms *Hypothesis 2* that female independent directors are more likely to execute over-monitoring activities to deteriorate firm performance, echoing the findings in Adams & Ferreria (2008). Similarly, in Column (4), we notice that Hubei firms with more busy directors decrease their operating income growth by 5.6 percentage points. This result is consistent with *Hypothesis 3*, as busy directors are more easily distracted from their working duties and weaken their job performance.

Some control variables are also worth reporting their meanings. For instance, Table 2 shows that the coefficient of compensation for independent directors is positively significant, and the economic magnitudes remain similar in all columns. This finding indicates that incentive-based compensation for independent directors improves firm operating performance, which is in line with Ryan & Wiggins (2004). Board ownership is also positively related to the firm operating performance at 1% significance level. This is possibly because a higher percentage of board directors' shares contributes to their monitoring quality and activities (Beasley, 1996), improving the firm operating performance.

[Insert Table 2 here]

## **4.2 Economic Mechanism**

We further explore the economic mechanism through which independent directors may impact firms' operating recovery. Specifically, we hypothesize that female or busy directors would propose fewer opinions to firms due to the pandemic distraction. Consequently, fewer opinions would lead to a slower firm recovery. To test this mechanism and show the pandemic impinges on independent directors' performance, we replace the same DDD model in Eq. (1) using independent directors' opinions as our new dependent variable.

Table 3 shows that the independent directors' characteristics have a measurable impact on the number of opinions during the pandemic period. Column (1) reports that Hubei firms with one more percentage point of female independent directors would issue 3.827 fewer opinion reports. The result suggests female directors are more reluctant to express an opinion under the pandemic. The coefficient of Column (2) indicates that Hubei firms with an additional percentage point of busy director ratio experiences a 0.042 decrease in the number of opinions.

[Insert Table 3 here]

## **4.3 Robustness Check**

### **Propensity Score Matching (PSM) and the PSM-DID**

One potential endogeneity is that Hubei firms could be different from non-Hubei firms in many aspects such as corporate governance and industry characteristics. We employ a PSM method and match Hubei and non-Hubei firms across various observable indicators to address this issue. Following Nguyen & Nielsen (2010), the matching variables include industry, corporate governance (last year's institutional ownership, leverage ratio, firm size), profitability (ROA,

Tobin's Q), and R&D expenditure. We use the following logit model to calculate the propensity score:

$$Pscore(X_{i,t-1}) = Pr(Hubei = 1 | X_{i,t-1}) \quad (2)$$

where  $Pscore(.)$  is the propensity score assigning function and  $Pr(.)$  denotes the probability. Due to the relatively small sample size, we use a 1-to-3 matching algorithm.<sup>6</sup>

Figure 1 shows the density graph before and after the PSM, and the fitting line of the control group becomes more aligned with the treatment group in our matched sample. We then re-conduct the regression analysis of Hypotheses 1, 2, and 3 based on the matched sample and report them in Table 4. Columns (1) to (4) of Table 4 show that, given the reduced sample size, the statistical significances and economic magnitudes of the PSM-DID results become slightly larger compared to the baseline estimations in Table 2.

[Insert Figure 1 here]

[Insert Table 4 here]

### **Alternative Proxies for Key Variables**

Next, we show that our results are robust when choosing the independent and dependent key variables' alternative proxies. First, we use the firm's sales growth rate as another proxy of the firm's operating performance, as is suggested by Hendricks & Singhal (2005). According to Column (1) of Table 5, we find that Hubei firms' sales growth rates in the first two quarters of 2020 dropped by 21.2 percentage points than those of non-Hubei firms. We also find a similar effect when including board characteristics. Columns (2) to (4) of Table 5 show that all DDD estimates remain the same in their statistical significance.

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<sup>6</sup> This study selects one to three matching ratio because it provides the advantage of yielding higher precision than 1-1 matching at the expense of a small increase in bias (Rassen *et al.*, 2012). We have checked other matchings (through 1 to 4) and our results remain consistent. Our paper also acknowledges that changing the number of matches to any number between 1, 2 and 4 has little implications on the results.

[Insert Table 5 here]

We also collect the proportion of the COVID-19 mortality and confirmed cases in each province up to May 31, 2020. Then, we scale the number of provincial COVID-19 mortalities and confirmed cases by the corresponding national sum as two alternative proxies of the regional pandemic seriousness. Table 6 and Table 7 present the results of our alternative treatment variables, respectively. The results are mostly consistent with our baseline results (*i.e.*, in Table 2). Thus, we are confident that our conclusions are not sensitive to the choice of pandemic severity.

[Insert Table 6 here]

[Insert Table 7 here]

## **5 Discussions**

### **Independent Directors' Compensation**

It is well documented that directors' compensation serves as an essential source of their incentives (Yermack, 2004). Thus, we explore whether independent directors' remuneration plays any role in recovering firms' operating performance under the COVID-19 spike. Concretely, we investigate whether independent directors' compensation could mitigate Hubei firms' declining recovery compared with their counterparts. In Column (1) of Table 8, we note that Hubei firms' operating income increase by 160.9 percentage points for companies paying one more percent of independent directors' compensation. Column (2) of Table 8 shows the economic mechanism that more compensation could indeed incentivize independent directors to express more opinions. The result still holds if we use alternative pandemic proxies (*i.e.*, mortality ratio), as reported in Column (3) of Table 8.

[Insert Table 8 here]



### **Independent Directors' Age and Educational Level**

We also consider the mitigation effect of independent directors' competency proxied by their ages and educational levels. Following Tang *et al.* (2013), we expect that independent directors who are elder and well-educated be more capable and competent and, hence, more likely to express their opinions. Panel A and Panel B of Table 9 present the independent directors' age and education to their operating performance recovery and the received opinions. In Column (1) of Panel A, one year increase in the average age would lead to a 35.8 percentage points increase in the operating income growth.

Similarly, in Column (1) of Panel B, it shows that one unit increase in independent directors' average education could contribute to a 33.2 percentage point increase. Moreover, the number of opinions disclosed by independent directors increases significantly (Column 2 of Table 9), suggesting that senior and well-educated directors are more likely to voice out during the pandemic period. This finding is also consistent with the arguments of Francis *et al.* (2015) and Jiang *et al.* (2016).

[Insert Table 9 here]

### **6. Conclusions**

In this study, we investigate whether the independent directors' involvement or distraction influences firms' operating performance recovery during the pandemic period. We use data of the Chinese listed firms' operating and sales income, and show that the opinions from independent directors could strengthen Hubei firms' operating performance recovery. Besides, firms with more female independent directors and busy directors suffer more from their declining operating net income recovery. A possible economic mechanism is that independent directors with more female or busy director percentages were less likely to provide opinions since those independent directors are more likely to be distracted during the pandemics. These

findings suggest that independent director distraction is detrimental to firms. Also, our study investigates the moderating effects of independent directors' compensation, age, and education level. Our results demonstrate that firms having well-educated and well-paid independent directors played an essential role in supporting the recovery of firm's operating performance.

Our results provide valuable insights to corporate insiders for the significant monitoring roles that independent directors played in the firms' business operations, especially during the pandemic outbreak. These insights might also suggest some implications for the development of board structure. First, corporate insiders could consider a more diversified board, which might minimize the likelihood that several independent directors are distracted due to external interruptions. Second, corporate insiders could consider paying more to experienced independent directors, promoting independent directors' involvement, and encouraging independent directors to be more effective in monitoring and advising the firm.

## **Declaration of Interest**

The authors declare that they have no relevant or material financial interests that relate to the research described in this paper.

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**Appendix Table 1 Variables Definitions.**

<b>Variable type</b>	<b>Variable name</b>	<b>Definitions</b>
Dependent variables	<i>OI growth</i>	The firms' operating net income growth rate during the first two quarters in the years of 2019 and 2020.
	<i>Sales growth</i>	The firms' sales growth rate during the first two quarters in the years of 2019 and 2020.
Main variables	<i>Hubei</i>	A dummy variable that equals to one if the firm is from Hubei province and zero otherwise.
	<i>Independent director ratio</i>	Percentage of directors on the board that are independent.
	<i>Avg. age</i>	Average age of the independent directors of the firm.
	<i>Busy director</i>	Proportion of independent directors serving on two or more boards scaled by the total independent directors.
	<i>Female</i>	Proportion of female independent directors divided by the total number of independent directors of the firm.
	<i>Opinion</i>	Number of independent director opinion reports issued.
	<i>Avg. edu</i>	Educational level of the independent directors of the firm. 1 if the independent director has a junior college degree; 2 if the independent director has a university degree; 3 if the independent director has a master degree; 4 if the independent director has a doctoral degree and above.
	<i>Ln(compensation)</i>	Natural logarithm of the cash compensation of independent directors of the firm.
Control variables	<i>Leverage</i>	Long-term debt divided by total assets at the end of the previous year.
	<i>Board ownership</i>	The firm's share percentage owned by board of directors.
	<i>Firm size</i>	Natural logarithm of the firm's total asset.
	<i>Tobin Q</i>	Ratio of a firm's physical asset's market value divided by its replacement value.
	<i>R&amp;D intensity</i>	Research and development expenditure divided by the book value of total assets.
	<i>Board meeting</i>	The firm's board meeting frequencies.
	<i>Board size</i>	The number of directors on the board.
	<i>Duality</i>	A dummy variable that equals to one if the firm's CEO is also the chairman of the board of directors and zero otherwise.
	<i>Big 10</i>	A dummy variable that equals to one if the firm's auditor is a big ten auditing firm and zero otherwise.
	<i>Institutional ownership</i>	The firm's institutional investor share percentage.
<i>Top 3 ownership</i>	The firm's largest three shareholders' ownership percentage.	



**Appendix Table II.**  
**Provincial pandemic statistics as of 31<sup>st</sup> May, 2020.**

<b>Province</b>	<b>Mortality Cases</b>	<b>Mortality Proportion</b>	<b>Confirmed Cases</b>	<b>Confirmed Proportion</b>
Anhui	6	0.14	991	1.19
Beijing	9	0.21	593	0.71
Chongqing	6	0.14	579	0.7
Fujian	1	0.02	358	0.43
Gansu	2	0.05	139	0.17
Guangdong	8	0.18	1593	1.92
Guangxi	2	0.05	254	0.31
Guizhou	2	0.05	147	0.18
Hainan	6	0.14	169	0.2
Hebei	6	0.14	328	0.4
Heilongjiang	13	0.30	945	1.14
Henan	22	0.51	1276	1.54
Hubei	4212	97.19	68135	82.09
Hunan	4	0.09	1019	1.23
Inner Mongolia	1	0.02	232	0.28
Jiangsu	0	0	653	0.79
Jiangxi	1	0.02	937	1.13
Jilin	2	0.05	155	0.19
Liaoning	2	0.05	149	0.18
Ningxia	0	0	75	0.09
Qinghai	0	0	18	0.02
Shaanxi	3	0.07	308	0.37
Shandong	7	0.16	792	0.95
Shanghai	7	0.16	672	0.81
Shanxi	0	0	198	0.24
Sichuan	3	0.07	564	0.68
Tianjin	3	0.07	192	0.23
Tibet	0	0	1	0.001
Xinjiang	3	0.07	76	0.09
Yunnan	2	0.05	185	0.22
Zhejiang	1	0.02	1268	1.53

**Table 1 Summary statistics.**

VARIABLES	Observation	Mean	Std. Dev.	Min	Max
OI growth	3,980	0.778	1.130	-0.895	3.666
Sales growth	3,980	1.276	0.411	-0.331	2.036
Hubei	3,980	0.013	0.112	0	1
Leverage	3,980	0.435	0.193	0.071	0.743
Institution ownership	3,980	0.455	0.235	0.002	0.778
Independent director ratio	3,980	0.224	0.066	0.107	0.370
Avg. age	3,980	54.063	4.752	42.667	63.000
Busy director	3,980	0.094	0.163	0	0.500
Female	3,980	0.185	0.205	0	0.667
Opinion	3,980	11.421	4.602	1.000	21.000
Avg. edu	3,980	3.152	0.569	1.750	4.000
Compensation (thousand)	3,980	73.378	31.168	19.643	150
Board ownership	3,980	0.120	0.184	0	0.562
Board meeting	3,980	9.747	3.462	4.000	17.000
R&D intensity	3,980	0.017	0.015	0	0.050
Duality	3,980	0.271	0.444	0	1
Big 10	3,980	0.602	0.490	0	1
Top 3 ownership	3,980	0.501	0.147	0.181	0.750
Firm size (billion)	3,980	10.5	14.3	0.514	57.9
Tobin Q	3,980	2.015	1.058	0.826	4.732

**Table 2 The impact of the independent director on firm's operating performance.**

	(1)	(2)	(3)	(4)
VARIABLES	OI growth	OI growth	OI growth	OI growth
Post × Hubei	-2.313*** (0.001)	-4.947*** (0.001)	-1.532*** (0.001)	-1.960*** (0.001)
Post × Opinion		-0.304*** (0.003)		
Post × Female			-0.095* (0.008)	
Post × Busy director				0.130* (0.013)
Hubei × Opinion		-0.291* (0.026)		
Hubei × Female			0.023 (0.106)	
Hubei × Busy director				0.022 (0.142)
Post × Hubei × Opinion		0.166*** (0.001)		
Post × Hubei × Female			-0.003*** (0.001)	
Post × Hubei × Busy director				-0.056*** (0.001)
Leverage	-5.362 (9.269)	-4.758 (8.480)	-5.228 (8.992)	-5.671 (9.303)
Institutional ownership	3.991 (7.687)	4.157 (8.017)	4.374 (8.255)	3.996 (7.755)
Independent director ratio	10.202* (5.808)	7.215* (3.001)	10.985 (10.856)	13.878* (6.152)
Ln(compensation)	8.810** (3.518)	8.799** (3.375)	8.815** (3.506)	8.854** (3.477)
Board size	-0.697 (0.488)	-0.690 (0.490)	-0.695 (0.485)	-0.774 (0.508)
Board meeting	-0.295 (0.189)	-0.284 (0.178)	-0.302 (0.201)	-0.288 (0.178)
R&D intensity	6.413 (3.741)	6.540 (3.822)	6.391 (3.725)	6.390 (3.701)
Duality	-1.205 (2.124)	-1.245 (2.135)	-1.210 (2.122)	-1.224 (2.128)

*(continued)*

Board ownership	0.142***	0.121***	0.129***	0.147***
	(0.039)	(0.028)	(0.035)	(0.038)
Big 10	0.952	0.745	0.994	0.888
	(0.561)	(0.460)	(0.587)	(0.546)
Top 3 ownership	0.113	0.797	0.111	0.105
	(0.152)	(0.148)	(0.145)	(0.158)
Firm size	6.580	7.134	6.288	6.621
	(6.156)	(6.171)	(6.313)	(6.109)
Tobin Q	1.183	1.182	1.102	1.224
	(0.835)	(0.835)	(0.763)	(0.856)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	3,980	3,980	3,980	3,980
R-squared	0.503	0.601	0.459	0.473

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Firm and year fixed effects are included in all estimations. Standard errors, clustered at the firm level, are shown in brackets. The detailed definitions of variables are in Appendix Table I. \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

**Table 3 The impact of independent directors on number of opinions.**

VARIABLES	(1)	(2)
	Opinion	Opinion
Post × Hubei	-0.255** (0.011)	-0.236** (0.001)
Post × Hubei × Female	-3.827** (0.168)	
Post × Hubei × Busy director		-0.042** (0.002)
Firm Controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Observations	3,980	3,980
R-squared	0.525	0.523

Firm and year fixed effects are included in all estimations. Standard errors, clustered at the firm level, are shown in brackets. The detailed definitions of variables are in Appendix Table I. \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

**Table 4 The DID-PSM identification.**

	(1)	(2)	(3)	(4)
VARIABLES	OI growth	OI growth	OI growth	OI growth
Post × Hubei	-4.292*** (0.001)	-4.292* (0.457)	-0.670 (1.559)	-4.058* (0.421)
Post × Hubei × Opinion		0.220*** (0.001)		
Post × Hubei × Female			-0.206*** (0.002)	
Post × Hubei × Busy director				-0.164*** (0.001)
Firm Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	230	230	230	230
R-squared	0.551	0.570	0.575	0.512

Firm and year fixed effects are included in all estimations. Standard errors, clustered at the firm level, are shown in brackets. The detailed definitions of variables are in Appendix Table I. \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

**Table 5 Alternative proxy for operating performance.**

	(1)	(2)	(3)	(4)
VARIABLES	Sales growth	Sales growth	Sales growth	Sales growth
Post × Hubei	-0.212*	-0.733*	-0.023	-0.236**
	(0.018)	(0.091)	(0.057)	(0.018)
Post × Hubei × Opinion		0.040**		
		(0.001)		
Post × Hubei × Female			-0.045**	
			(0.001)	
Post × Hubei × Busy director				-0.005**
				(0.001)
Firm Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	3,980	3,980	3,980	3,980
R-squared	0.513	0.526	0.538	0.510

Firm and year fixed effects are included in all estimations. Standard errors, clustered at the firm level, are shown in brackets. The detailed definitions of variables are in Appendix Table I. \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

**Table 6 Alternative proxy for pandemic severity: mortality.**

	(1)	(2)	(3)	(4)
VARIABLES	OI growth	OI growth	OI growth	OI growth
Post × Mortality	-0.259*	-0.865**	0.744	-0.405**
	(0.132)	(0.312)	(0.269)	(0.175)
Post × Mortality × Opinion		0.057**		
		(0.001)		
Post × Mortality × Female			-0.021**	
			(0.001)	
Post × Mortality × Busy director				-0.025**
				(0.001)
Firm Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	3,980	3,980	3,980	3,980
R-squared	0.503	0.503	0.503	0.504

Firm and year fixed effects are included in all estimations. Standard errors, clustered at the firm level, are shown in brackets. The detailed definitions of variables are in Appendix Table I. \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.



**Table 7 Alternative proxy for pandemic severity: confirmed rate.**

	(1)	(2)	(3)	(4)
VARIABLES	OI growth	OI growth	OI growth	OI growth
Post × Confirmed rate	-5.400*	-1.427*	-2.355	-1.549**
	(3.506)	(0.735)	(1.210)	(0.704)
Post × Confirmed rate × Opinion		0.709*		
		(0.381)		
Post × Confirmed rate × Female			-0.317**	
			(0.005)	
Post × Confirmed rate × Busy director				-0.584*
				(0.316)
Firm Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	3,980	3,980	3,980	3,980
R-squared	0.503	0.503	0.504	0.505

Firm and year fixed effects are included in all estimations. Standard errors, clustered at the firm level, are shown in brackets. The detailed definitions of variables are in Appendix Table I. \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

**Table 8 Discussion: independent directors' compensation.**

VARIABLES	(1)	(3)	(4)
	OI growth	Opinion	OI growth
Post × Hubei	-6.786** (0.242)	-1.591*** (0.006)	
Post × Mortality			-2.254*** (0.001)
Post × Hubei × Ln(compensation)	1.609*** (0.001)	1.263*** (0.007)	
Post × Mortality × Ln(compensation)			0.202** (0.009)
Firm Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	3,980	3,980	3,980
R-squared	0.503	0.761	0.503

Firm, and year fixed effects are included in all estimations. Standard errors, clustered at the firm level, are shown in brackets. The detailed definitions of variables are in Appendix Table I. \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

**Table 9 Discussion: independent directors' age and education.**

VARIABLES	(1)	(2)	(3)
	OI growth	Opinion	OI growth
<i>Panel A: Independent directors' age</i>			
Post × Hubei	-0.115 (2.835)	-1.206*** (0.006)	
Post × Mortality			-0.250*** (0.001)
Post × Hubei × Avg. age	0.358*** (0.001)	0.255*** (0.041)	
Post × Mortality × Avg. age			0.047*** (0.001)
Firm Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	3,980	3,980	3,980
R-squared	0.502	0.761	0.503
<i>Panel B: Independent directors' education</i>			
Post × Hubei	-1.074* (0.130)	-0.628** (0.016)	
Post × Mortality			-0.966*** (0.001)
Post × Hubei × Avg. edu	0.332*** (0.001)	0.147*** (0.049)	
Post × Mortality × Avg. edu			0.117*** (0.186)
Firm Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	3,980	3,980	3,980
R-squared	0.503	0.752	0.504

Panel A and Panel B present the independent directors' age and education level to the firms' operating income growth rate and the received opinions. Firm and year fixed effects are included in all estimations. Standard errors, clustered at the firm level, are shown in brackets. The detailed definitions of variables are in Appendix Table I. \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

**Figure 1. Density Plot before and after the PSM.**

