A New Role of Confucian Culture: Promoting Corporate Resilience from Crisis?

Abstract

Although Confucian culture (CC) due to its conservative nature may hinder risk-taking behavior such as starting a business or innovation, it could help business recovery from crisis such as earthquakes or pandemics. Using unique big data from China, we conduct a series of identification strategies to document that CC causally promotes firm corporate resilience amid crises (measured by stock prices). Causal mediation analysis shows that this is achieved by facilitating the firm's internal-control practices and intensity, such as compliance with rules and operational continuity; in contrast, moderation effect estimates indicate that external-control proxies such as institutional shareholdings and auditing causally weaken the promotional effect of interest, thus indirectly confirming the effectiveness of internal control.

Introduction

Confucian culture (CC) due to its conservative nature could hinder risk-taking behavior such as starting a business or inventing new products.[1] However, it is only one side of the coin. In the present article, we argue that in times of crisis such as earthquakes or pandemics, the social norms that CC helped build in the past may play critical roles for local business recovery, through encouraging coordination behavior such as information sharing, consensus forming, and group action. CC protects the bottom line from individuals' selfish behavior that might arise in the absence of formal monitoring such as during pandemics and telework. Also, as a matter of fact, China uses the influence of CC to host hundreds of Confucius Institutes throughout the world.

Traditions that have been established for thousands of years can help shape the collective identity of the local community in a country or region. The Chinese traditional culture is based on Confucianism that advocates cooperative relationship amongst people and self-cultivation of an individual by the ethical system, i.e., Ren (benevolence), Yi (righteousness) and Li (propriety). Among these ethical virtues, Ren means 'loving others' (Huang, 1997) and imposes particular restrictions on the behavior of superiors in resource allocation; Yi provides the necessary balance and moderation needed to act virtuously in context; and Li refers to the superior's and subordinate's actions according to rules and etiquette (Hwang, 2001).

These virtues may breed social norms to motivate individuals to perform moral duties during a crisis. As illustrated in panel A of Figure 1, CC would encourage a firm's internal control (IC) practices that can generate corporate resilience (CR) against the crisis. Specifically, with virtues of benevolence (Ren) and propriety (Li; acting per etiquette/rules), CC

[1]For instance, Bai (2019) argues that the dismantling of China's imperial examination system helped modernize the country's economy and governance, and Chen et al. (2022) show that regions with historically stronger Confucian clans established significantly fewer modern banks.

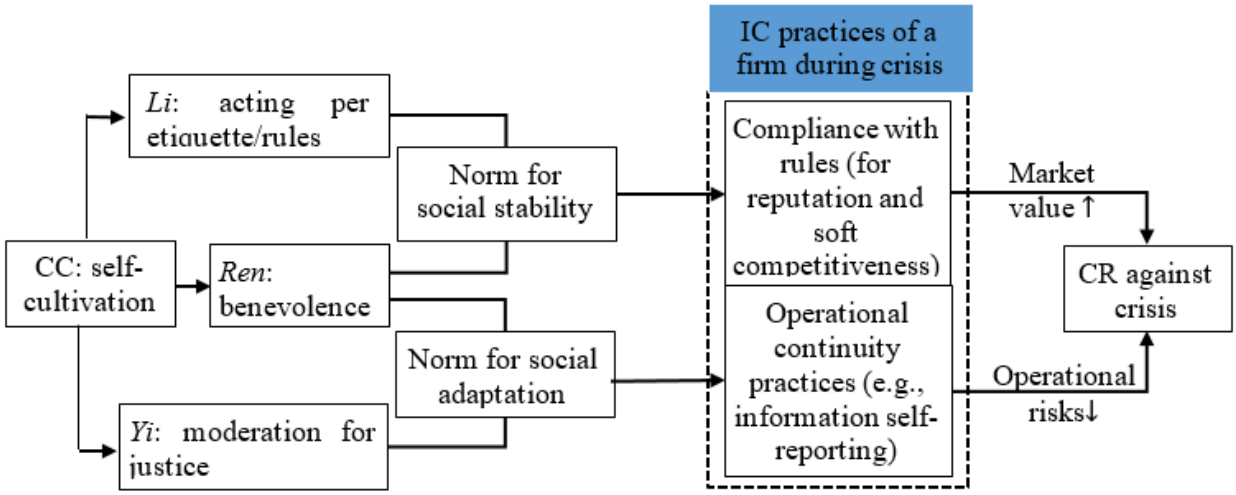
can function as a social norm for societal stability (Fernandez, 2013; Kung and Ma, 2014; Young, 2015; Chen, 2022) that facilitates firm actions to comply with rules, which can help the firm's reputation and soft competitiveness, thereby increasing market value as well as CR from crisis; these virtues can also breed a norm for social adaptation that help firms motivate members (e.g., employees, managers) to collectively participate in anti-crisis programs (e.g., wearing masks, information self-reporting) for operational continuity (Hadfield and Weingast, 2012, 2013; Abidi et al., 2022). Consequently, both social norms bred by CC promote firms' internal-control practices & intensity, and inspire social signs of virtue for decentralized collaboration against the pandemic.

Thus, in the present paper, we focus on the economic impacts of COVID-19 and expect that a firm located in a region with an intensive CC would have stronger CR, with a lower *severity of loss* and a shorter *time to recovery* (measured by stock prices) from the pandemic, through the channel of internal control practices and intensity, essentially exhibiting in its compliance with rules and operational continuity control. Further, as sketched in Figure 1 panel B, we also examine the channel indirectly with a negative moderation effect of external control, in the form of institutional shareholdings and auditing.

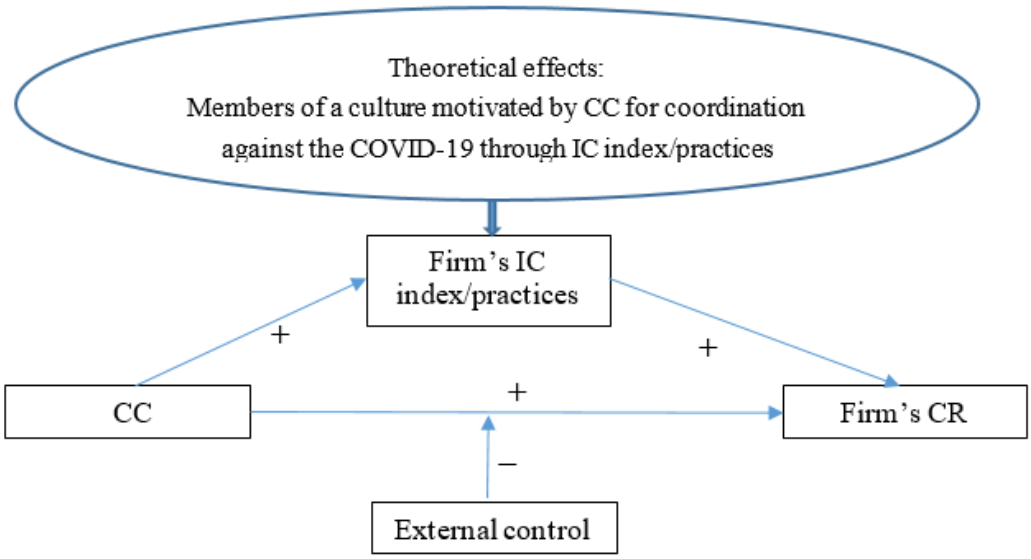
Specifically, we explore the effects of CC on a firm's CR, using big data collected from historical China. Our study is inspired by a social survey, which generates a significantly positive relationship between CC and individual collective benefits and goals.[2] As shown

[2]We employ the Chinese General Social Survey in 2010, which has three questions reflecting whether individuals endeavor effort on collective benefits and goals. The three questions are: (i) whether the individual would stop others from destroying communal commons; (ii) whether the individual would make ex-ante effort in seeking a win-win solution with the collaboration party, reflecting the willingness to realize mutual benefits instead of her own benefit maximization; (iii) whether the individual would participate in a collective appeal and especially whether the appeal is related to her own benefits. Based on these, we generate a dummy for the participation in collective appealing only when the appealing is unrelated to her own benefits. In particular, since urban and rural residents have different attitudes toward communal activities (see Section 5.1), we distinguish between them by clustering standard errors in sub-city areas (i.e., urban

Figure 1: Framework and Expectation



A. The social norm framework



B. Arguments and expected relationships

Figure 1

in Figure 2, our measure of CC is positively and significantly related to an individual's perception of the protection of communal commons, effort ex-ante in seeking a win-win solution and participation in collective appeal. Moreover, unlike other ancient civilizations in the world, China has a continued civilization history mainly due to CC (Krache, 1952) that develops a series of Confucian Temples and shrine buildings in honor of Confucius and Confucianism, from which we obtain big data that are used to carry out our empirical analysis.[3]

[Insert Figure 2 about here]

To identify the causal effect of interest, we adopt a series of strategies. First, we conduct extensive tests to examine whether our results are robust to different measures of CC, stock price over-sensibility, the potential 'recovery illusion', other dimensions of CC (i.e., Jinshi, Confucian academies or clans), other representative traditional culture (i.e., Buddhism and Taoism), as well as additional controls and confounding factors. Second, we perform a group of placebo tests to show that the significant and positive relationship between CC and CR is unlikely to be driven by omitted variables, measurement errors, uncontrolled factors, and reverse causality, thus confirming general robustness to potential endogeneity bias.

Next, we use the number of Chastity Memorial Archways (CMAs) in a firm's city as an instrument, which reflects the feudal-era Confucianism honoring women who either kept their virtue or died for doing so. This custom of the husband's authority over the household (i.e., the "widowhood spirit") has been abolished in modern-day China, theoretically rejecting the direct effect of IV on CR. We find the IV is insignificantly related to CR variables after controlling for CC, which is consistent with our data set that documents the IV is insignificantly related to contemporary female participation in firm operations. These jointly

areas and rural areas in the same city).

[3]These temples enable us to measure the strength of CC. Furthermore, throughout history, China's political regimes often adopt unified Confucianism-based formal institutions and policies for crisis response (Song et al., 2011), which offers a unique context to explore how CC affects CR in today's businesses.

confirm that our IV implausibly affects CR except through CC: CC is significantly and positively related to CR; that is, negatively related to a firm's severity of loss and time to recovery during COVID-19.

Then, we apply causal mediation analysis to show that the internal control (IC) index of a firm significantly mediates the effect of interest, for different measures of internal control and CR. A firm's internal control practices basically exhibit in its compliance with rules and its operational continuity control. In particular, we find that the average causal mediation effect accounts for 18.393% - 26.868% of the total effect on the *severity of loss* and could exceed 10% of the total effect on the *time to recovery*. Further, across all estimations, the sensitivity test shows that sequential ignorability cannot be rejected.[4] These jointly suggest that CC causally promotes a firm's CR through IC. Also, we repeat the causal mediation analysis, but with a focus on two IC practices–compliance with rules and anti-crisis programs, which can, respectively, refer to a normative effect of CC for social stability on a firm's decision and for social adaptation in motivating collective participation of members for operational continuity. The corresponding results are similar as before, enabling us to conclude that the mediation effect of internal control has general and practical implications for firm operations and strategies.

Finally, we conduct IV estimates to show that either the audition rate of an industry (ARI) or the institutional shareholdings of an industry (ISI) as a proxy for external control weakens the promotional effect of CC, thereby indirectly confirming that the internal control mechanism matters. In addition, our heterogeneity tests show that the coefficient of CC on CR is significantly negative only for non-state-owned enterprises (non-SOEs). Given that SOEs inherently have stronger internal control due to their governmental linkages and power hierarchy that enable them to gain more resources, this finding indicates that the internal control mechanism is critical for the effect of CC on CR.

[4]Specifically, only one sensitivity parameter is lower than 0.1 but still greater than 0.05.

To the best of our knowledge, this study is the first to investigate how Confucian culture affects CR through the internal control mechanism. The literature on economic resilience during the COVID-19 pandemic focuses on financial & management practices (e.g. Pagano et al., 2023; Lamorgese et al., 2024), and external resources (Liu et al., 2023; Ozanne et al., 2022; Wulandhari et al., 2022). In contrast, this paper contributes by looking inside the cultural channel that can strengthen corporate internal control, thereby restraining immorality and motivating decentralized cooperation.

Also, the literature assumes that culture functions as a product of formal institutions (e.g., Acemoglu et al., 2001; La Porta et al., 2008; Chang, 2011A; lesina and Guiliano, 2015; Lowes et al., 2017; Chen et al., 2020; Liu et al., 2023).[5] However, history especially the strict lockdowns during COVID-19 show that "global standard institutions" such as private rights protection lack tools to foster a firm's CR for economic development (e.g., Haug et al., 2020), since formal institutions might have inherent rigidity that hinders adaptability and effective responses to unexpected shocks (Oliver, 1991). These suggest a need to reconsider the issue from perspectives beyond formal institutions, which is especially important in times of disasters such as pandemics or earthquakes.

In addition, with regard to China, the literature has explained its macroeconomic growth puzzle by considering the importance of informal institutions (Xu, 2006; Kung and Ma,2018). The present paper goes further in confirming the promotional role of CC in the bounce-back of individual business recovery from crisis, specifically using detailed firm-level data. Since China has been the largest developing economy in the world, its firm operations and CR could offer representative implications for other developing countries such as India and Egypt, both

[5]Acemoglu et al. (2005) assert that economic institutions are the fundamental cause of development although some later research offers counterevidence (Michalopoulos and Papaioannou, 2014; Dell and Olken, 2020). Friedman (1988) assumes that the impact of shocks is transitory without structural and functional changes, and institutional changes are the key driver of dynamic growth (see also Acemoglu and Robinson, 2012; Greif and Laitin, 2004).

of which have long history and rich traditions.

1 Economics of the Confucian Culture for Corporate Resilience

Traditional culture refers to informal rules embedded in a country for hundreds or even thousands of years, endowing individuals with a collective identity for common values, wisdom and norms. This paper adopts the social norm framework to explain how CC helps maintain existing rules and shape new rules to overcome adversity and help local communities and firms to prevent the bottom line from falling. We shall first explain how the Confucian ethical system breeds social norms for societal stability and social adaptation, and then illustrate how CC motivates relevant practices under social norms to foster CR.

1.1 Confucian ethical system, social norm and cultural evolution against crisis

Confucianism admits biological limitations and desires of humans, by employing an ethical system of Ren-Yi-Li to regulate interpersonal interaction (Hwang, 2001). It requires individuals to self-cultivate these three virtues for social benefits: Ren (benevolence) refers to loving others; Yi (righteousness) pursues the path of Ren in context and imposes restriction on the behavior of the superior (e.g., the government or the elder) in resource allocation, and Li (propriety) requires individuals to act according to informal or formal rules. These virtues breed social norms to realize moral duties and motivate individuals during a crisis. As panel A of Figure 1 shows, the virtues of Ren and Yi can motivate individuals to build norms for societal stability (Fernandez, 2013; Kung and Ma, 2014; Young, 2015): To reach social harmony, individuals need to be benevolent, and act according to the formal and informal rules.

Formally speaking, the social norm for societal stability governs societal behavior and individual decisions for collective interaction (Leung and Morris, 2015; Marquis and Tilcsik, 2013; Young, 2015). It often overrides personal values for decisions (Van et al., 2005) and motivates individuals to follow others' observable behavior (Marquis et al., 2007). Specifically, the societal stability norm may encourage individuals to signal personal character and membership in a group or to have reference points and default solutions. This type of social norm is usually labeled as a "descriptive norm". Also, the norm for societal stability may function as an injunctive norm for the coordination desire or the fear of social punishment (Cialdini et al., 1991).

Moreover, the virtues of Ren and Li can breed norms for social adaptation, in the relationship for social justice/benefits between the benevolent superior for resource allocation and the inferior (e.g., the public or employee) who respects the benevolent superior. They could stimulate the social learning process to establish new social norms against crisis. According to the social learning model (Fernandez, 2013), individuals process noisy public signals reflecting others' preferences when making decisions. In an environment with lasting influence of Confucian culture, the social learning process would be activated faster to seek a new rule to surmount adversity (Nunn & Wantchekon, 2011) or even create opportunities for social adaptation (Baumol, 1990).

1.2 Confucian culture and corporate resilience

As explained above, CC with an ethical regulation of Ren-Yi-Li transmits social norms over individuals to generate a common logic, and enforce social norms for coordinative goals (Hadfield and Weingast, 2012, 2013 and 2014).[6] Such culture-driving action will survey information among individuals to realize decentralized coordination. In this regard, China possesses a Confucian culture that has continued for centuries, so CC may effectively evoke

[6]Hadfield and Weingast (2012, 2013 and 2014) explore the micro-foundation of "law without state".

social norms, and stimulate individuals to behave against the COVID-19 pandemic for economic resilience. Practically speaking, during COVID-19, telework from home became a key strategy for firms to cope with social distancing. The absence of a monitoring mechanism for telecommuters breeds opportunistic behaviors (Bilotta et al., 2021). Since CC can function for societal stability and social adaption, it reduces corporate and individual (e.g., managers, employees) opportunistic behaviors, thereby helping firms to establish CR (Figure 1 panel A).

Given the above discussion, we can generate the following hypothesis.

Hypothesis 1 (H1): CC promotes corporate resilience to crisis; specifically for empirical tests, it causally reduces the severity of loss and time to recovery during COVID-19.

In particular, CC could breed a social norm for societal stability, to lower the moral hazard of firm members including employees, managers, and others involved in firm operations. Given that COVID-19 generates a shock to the prior industrial pattern, firms have opportunities to disobey rules without ex post penalty. As an anecdote, the blocking policies during COVID-19 prohibit regulators from monitoring firm operations, and regulators have almost no information to ex post verify firms' opportunistic behavior (Rawtani et al., 2021). However, CC emphasizes the virtues of benevolence and propriety for societal stability, thereby constraining firms' immoral incentives. As the existing literature (Kung and Ma, 2014) indicates, CC has strong power to motivate individuals' trust in the state and government so as to restrict the latter's opportunistic behavior.

From the firm's point of view, shareholders in cities with higher CC would be self-restricted by the virtue of Ren (benevolence) from supporting opportunistic behavior of firms, and also motivated by the virtue of Li (propriety) to behave legally. Similarly, directors and managers would be motivated by these virtues to implement firm operation strategies under the rules; and employees tend to be more intrinsically restricted in their telework under weak external monitoring. All of these practices lead to firms' compliance with rules during the pandemic, and could generate a signal to society for its reputation

to maintain soft competitiveness, which is especially important for a listed company (von Berlepsch et al., 2025), thereby increasing its market value and CR reflected in the stock market.

Moreover, CC could breed a social norm for social adaptation, in reducing shirking for anti-epidemic coordination, motivating individuals to participate in group campaigns against the pandemic. Telework causes a lack of monitoring, and since production involves a chain of procedures, one particular immorality may lead to the suspension of the whole firm operation. In a city with higher CC, economic organizations can employ cultural identity to better implement anti-crisis policies, instead of ignoring them by simply believing in their immunity to the virus or putting individual freedom as the priority.

Specifically, shareholders could be motivated by the virtues of Ren (benevolence) and Li (righteousness or justice) to actively participate in the social campaign against COVID-19. Firm managers and employees could be induced by the virtues of CC to lower moral hazard (Zolotoy et al., 2018), helping or even substituting for formal corporate governance. The moral motivation or constraint on firm members is critical when COVID-19 requires all potential and unknown infected persons to adopt quarantine and other protective measures. Also, the social-adaptation norm arising from CC virtues would help firms to effectively address shirking during the COVID. For example, CC could help firms implement anti-crisis policies, such as requiring firm members to report their status and personal traveling information (Abidi et al., 2022). By doing so, firm members may sacrifice some personal privacy and freedom, in the hope of helping the whole firm to identify potential infected cases.

As explained above, CC informally regulates individual behavior, thereby helping firms better adopt IC practices (compliance with rules and anti-crisis programs for operational continuity). Theoretically speaking, (i) CC safeguards a firm's business ethics and increases societal stability in crisis, so as to maintain competitiveness in the financial and real markets; (ii) it helps the firm to use sharedness mechanisms (e.g., reputation) for societal adaptation

to ensure employee participation and obtain their travel information, thereby better avoiding production suspension and governance inefficiency. Hence, we expect both the practice and intensity of a firm's internal control positively to mediate the promotional effect of CC on its corporate resilience to a crisis, which can be summarized as

Hypothesis 2 (H2): A firm's internal control positively mediates the promotional effect of CC on its corporate resilience to a crisis, mediating the effect of CC on the severity of loss and time to recovery.

However, as shown in panel B of Figure 1, we expect that, if a firm is in an industry that has external monitoring, the effect of internal control will be reduced. Specifically, we use the industry's ARI (measured by the ratio of firms with service from the Big 4 auditors) or ISI (measured by the average institutional shareholding rate) as moderators. When an industry has a high share of firms with services from the Big 4 auditors, it tends to have a high level of external monitoring and control from professional and qualified audit organizations, to avoid over-enthusiastic investments or operations and to possibly seek better growth paths (Knechel et al., 2020; Leuz and Wysocki, 2016). In other words, auditing can help the firm promptly identify its financial fragility and offer guidance about where to adopt pertinent measures; thus, a high auditing rate tends to generate a high level of control that can help firms obtain CR, thereby reducing the reliance and significance of the internal control mechanism. Hence, we have

Hypothesis 3.1 (H3.1): ARI reduces the promotional effect of CC on its corporate resilience to a crisis, by positively and significantly moderating the negative effect of CC on the severity of loss and time to recovery.

Also, a higher industry level of institutional shareholdings enables the corresponding firms to have better risk management and resource utilization, leading to higher innovation (Aghion et al., 2013; Rong et al., 2017). Institutional shareholders can use their experience, resources, and social capital to address the potential distress in firms, and obtain prompt information about financial and economic risks and opportunities in the market; Also, they

have institutional support and economic incentives to monitor and control the shareholding firms. Thus, a higher industry level of institutional shareholdings enables a higher level of external control on firms, leading to a smaller promotional effect of CC on CR.

Hypothesis 3.2 (H3.2): ISI reduces the effect of CC on corporate resilience to crisis, by positively moderating the negative effect of CC on the severity of loss and time to recovery.

2 Empirical Design

In this section, we test the above hypotheses with empirical data and evidence. Before introducing the empirical design, some clarification of our control-selection strategy is in order. We follow standard econometric principles and the spirit of Angrist and Pischke (2009) to only control for exogenous controls in the baseline estimations. Specifically, to avoid bad control issues, we omit some endogenous variables (e.g., financial or management practices) that might be important for economic performance. Moreover, some variables that may confound the relationship of interest cannot be controlled for either; for example, historical transportation and population may be related to our measures of CC and CR, but including them would bias the estimates of interest.

Instead, we shall test and show that representative confounding factors and omitted variables are unlikely to affect our baseline estimates (see Sections 5.3-5.4). We will also undertake placebo tests by randomly assigning pandemic intensity to prefectures and then conduct regressions 1000 times, thereby testing the robustness of our baseline estimates (Section 5.5). After that, we will undertake a thorough IV strategy to isolate the effect of interest from potential endogeneity biases.

With the above explanations, we now test the relationship between Confucian culture and corporate resilience in China, by conducting baseline estimations using

$$CR_i = c + \alpha_1 CC_i + \alpha_2 Z_j + u_k + e_i \tag{1}$$

where CR is corporate resilience, CC is the intensity of Confucian culture for a firm, and Z is a series of control variables explained later. Subscripts i,j, and k refer to the firm, prefecture, and industry, respectively. Considering unobservable industry characteristics, we also control for industrial dummies (u_k), with standard errors (e_i) clustered at the city and industry level.

To formally address potential bias, we shall adopt the following strategies to identify the causal effects of interest.

2.1 Causal effect of interest

To isolate the causal effect of CC on CR, we first test the validity of our IV

$$CC_i = c + \theta_1 IV_i + \theta_2 Z_i + u_k + e_i \tag{2}$$

$$CR_i = c + \theta_3 IV_i + \theta_4 Z_i + u_k + e_i \tag{3}$$

$$CR_i = c + \theta_5 IV_i + \theta_6 CC_i + \theta_7 Z_i + u_k + e_i \tag{4}$$

where IV is the number of Chastity Memorial Archways (CMAs) in a firm's city, and other variables remain designed as before. CMAs are used as an instrument since they are feudal-era archways honoring women who either kept their virtue or died for doing so. These monuments typify the Confucian principles of honor and modesty, indicating the strength of Confucianism. However, they stand as examples of the husband's authority over the household (e.g., the "widowhood spirit"), which oppresses women through inequality and has been largely abolished in modern China. Thus, CMAs are not expected to affect firm operations or growth in China today, apart from their relevance to CC.

For validity of the IV, the relevance assumption requires coefficient θ_1 in eq. (2) be significantly positive, and the exclusion restriction suggests that θ_3 in eq. (3) be significantly negative and θ_5 in eq. (4) be insignificant. Specifically, the negative θ_3 indicates that our IV can affect CR through CC, whereas insignificant θ_5 shows that IV does not affect CR

directly when the variable of interest has been controlled for. Thus, IV tends to affect CR only through CC. In fact, we further test the exclusion restriction by regressing female participation in firm operations today on IV, since the former is one of the most standard measures of gender inequality.

With the above validity confirmation, we then undertake 2^{nd}-stage estimation,

$$CR_i = c + \beta_1 \hat{CC}_i + \beta_2 Z_j + u_k + e_i \tag{5}$$

where $\hat{CC}_i$ is the fitted value from eq. (2); other variables are as designed before.

2.2 Causal mediation analysis: internal control

Considering that there may be other channels of CC on CR, in order to ensure our mediation effect is robust to omitted variables, here we follow Imai et al. (2010), by calculating the average causal mediation effect (ACME):

$$CR_i = c + \alpha_1 CC_i + \alpha_2 Z_j + G_k + e_i \tag{6}$$

$$IC_i = c + \alpha_3 CC_i + \alpha_4 Z_i + G_k + e_{i,1} \tag{7}$$

$$CR_i = c + \alpha_5 CC_i + \alpha_6 IC_i + \alpha_7 Z_i + G_k + e_{i,2} \tag{8}$$

where IC refers to the internal control index (including both practices and intensity, such as compliance to rules, and operational continuity arising from collective participation against the COVID). To ensure the feasibility of approximation for ACME, we control for G_k in regressions, which indicates the average sales growth ratio in an industry (representing the growth tendency).

The causal mediation method requires calculating the product after "simulating predicted values of the mediator or outcome variable, which we do not observe, and then calculating the appropriate quantities of interest" (Hicks and Tingley, 2011). This method has an important advantage in testing how the mediation effect of interest is robust to potential endogeneity

bias. It does not assume no endogeneity but sequential ignorability, and it tests sensitivity. Statistically, sequential ignorability can be represented by non-correlation between the two error terms in eqs. (7)-(8), i.e., v=cov($e_{1,i}$,$e_{2,i}$)=0. Imai et al. (2010) show that ACME can be consistently estimated for any assumed value of v in this range and then expressed as a function of v. Thus, a sensitivity analysis can be conducted to calculate v when ACME is 0. In other words, we can test the null hypothesis (v=0) for ACME.

2.3 Causal moderation analysis

We next conduct IV estimations to test the moderation effect of interest,[7]

$$CR_i = c + \beta_3 \hat{CC}_i + \beta_4 \hat{CC}_i * M_k + \beta_5 Z_i + u_k + e_i \tag{9}$$

where M is an indicator for the moderator of interest, ATI or ISI, which have been absorbed by industrial dummies, so we do not control for them but only add the interaction between M and CC. In particular, we expect β_4 to be significant and positive.

3 Data and Variables

This section explains the data and measures of our variables, mainly coming from CSMAR (China Stock Market and Accounting Research) that reports information on all 3,515 A-share listed firms and is a frequently used database in existing China studies (e.g., Du 2015). All city-level geographic variables are extracted by ArcGIS from raw geographic data (The Administration of Surveying and Geographic Information, 2022). Descriptive statistics and correlation matrix of the main variables are provided in Tables 1 and 2, respectively.

[Insert Table 1 about here]

[Insert Table 2 about here]

[7]The estimation results without instruments are provided upon request.

3.1 Variable of outcome: the firm's CR measured in stock prices

To quantify CR, we adopt three observation windows for respectively 12-, 18-, and 24-months, with reference to the onset of the event shock (i.e., the COVID-19 pandemic). Following Liu et al. (2023), we use January 22, 2020 as the starting date of COVID-19, which is the day when Wuhan was locked down. In particular, Wuhan was the first city to be ravaged by COVID-19, and after its lockdown, the Chinese central government set strict instruments to control the spread of the pandemic across the country, locking down nearly 80% of the cities for at least one time in the following year.[8]

To precisely measure a firm's CR to COVID-19, following DesJardine et al. (2019), we exploit the outcome in stock price in two ways. First, we measure a firm's *severity of loss*, calculated as the absolute percentage change in the firm's stock price between the closing price on January 22, 2020, and its lowest price in the observation period. Second, we measure a firm's *time to recovery*, calculated as the number of days until the firm's stock price fully recovered to its closing price on January 22, 2020. We also use the *length of recovery* as a robustness check later.

3.2 Variable of interest: Confucian culture

To measure the intensity of CC, we focus on Confucianism-related structures. Since Confucianism serves as the bedrock of socio-political philosophy and has shaped norms and political institutions throughout history in China (Du, 2015), it determines China's ethos (Chao et al., 2023) as well as organizational capabilities for firm operations (Fu and Tsui, 2003), which are crucial for resilience (Hillmann and Guenther, 2021). To capture the Confucian culture's ambience in the surrounding environment of a firm, we follow Du (2015) by using the number of Confucian temples, i.e., shrine buildings in honour of Confucius, to measure the strength of Confucianism. By matching the Confucian temple data with the

[8]Information gathered from official news and reports by authors.

registered firm addresses, we calculate the number of Confucian temples within a 200km radius of each firm as the baseline variable of interest. For robustness checks, we also measure the number alternatively with reference to 100km, 150km, and 250km. CC intensity is calculated as $log(1+x)$, with x being Confucian temples.

Specifically, we measure the current intensity of CC with reference to the heritage of Confucian temples, which are developed as cultural sites to promote local culture and tradition, as well as attracting tourists. Since CSMAR provides the longitude and latitude of the objects, we can adopt this methodology to ensure that our measure of CC is oriented at the firm level, unlike prior studies based on historical data that only reached the prefecture level (see Bai, 2019; Chen et al., 2022).[9]

3.3 Other dimensions of Confucian culture

We also measure the intensity of CC in other dimensions below, which have also been mentioned by the existing literature. All measures are based on Confucianism but developed to other dimensions.

The number of *Jinshi*. *Jinshi* is a scholar who attained the highest qualification in ancient China's civil examination system–known as *Keju* in Chinese. Since the Ming Dynasty, several classic books and sutras for Confucian scholars had been designated as school textbooks, and only those who got excellent scores in *Keju* would become political or economic officials. Therefore, the historical number of *Jinshi* reflects the traditional *Keju* culture of a city. It not only captures the Confucian wisdom endorsed by the textbooks

[9]Prior studies (e.g., Bai, 2019; Chen et al., 2022) adopt the number of historical Confucianism-related structures in a prefecture relative to the historical population. After carefully examining the historical data, we found significant informational errors, for two reasons: i) due to historical events such as wars, many historical structures disappeared and the current population is significantly different from the historical one; ii) jurisdictional changes forced these scholars to use ArcGIS to predict the historical CC intensity within a current prefecture/city.

but also generates a cultural view aiming at valuing education and agriculture (Chen et al., 2020). The *Jinshi* data are obtained from the book Ming-Qing *Jinshi* Timing *Beilu Suoyin* (Zhu and Xie, 1980), which covers a total of 51,624 Jinshi and their places of origin for the Ming and Qing dynasties (AD 1368-1912). By matching the ancient locations to contemporary China's administrative divisions, we obtain the city-level number of *Jinshi*.

The number of *Shuyuan*. *Shuyuan*, also known as the Confucian academy, is the professional place for teaching and learning Confucian wisdom and culture. Confucian academies are authorized by the Qing government and protected by local clans and families; as such, they are official and private transmitters of Confucian culture. The data come from the development history of China's Confucian academy (zhongguo gudai shuyuan fazhanshi). Calculations are also made at the city level.

The number of Genealogies. *Genealogies* are documents used to record the lineage of families and the deeds of people that have been passed down from ancient times to the present day. They are the embodiment of China's clan culture, which is bred from kinship-based groups. The clan culture is deeply based on the morality and ethics promoted by Confucianism, and it has developed into a unique patriarchal norm and order, both of which emphasize the spirit of blood identity and principles. Following Cao et al. (2022) and Zhang (2020), we use the number of genealogies to measure the strength of clan culture. Data are extracted from *Zhongguo Jiapu Zongmu*, which is the largest collection of Chinese genealogies from the Song Dynasty to 2007 (Wang, 2007). We count the number of genealogies at the city level and normalize it by population size.

3.4 City-level controls

A series of historical and geographical variables that may affect CR are also controlled for in our baseline regressions.

Land suitability. Because the majority of China's history is agricultural development

and the agricultural norm affects contemporary economic performance (Qian, 2008), we control for a city's average land fertility that is calculated from the raw data of Galor and Özak (2016).

Slope. The slope of a city is one of the basic geographic characteristics. China has a farming history of 5,000 years, which has been constrained by land slope. We control for the average slope of a city, and the raw data on the topography and geology are obtained from the Resource and Environment Science and Data Center of the Chinese Academy of Sciences (CAS).

Terrain ruggedness. Complex topography has limited migration in ancient times, and the long-term clustering of the population favors the formation of local shared values. Specifically, terrain ruggedness expresses the amount of elevation difference between adjacent points. Following Nunn and Puga (2012) we calculate the average level of each city with variable ArcGIS, and control for terrain ruggedness that can constrain transportation and development. We use the same raw dataset as for slopes above.

Distance to coastline. China was forced by Western countries to open treaty ports after wars (Jia, 2014), so the distance to the coast measures the Western influence in modern institutions and culture—specifically, the quality of economic institutions, the openness of markets, and the human capital of market economies. This variable is measured as the distance in meters between a prefecture's centroid and the closest point on China's coast (Chen et al., 2020).

Literary inquisition. The literary inquisition is a product of feudal and authoritarian politics in ancient China, which became the most intense during the Qing Dynasty. To strengthen ideological and cultural control, the ruling class tortured intellectuals on the grounds that their writings violated taboos, so the literary inquisition reflected political instability. In line with Koyama and Xue (2015), we hand-curate the persecution cases from the book Qingdai Wenziyu Dang (Shanghai Shu Dian Chu Ban She, 2007), then match the original places of persecuted people to contemporary China's administrative divisions at

the city level. The variable is constructed as the number of people persecuted by literary inquisition during the Qing Dynasty in each city.

Death due to COVID-19. The death cases are set to control for the severity of the pandemic as suggested in previous literature (Bartscher et al., 2021; Makris, 2021). The city-level death data for the whole of 2019 are manually collected and aggregated from the official notices of the Commission of Health of each province. Partially missing data are hand-arranged by the authors from other official reports.

3.5 Firm-level controls and confounding factors

As mentioned before, to avoid the bad-control issue, we did not control for potentially endogenous variables in the baseline analysis, which may yield estimation bias. Here we control for several firm characteristics that may affect CR, as suggested in the literature (e.g., DesJardine et al., 2019), including (logged) firm age, firm size (logged book value of total assets), independent director ratio, inventory turnover ratio, fixed assets ratio, and number of board directors (logged). To minimize endogenous interference, we use the values for 2019, the year before the onset of COVID-19.

Some historical variables may be confounding factors, so we further add them in the robustness checks. First, because railways have a long-run impact on economic development (Jedwab et al., 2017), we use historical documents to identify the longitude and latitude of railways operating before the collapse of the Qing dynasty in 1911, following Zhang (1997). Second, we measure the number of historical epidemics in the last feudal dynasty, which may reflect unobservable properties generated by historical epidemics that affects current firm behavior. Third, we measure the number of COVID-19 confirmed cases that may not only reflect the severity of COVID-19 but also the enforcement of outbreak control (Fang et al., 2020). The confirmed case data are collected from the same source of deaths as measured before. Finally, we control for institutional quality, which may be a substitute or complement

to CC. This indicator is from the China Market Index Database of the National Economic Research Institute.

4 Main Results: Confucian Culture and Corporate Resilience

We report the baseline estimates in Section 4.1. With appropriate caution, we adopt a series of tests to show our results are robust to different measures and dimensions, the most representative other traditional cultures (i.e., Buddhist and Taoist), and additional controls and confounding factors (Section 4.2-4.7). More generally, we conduct a group of placebo tests in Section 4.8 to show our estimates are unlikely to be biased by potential endogeneity. Finally, we undertake joint tests (Section 4.9) to justify the validity of our IV and then isolate the causal effect of interest in Section 4.10.

4.1 Baseline estimates

Table 3 reports the baseline estimates for three observation windows. Columns (1)–(3) report the regression results with *severity of loss* as the dependent variable while Columns (4)–(6) report with *time to recovery* as the dependent variable.

[Insert Table 3 about here]

Across different observation windows (12-, 18-, and 24-months), we find that *Confucian temples* is significantly negatively related to a firm's severity of loss and time to recovery due to the COVID-19 shock. The coefficients are significant at 5% confidence level. Specifically, with the 12-month observation window estimates, the values of Confucian temples are -0.013 and -4.528 in Columns (1) and (2), respectively. This indicates that for every 1% increase in the intensity of CC, the maximum decline in a firm's share price due to COVID-19 would

be lowered by an average of 1.3%, and the time needed for the share price to recover from the pre-shock period would be shortened by an average of 4.5 days. In other words, CC has sheltered firms by promoting their CR in times of crisis.

[Insert Table 4 about here]

We next consider possible bias that may result from the measurement choice of how the Confucianism intensity is calculated. In panels A–C of Table 4, we use the number of Confucian temples around the listed firms at 100km, 150km, and 250km, respectively. The coefficients of interest are significantly negative for both CR measures, irrespective of different observation windows. Thus, our baseline estimates are not affected by the scale of geographic ranges used to compute the Confucianism intensity.

Some existing studies measure cultural strength by using the distance to the culture-related structure. It assumes that a structure has a far-run impact and the impact decreases with distance. Here we repeat our baseline estimations by replacing the intensity of CC with the strength of CC and obtain similar results.[10]

4.2 Robustness to other dimensions of recovery

[Insert Table 5 about here]

We have followed the standard literature (DesJardine et al., 2019) to measure the time to recovery for CR. However, there could be a fleeting show concern that the stock price recovers to the original level but falls again shortly, making recovery an illusion. To *lessen this concern*, we measure length of recovery: how many days the stock price stays not lower than 90% of the original level after it is recovered post COVID-19, which is regressed on

[10]Specifically, we calculate the average distance of a firm to Confucian temples in the province and transform it using the inverse hyperbolic sine function before regressions. As it turns out, the distance is positively and partially significantly related to CR.

controls as before. In Table 6, the coefficient of CC is positive and significant, in line with our baseline estimates. Thus, our estimates are robust to the potential recovery illusion.

4.3 Robustness to stock-price manipulation and over-sensitivity

In our sample, only 10 companies experienced trading suspension due to mandatory regulation or voluntary restriction. Thus, stock-price manipulation is negligible.

Nevertheless, China's financial market is far from complete, and over-sensitivity in stock price could confound the effect of CC on CR. Here, we construct an over-sensitivity dummy using a firm's continuous 3-day limit-ups or limit-downs, and repeat our baseline estimation by controlling for this dummy. As in Table 6, our coefficient of interest is still negative and significant as before.

[Insert Table 6 about here]

4.4 Robustness to other dimensions of Confucian culture

We also use other CC dimensions as variables of interest. Panels A–C of Table 7 report regressions on firm-level CR using the numbers of *Jinshi*, Confucian academy (*Shuyuan*), and genealogies, respectively. For both severity of loss and time to recovery, the coefficients of interest are significantly negative at the 5% confidence level, thereby confirming the robustness of the impact of CC on CR.

[Insert Table 7 about here]

4.5 Robustness to other forms of traditional culture

More generally, China's traditional culture also exhibits in Buddhism and Taoism though Confucianism is the main source. In theory, Buddhism and Taoism would not really confound the effect of CC on CR since they encourage individuals to go out of the real world; whereas

Confucianism emphasizes the reality and calls for addressing realistic problems. In particular, Taoist temples are always hidden in mountains as Taoism emphasizes "no action" in economic operations (Ma and Tsui, 2015).

[Insert Table 8 about here]

With extra caution of the mutual effect between Confucian Culture and Buddhism or Taoism, here we repeat the baseline estimation but additionally control for the intensity of Buddhism and Taoism, which are measured by the number of Buddhist and Taoist temples, respectively. For data fitting, we also employ an inverse hyperbolic sine function before regression, which corrects nonpositive data, retains the sample size and avoids excessive sensitivity at the zero-value point (Friedline et al., 2015). As Table 8 shows, the coefficients of interest remain significantly negative as before, confirming the robustness of the relationship between CC and firm CR to other representative traditional cultures.

4.6 Robustness to additional, firm-level controls

Further, we add as additional controls the firm-level characteristics for the year 2019 in regressions. In Table 9, across the three observation windows, the estimates remain statistically significant. For the severity of loss, the coefficients of Confucian temples are significantly negative at the 1% confidence level and are greater than those in the baseline estimates (Columns (1)–(3) of Table 3). For time to recovery, the coefficients of Confucian temples are negative and still significant at the 10% confidence level. Thus, even with additional firm-level controls, our benchmark model obtains similar findings as before.

[Insert Table 9 about here]

4.7 Robustness to confounding factors

[Insert Table 10 about here]

Table 10 reports the regression results by further controlling for confounding factors as introduced in sub-section 3.5. For all three observation windows, the coefficients of Confucian temples are significantly negative, in line with the baseline estimates. The values of coefficients are similar, suggesting that the relationship between CC and CR is robust to other historical and institutional confounding factors.

4.8 Falsification tests

So far, we have exploited city level (historical, geographic, institutional) and firm-level characteristics to check the robustness of the baseline estimates. Next we undertake placebo tests, by randomly assigning Confucian temples to a firm and then conducting 1,000 iterations to evaluate the robustness of α_1.

[Insert Figure 3 about here]

[Insert Figure 4 about here]

Given the three observation windows for the CR measure, we undertake three rounds of placebo tests separately for severity of loss (Figures 3.1-3.3) and time to recovery (Figures 4.1-4.3). For the former, the coefficients of CC are symmetrically zero-centered, and the corresponding t statistics lie mostly between -1.964 and 1.964. Random simulation produces an insignificant coefficient of false CC for the severity of loss, regardless of observation windows. Similarly, for the latter, the coefficient of false CC is insignificant for time to recovery, regardless of which observation window we consider.

As shown above, the relationship between CC and CR is generally robust to the random assignment of CC values; thus, it is unlikely driven by omitted variables, measurement errors or uncontrolled factors. Moreover, CC is at the city level and CR is at the firm level, so reverse causality is inherently unlikely.

4.9 Validity of IV

We report the results for IV validity in Table 11. In Column (1), the coefficient of CMAs is significantly positive at the 1% confidence level, indicating a strong correlation between the IV and the variable of interest; the F statistic reaches 12.47, indicating a good relevance of our IV. Moreover, we undertake reduced form estimates based on eq. (3). In Columns (2)–(7), our IV estimates are significantly negative. Recall that the relationship between the variable of interest and CR (or IV) is negative (or positive); thus, the significantly negative coefficient of the IV indicates CMAs may affect a firm's CR through the variable of interest in an expected way.

[Insert Table 11 about here]

To test whether our IV satisfies the exclusion restriction, we regress both Confucian temples and CMAs on a firm's CR based on eq. (4). As Columns (8)–(12) show, across the estimates for all three observation windows and the two CR variables, the coefficients of CMAs are insignificant, suggesting that the IV does not affect CR when the variable of interest has been controlled for.

With extra caution, we further examine whether our IV affects female participation in firm operation after CMA is abolished. Female participation is one of the most standardized measures of gender inequality in the existing literature (e.g., Alesina et al., 2013). We regress CMAs on the number and ratio of female directors in firms as dependent variables. In Table 12, the coefficients of CMAs are insignificant to contemporary female participation in direction and execution. Hence, our IV is uncorrelated with female participation in firm operations, justifying that CMAs cannot affect firm operations directly.

[Insert Table 12 about here]

To summarize the evidence for exclusion restrictions, our IV (CMAs) cannot affect current female participation, since it was abolished. More directly, we test the impact of the IV after

controlling for CC, and find it insignificant. These evidences suggest that our IV is plausibly exogenous, satisfying the exclusion restrictions.

4.10 Second-stage estimates

We report the 2^{nd}-stage estimates in Table 13. Across all speculations, Columns (1)–(6) show that the coefficients of Confucian temples are significantly negative, suggesting a robust causality between CC and CR after accounting for potential endogeneity bias, thereby confirming our expectations.

[Insert Table 13 about here]

5 Mechanism: Internal Control Matters

We first undertake causal mediation analysis to test whether the practices and intensity of internal control (IC) mediate the effect of CC on CR. Then we test whether ARI or ISI as a proxy for external control weakens the promotional effect of CC, thereby indirectly confirming that the internal control mechanism matters.

5.1 Causal mediation analysis

A firm's internal control practices basically exhibit in its compliance with rules and its operational continuity control. As explained before, CC has strong power to motivate individuals' trust in the state and government and restrict their opportunistic behavior. Specifically for firms, shareholders in a city with higher CC would be self-restricted by the virtue of Ren (benevolence) from supporting opportunistic behavior, and motivated by the virtue of Li (propriety) to behave legally. Similarly, directors and managers would be motivated by these virtues to implement firm operation strategies by following the rules, while employees tend to be more intrinsically restricted in their telework. All of these practices lead firms

to comply with rules, generating a signal to society for good reputation in maintaining its competitiveness, thereby increasing its market value and CR, as reflected in the stock market.

Moreover, CC could breed a social norm for social adaptation, in reducing shirking for anti-epidemic coordination. In a city with higher CC, shareholders would be motivated by the virtues of Ren (benevolence) and Li (righteousness or justice) to actively participate in the social campaign against the COVID. Managers and employees may be motivated to lower moral hazard, helping or even substituting for formal corporate governance. As a representative example, CC could help firms implement anti-crisis policies, such as encouraging firm members to report their status and personal traveling information to identify potential infected cases, although with sacrifice of some personal privacy and freedom.

To sum up, CC can function as a social norm for societal stability to facilitate a firm's compliance with rules for its reputation and soft competitiveness, thereby increasing market value and CR during the crisis; it also can breed a norm for social adaptation to motivate firm members' collective coordination in anti-crisis programs for operational continuity, improving its CR. We expect these two practices of IC to mediate the effect of interest; to confirm it, we will first test whether the general IC index mediates the effect of interest as follows.

We examine the causal mediation effect following eqs. (6)–(8). The firm annual IC indices are from the Internal Control database of DIB Big Data Research Centre. We regress as mediators, respectively, the firm IC index in 2019, the past 3-year average IC index (2017-2019), and the past 5-year average IC index (2015-2019). In panels A and B of Table 14, across all estimates, the mediation effect of IC is statistically significant. Taking the 12-month observation window as a benchmark for analysis, for the severity of loss, the ACME of IC is -0.002 and significant at the 5% confidence level, suggesting that 21.632% of the total effect is mediated by internal control. For *time to recovery*, the ACME of IC is -0.366, calculated as 7.458% of the total effect. In general, a firm's IC index mediates the effect of CC on its CR.

[Insert Table 14 about here]

Also, our mediation estimates show that the ACME of IC is robust to potential endogeneity. Specifically, it shows that we cannot reject the sequential ignorability assumption even at the 10% level. Thus, the mediation effect of IC on the relationship between CC and CR is robust to potential endogeneity bias, confirming our expectation.

In addition, our dataset offers IC information with concrete practices of firm behavior. Here we re-conduct causal mediation analysis but with the IC practices of compliance with rules and anti-crisis programs against the COVID-19. In particular, the former IC practice refers to a firm's response to norms for societal stability to control for its opportunistic behavior, whereas the latter IC practice refers to norms for social adaptation during COVID-2019, to help the firm motivate its members to participate in coordination against COVID-19, such as no-shirking in anti-crisis and information self-reporting to the firm. The corresponding results are similar as before,[11] so we can conclude that our mediation effect estimates have general and practical implications for firm operations and strategies.

5.2 Causal moderation effects

To further examine whether the IC mechanism matters, we employ ARI and ISI as proxies for external control. Specifically, we expect ARI or ISI to weaken the promotional effect of CC, i.e., a significantly positive interaction-term coefficient in the regression results.

We present the 2^{nd}-stage regression results of moderation effect estimates based on eq. (9). In Table 16 panel A, the coefficients of the interaction term in all 6 columns are significantly positive, suggesting a substitutive role of ARI on CC. Similarly, panel B shows that the interaction coefficients of ISI are significantly positive; that is, ISI weakens the effect of Confucian culture on the severity of the loss and the time to recovery.

[11] Since the results are similar as before, to save space, they are not reported here, but are available upon request.

The above findings confirm our expectations. Specifically, given that CC reduces the severity of loss and the time to recovery via internal control, the significantly positive interaction items suggest that the intensity of external monitoring from auditing organizations or institutional shareholders tends to weaken the effect of IC, thereby confirming the substitution function of external monitoring forces, and also indirectly confirming that the IC mechanism matters.

[Insert Table 15 about here]

6 Heterogeneity tests

The final part of our empirical analysis examines whether the effects of CC are heterogeneous across different types of firms, the results of which can help guide policy discussions and future studies on CC. Here we repeat the regressions using the same main controls and firm-level characteristics as in Section 3.5 but with the sample split into State-owned enterprises (SOEs) and others.[12]

First, we examine whether the effect of CC on CR is different for SOEs and non-SOEs. Since SOEs inherently have stronger internal control due to their governmental linkages and hierarchy that enable them to obtain more resources, the norms for social stability or social adaptation and the internal control mechanism may be much less important. Indeed, we find that the coefficient of CC on either severity of loss or time to recovery is significantly negative only for non-SOEs, regardless of different windows (e.g., 12, 18 or 24 months). In addition, the coefficient size is consistently greater for non-SOEs, significant at the 1% level.[13] These findings indicate that the internal control mechanism is critical for the effect of interest.

Furthermore, our sample-splitting regressions show that the coefficient of CC in CR is more negative for firms with losses than without losses during COVID-19. Specifically, the

[12]To save space, they are not reported here, but are available upon request.

[13]We adopt Chow test to examine the coefficient differerence

former firms have significantly higher coefficients of severity of loss. This indicates that firms with losses need to rely more on CC to obtain CR from the crisis. In fact, we additionally find similar results using Tobin's Q value for the severity of loss. If a firm's Q is greater than 1, it has more chances to obtain financial capital and employ the internal control mechanism to gain CR against the pandemic.

7 Conclusions

Using evidence from China, we have documented that CC causally promotes CR from crises such as COVID-19. We adopted a causal mediation analysis to show that CC affects firms' CR by increasing internal control practices, such as improving compliance with rules and maintaining operational continuity, while external monitoring proxies weaken the promotional effect of interest, thereby indirectly confirming the internal control mechanism.

To our knowledge, this study is the first to investigate how CC affects CR through the internal control mechanism. The existing literature has paid attention to economic resilience, by focusing on strategies, external resources, or other dimensions. The present paper adds to the understanding of economic development from the perspective of local traditional culture. In addition, some studies have explained China's macroeconomic growth puzzle by reconsidering the role of institutions. The present paper goes further by confirming the promotional role of CC in the bounce-back of businesses using firm-level data, complementing the literature. Hence, it might provide guidance for businesses in countries with long traditions, such as Egypt, India, Japan, and Korea, etc.

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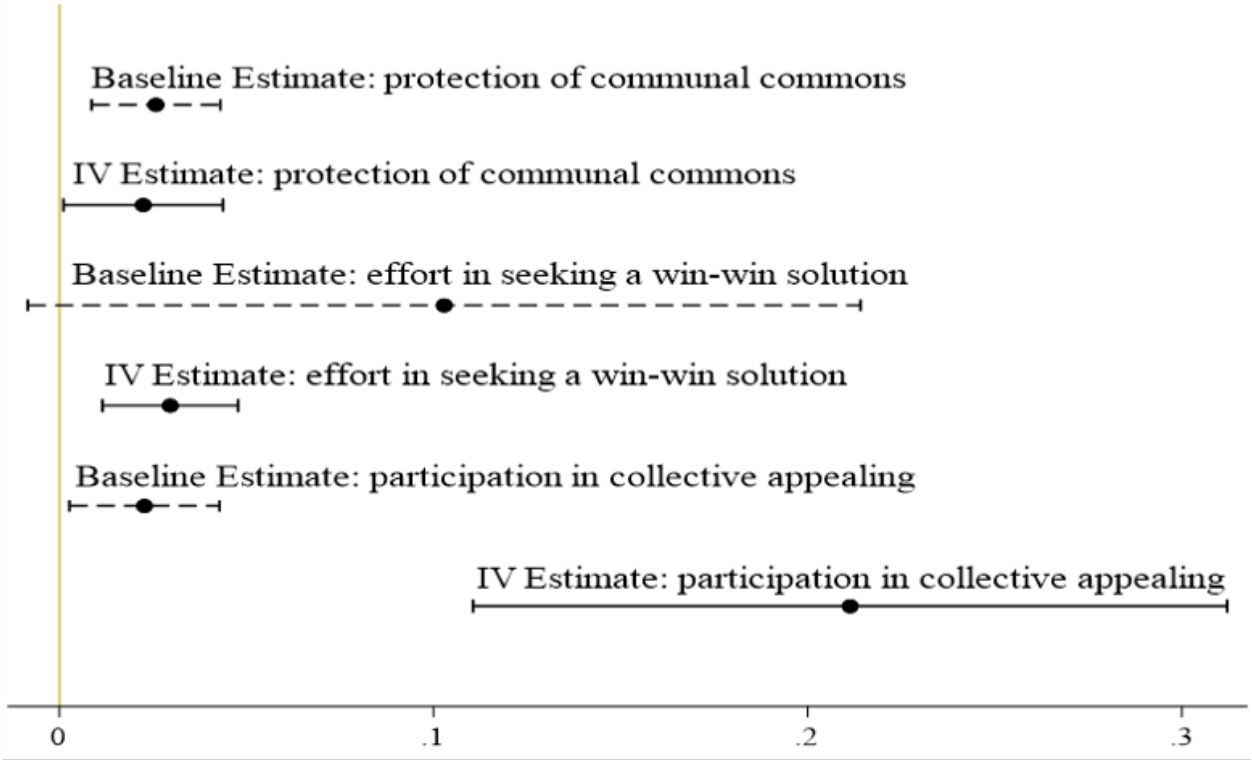


Figure 2: Coefficients of Confucian culture (for collective behavior and beliefs)

Figure 3.1: for 12 months

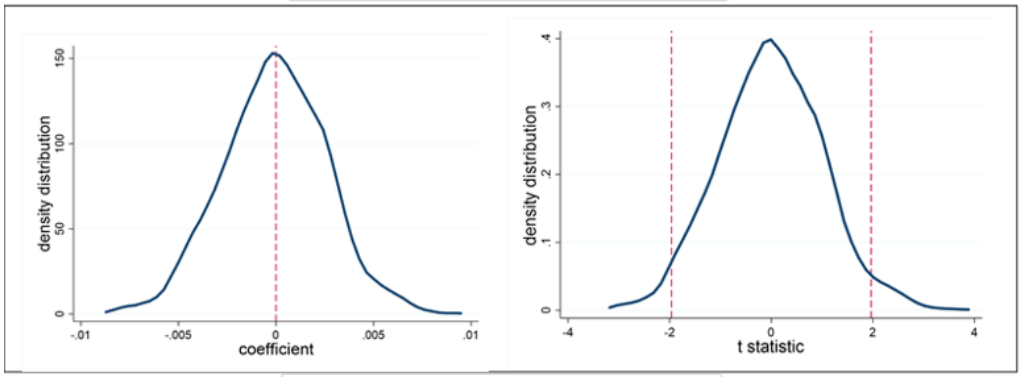


Figure 3.2: for 18 months

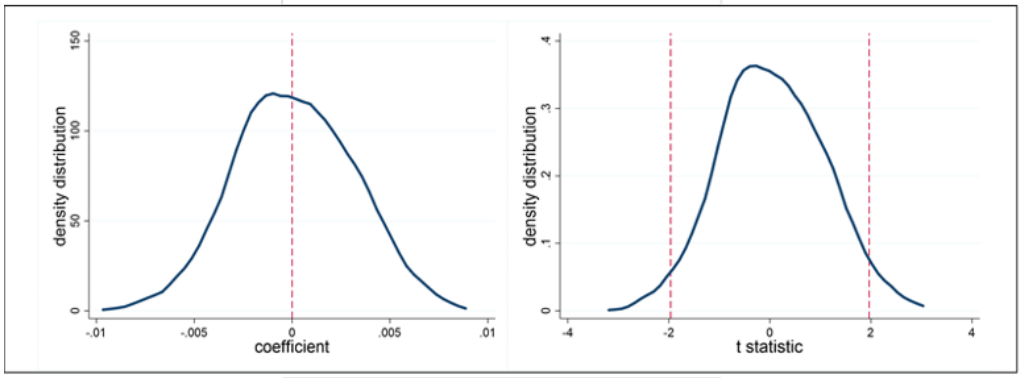


Figure 3.3: for 24 months

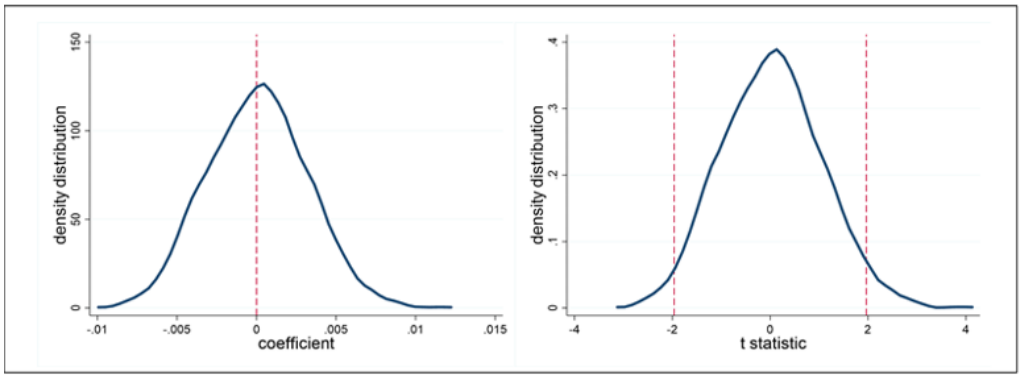


Figure 3: Placebo texts for severity of loss

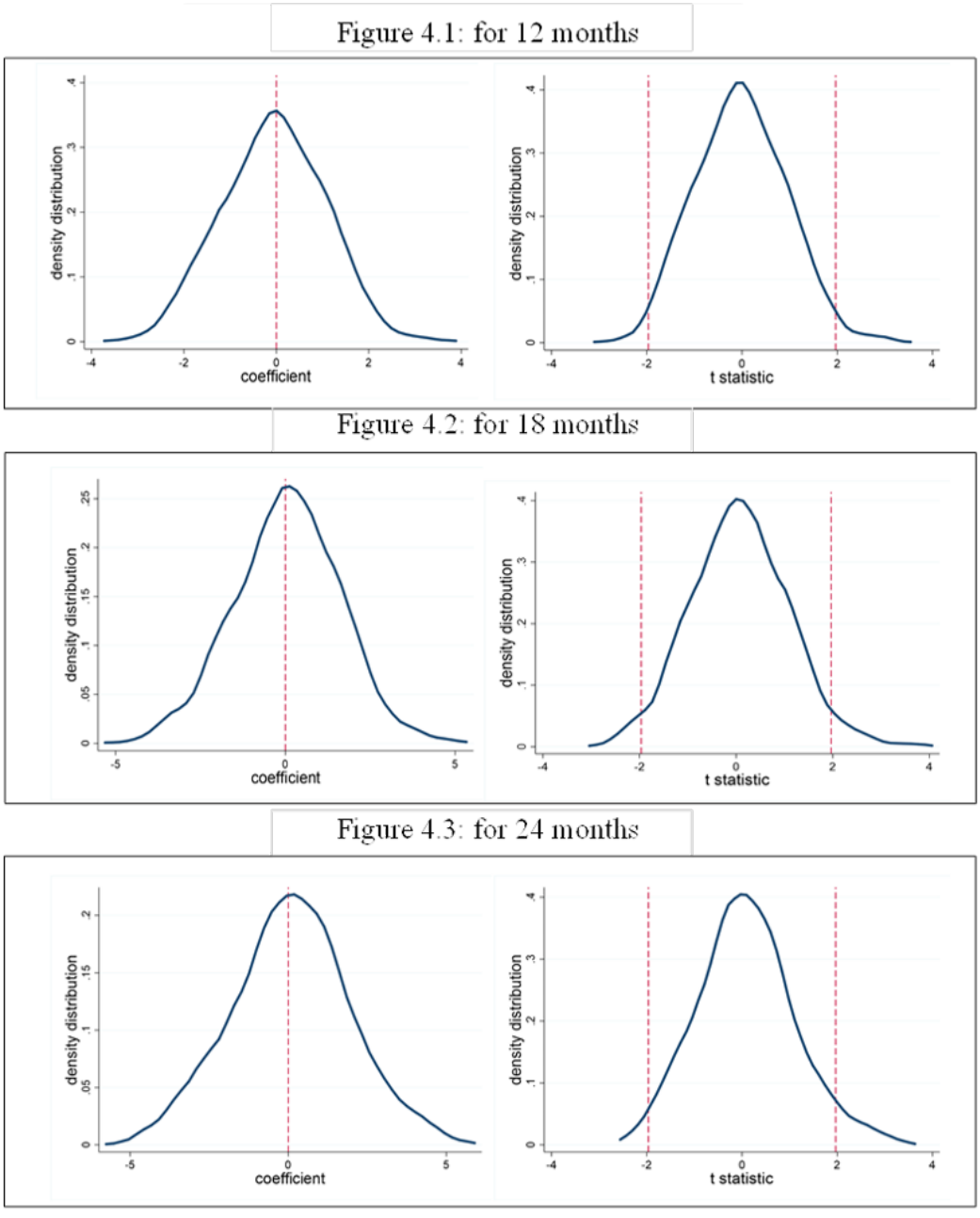


Figure 4: Placebo texts for time to recovery

Table 1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Severity of loss (12 months)	3,749	-0.748	0.135	-1	-0.058
Severity of loss (18 months)	3,749	-0.711	0.156	-1	-0.044
Severity of loss (24 months)	3,749	-0.697	0.163	-1	-0.044
Time to recovery (12 months)	3,749	42.692	63.187	1	244
Time to recovery (18 months)	3,749	48.384	83.001	1	363
Time to recovery (24 months)	3,749	52.574	99.987	1	486
Confucian temples	3,749	2.614	0.862	0	4.094
Land suitability	3,720	7.453	1.137	-6.908	7.949
Terrain Ruggedness	3,721	7.674	1.397	3.929	11.755
Slope	3,721	1.893	1.577	0.033	12.66
Distance to coastline	3,720	11.506	1.577	5.717	15.077
Literary inquisition	3,730	3.442	6.843	0	25
Death due to COVID-19	3,515	0.9	1.313	0	8.261
Firm age	3,600	2.144	0.899	0	3.401
Firm size	3,600	22.28	1.358	17.545	28.636
Independent director (ratio)	3,600	0.38	0.057	0.25	0.8
Inventory turnover ratio	3,552	0.134	0.125	0	0.907
Fixed assets ratio	3,599	0.198	0.156	0	0.954
Board directors	3,600	2.103	0.198	1.386	2.833

Table 2: Correlation matrix

	Variable	1	2	3	4	5	6
1	Severity of loss (12 months)	1.000					
2	Severity of loss (18 months)	0.916	1.000				
3	Severity of loss (24 months)	0.871	0.975	1.000			
4	Time to recovery (12 months)	0.240	0.189	0.170	1.000		
5	Time to recovery (18 months)	0.269	0.224	0.205	0.980	1.000	
6	Time to recovery (24 months)	0.282	0.242	0.224	0.947	0.989	1.000
7	Confucian temples	-0.020	-0.016	-0.008	-0.092	-0.086	-0.082

Table 3: Baseline estimates

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent var.	Severity of loss			Time to recovery		
	12 months	18 months	24 months	12 months	18 months	24 months
Confucian temples	-0.013***	-0.014***	-0.012***	-4.528**	-6.041**	-7.282**
	(0.004)	(0.004)	(0.004)	(1.783)	(2.441)	(3.029)
Land suitability	-0.007	-0.008	-0.008	-0.220	0.603	1.467
	(0.005)	(0.005)	(0.005)	(1.964)	(2.502)	(2.947)
Terrain Ruggedness	0.002	0.002	0.002	0.401	0.729	1.180
	(0.002)	(0.003)	(0.003)	(0.990)	(1.314)	(1.571)
Slope	-0.000	-0.000	-0.001	-0.688	-1.054	-1.435
	(0.002)	(0.002)	(0.003)	(1.062)	(1.395)	(1.629)
Distance to coastline	-0.002	-0.002	-0.002	0.962	1.749*	2.304*
	(0.002)	(0.002)	(0.002)	(0.760)	(1.044)	(1.297)
Literary inquisition	-0.000	-0.000	-0.000	0.171	0.161	0.184
	(0.000)	(0.000)	(0.000)	(0.159)	(0.213)	(0.255)
Death due to COVID-19	-0.002	-0.001	-0.001	-0.323	-0.384	-0.706
	(0.002)	(0.002)	(0.002)	(0.936)	(1.314)	(1.465)
Constant	-0.647***	-0.598***	-0.589***	43.058**	35.900	27.995
	(0.048)	(0.055)	(0.056)	(19.810)	(26.121)	(31.413)
Industries	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,515	3,515	3,515	3,515	3,515	3,515
R-squared	0.107	0.122	0.132	0.179	0.161	0.144

Robust standard errors clustered at the city and industry levels in parentheses;

*** p<0.01, ** p<0.05, * p<0.1

Table 4: Using another measure of Confucian Temples (CT)

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent var.	Severity of loss			Time to recovery		
	12 months	18 months	24 months	12 months	18 months	24 months
	Panel A: CT within 100 KM as the variable of interest					
CT within 100 km	-0.011***	-0.010**	-0.008*	-4.395**	-5.814**	-6.683**
	(0.004)	(0.004)	(0.004)	(1.824)	(2.447)	(2.998)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Industries	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,515	3,515	3,515	3,515	3,515	3,515
R-squared	0.106	0.120	0.131	0.179	0.160	0.144
	Panel B: CT within 150 KM as the variable of interest					
CT within 150 km	-0.015***	-0.014***	-0.012***	-4.487**	-5.908**	-6.987**
	(0.004)	(0.004)	(0.004)	(1.868)	(2.555)	(3.169)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Industries	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,515	3,515	3,515	3,515	3,515	3,515
R-squared	0.108	0.122	0.133	0.179	0.161	0.144
	Panel C: CT within 250 KM as the variable of interest					
CT within 250 km	-0.014***	-0.015***	-0.013***	-4.952**	-6.573**	-8.001**
	(0.004)	(0.004)	(0.004)	(1.930)	(2.653)	(3.329)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Industries	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,515	3,515	3,515	3,515	3,515	3,515
R-squared	0.107	0.122	0.132	0.179	0.161	0.144

Robust standard errors in parentheses and clustered at the city and industry levels;

*** p<0.01, ** p<0.05, * p<0.1

Table 5: Robustness to the potential recovery illusion

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent var.	Length of recovery($p_t \geq p_{-1}$)			Length of recovery($p_t \geq 90\%p_{-1}$)		
	12 months	18 months	24 months	12 months	18 months	24 months
Confucian temples	7.569***	10.153***	12.441***	6.728***	9.659***	11.544***
	(2.032)	(3.073)	(4.023)	(1.905)	(2.852)	(3.789)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Industries	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,515	3,515	3,515	3,515	3,515	3,515
R square	0.117	0.117	0.130	0.110	0.114	0.124

Note: Length of recovery refers to the time when the stock price post COVID-19 (p_t) stays not lower than (90% of) the one just before COVID-19 (p_{-1}).

Robust standard errors in parentheses and clustered at the city and industry levels;

*** p<0.01, ** p<0.05, * p<0.1

Table 6: Robustness to manipulation and over-sensitivity

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent var.	Severity of loss			Time to recovery		
	12 months	18 months	24 months	12 months	18 months	24 months
Confucian temples	-0.013***	-0.013***	-0.012***	-4.570**	-5.982**	-7.182**
	(0.004)	(0.004)	(0.004)	(1.786)	(2.431)	(3.019)
Exceptional change in prices	0.020***	0.030***	0.024***	-2.391	1.746	3.605
	(0.007)	(0.007)	(0.006)	(2.661)	(3.254)	(3.717)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Industries	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,515	3,515	3,515	3,515	3,515	3,515
R square	0.110	0.128	0.137	0.179	0.161	0.144

Robust standard errors in parentheses and clustered at the city and industry levels;

*** p<0.01, ** p<0.05, * p<0.1

Table 7: Using other measures of Confucian culture

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent var.	Severity of loss			Time to recovery		
	12 months	18 months	24 months	12 months	18 months	24 months
	Panel A: Jinshi as the variable of interest					
The No. of Jinshi	-0.007***	-0.008***	-0.007***	-1.971**	-2.758**	-3.506**
	(0.002)	(0.002)	(0.002)	(0.942)	(1.272)	(1.583)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Industries	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,515	3,515	3,515	3,515	3,515	3,515
R-squared	0.107	0.123	0.133	0.178	0.160	0.144
	Panel B: Confucian academies as the variable of interest					
Confucian academies	-0.027***	-0.026***	-0.023***	-7.551***	-10.482***	-12.349***
	(0.003)	(0.003)	(0.003)	(1.349)	(1.848)	(2.249)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Industries	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,515	3,515	3,515	3,515	3,515	3,515
R-squared	0.146	0.148	0.153	0.193	0.176	0.159
	Panel C: clans as the variable of interest					
Clans	-0.005***	-0.005***	-0.005***	-2.303***	-3.048***	-3.569***
	(0.002)	(0.002)	(0.002)	(0.716)	(0.944)	(1.137)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Industries	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,515	3,515	3,515	3,515	3,515	3,515
R-squared	0.107	0.121	0.132	0.180	0.161	0.145

Robust standard errors in parentheses and clustered at the city and industry levels;

*** p<0.01, ** p<0.05, * p<0.1

Table 8: Buddhist or Taoist temples

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent var.	Severity of loss			Time to recovery		
	12 months	18 months	24 months	12 months	18 months	24 months
	Panel A: Taoist temples					
Confucian temples	-0.010**	-0.009**	-0.008*	-3.492*	-4.654*	-5.616*
	(0.004)	(0.004)	(0.004)	(1.986)	(2.667)	(3.221)
Taoist temples	-0.003	-0.003	-0.004	-0.600	-0.663	-0.764
	(0.002)	(0.002)	(0.003)	(1.075)	(1.437)	(1.720)
	Panel B: Buddhist temples					
Confucian temples	-0.009**	-0.009*	-0.007+	-2.856+	-3.799+	-4.532+
	(0.004)	(0.005)	(0.005)	(2.127)	(2.864)	(3.449)
Buddhist temples	-0.003	-0.004	-0.004	-1.131	-1.396	-1.704
	(0.003)	(0.003)	(0.003)	(1.228)	(1.650)	(1.971)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Industries	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,423	3,423	3,423	3,423	3,423	3,423
R square	0.149	0.172	0.182	0.149	0.172	0.182

Robust standard errors in parentheses and clustered at the city and industry levels;

*** p<0.01, ** p<0.05, * p<0.1, + p<0.20

Table 9: Additional controls

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent var.	Severity of loss			Time to recovery		
	12 months	18 months	24 months	12 months	18 months	24 months
Confucian temples	-0.014***	-0.015***	-0.014***	-3.093*	-3.955*	-4.577*
	(0.003)	(0.004)	(0.004)	(1.688)	(2.250)	(2.707)
Land suitability	-0.006	-0.007	-0.008	-1.002	-0.475	0.055
	(0.005)	(0.005)	(0.005)	(1.900)	(2.403)	(2.801)
Terrain Ruggedness	0.001	0.001	0.001	0.466	0.774	1.192
	(0.002)	(0.002)	(0.002)	(0.982)	(1.300)	(1.545)
Slope	-0.000	0.000	-0.000	-0.775	-1.082	-1.427
	(0.002)	(0.002)	(0.002)	(1.058)	(1.400)	(1.635)
Distance to coastline	-0.001	-0.001	-0.001	0.904	1.615	2.090*
	(0.002)	(0.002)	(0.002)	(0.735)	(0.992)	(1.213)
Literary inquisition	-0.000	-0.000	-0.000	0.173	0.139	0.138
	(0.000)	(0.000)	(0.000)	(0.163)	(0.215)	(0.257)
Death due to COVID-19	-0.001	-0.000	-0.000	-0.251	-0.230	-0.490
	(0.002)	(0.002)	(0.002)	(0.928)	(1.305)	(1.444)
Firm age	-0.019***	-0.027***	-0.031***	-1.693	-2.986	-4.266*
	(0.003)	(0.003)	(0.003)	(1.366)	(1.898)	(2.360)
Firm size	-0.008***	-0.009***	-0.006**	2.532**	2.708**	2.914*
	(0.002)	(0.002)	(0.002)	(1.015)	(1.332)	(1.624)
Independent director (ratio)	0.003	0.006	-0.001	-3.960	-14.116	-24.343
	(0.049)	(0.058)	(0.058)	(20.363)	(26.016)	(30.660)
Inventory turnover ratio	-0.061***	-0.070***	-0.071***	1.496	-0.646	0.098
	(0.021)	(0.025)	(0.025)	(9.701)	(12.983)	(15.784)
Fixed assets ratio	-0.052***	-0.088***	-0.102***	-0.010	-2.684	-3.263
	(0.017)	(0.020)	(0.021)	(8.632)	(11.471)	(13.876)
Board directors	-0.029**	-0.038**	-0.040**	-2.207	-4.380	-5.846
	(0.014)	(0.016)	(0.017)	(6.378)	(8.360)	(10.149)
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Industries	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,423	3,423	3,423	3,423	3,423	3,423
R square	0.148	0.172	0.181	0.185	0.167	0.151

Robust standard errors in parentheses and clustered at the city and industry levels;

*** p<0.01, ** p<0.05, * p<0.1

Table 10: Confounding factors

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent var.	Severity of loss			Time to recovery		
	12 months	18 months	24 months	12 months	18 months	24 months
Confucian temples	-0.014***	-0.015***	-0.014***	-4.478**	-5.753**	-6.778**
	(0.004)	(0.004)	(0.004)	(1.788)	(2.435)	(3.007)
Distance to historical rails	-0.003**	-0.004**	-0.003*	0.548	0.926	1.306
	(0.001)	(0.002)	(0.002)	(0.671)	(0.876)	(1.044)
Historical epidemics	0.001	0.000	0.001	-0.643	-1.035+	-1.294+
	(0.001)	(0.001)	(0.001)	(0.538)	(0.717)	(0.862)
COVID-19 Cases	-0.003	-0.003	-0.001	2.114*	2.492+	2.714
	(0.003)	(0.003)	(0.003)	(1.216)	(1.589)	(1.899)
Institutional quality	0.004	0.009*	0.009**	-1.229	-2.281	-3.234
	(0.004)	(0.005)	(0.005)	(2.103)	(2.745)	(3.345)
Basic controls	Yes	Yes	Yes	Yes	Yes	Yes
Industries	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,515	3,515	3,515	3,515	3,515	3,515
R square	0.11	0.12	0.13	0.18	0.16	0.15

Robust standard errors in parentheses and clustered at the city and industry levels;

*** p<0.01, ** p<0.05, * p<0.1

Table 11: Validity of IV

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	1st-stage	Reduced form estimates					
Dependent var.	Confucian temples	Severity of loss			Time to recovery		
		12 months	18 months	24 months	12 months	18 months	24 months
Chastity Memorial Archways	0.247***	-0.006***	-0.007***	-0.006**	-2.408**	-3.095**	-3.802**
	(0.016)	(0.002)	(0.003)	(0.003)	(1.016)	(1.359)	(1.665)
R-squared		0.105	0.121	0.132	0.179	0.160	0.144
		Exclusion restriction test					
		(8)	(9)	(10)	(11)	(12)	(13)
Confucian temples		-0.011***	-0.011**	-0.010**	-3.410*	-4.650*	-5.545*
		(0.004)	(0.004)	(0.004)	(1.948)	(2.647)	(3.239)
Chastity Memorial Archways		-0.003	-0.004	-0.004	-1.564	-1.944	-2.429
		(0.002)	(0.003)	(0.003)	(1.105)	(1.466)	(1.768)
R-squared	0.358	0.107	0.122	0.133	0.179	0.161	0.145
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industries	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,515	3,515	3,515	3,515	3,515	3,515	3,515
F statistic	12.47						

Robust standard errors in parentheses and clustered at the city and industry levels;

*** p<0.01, ** p<0.05, * p<0.1

Table 12: IV and female participation in corporate operations

Dependent var.	Female directors	Female director ratio	Female executives	Female executive ratio
Chastity Memorial Archways	-0.015	-0.003	-0.027	-0.006
	(0.023)	(0.003)	(0.023)	(0.004)
Controls	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes
Industries	Yes	Yes	Yes	Yes
N	3,512	3,512	3,512	3,512

Robust standard errors in parentheses and clustered at the city and industry levels;

*** p<0.01, ** p<0.05, * p<0.1

Table 13: 2^{nd}-stage estimates

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent var.	Severity of loss			Time to recovery		
	12 months	18 months	24 months	12 months	18 months	24 months
Confucian temples	-0.024***	-0.028***	-0.024**	-9.840**	-12.633**	-15.512**
	(0.009)	(0.010)	(0.010)	(4.314)	(5.758)	(7.054)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Industries	Yes	Yes	Yes	Yes	Yes	Yes
N	3,515	3,515	3,515	3,515	3,515	3,515

Robust standard errors clustered at the city and industry level in parentheses;

*** p<0.01, ** p<0.05, * p<0.1

Table 14: Causal mediation effects

Panel A: for severity of loss			
Dependent variable:	During 12 months		
Mediator: internal control index	In 2019	2017-2019	2015-2019
Average causal mediation effect	-0.002**	-0.002***	-0.002***
Ratio of total effect mediated	21.632%	21.183%	18.933%
Sensitivity	0.252	0.190	0.162
	During 18 months		
Mediator: internal control index	In 2019	2017-2019	2015-2019
Average causal mediation effect	-0.002**	-0.002***	-0.002***
Ratio of total effect mediated	20.891%	19.876%	17.831%
Sensitivity	0.230	0.169	0.144
	During 24 months		
Mediator: internal control index	In 2019	2017-2019	2015-2019
Average causal mediation effect	-0.002**	-0.002***	-0.002***
Ratio of total effect mediated	22.305%	26.868%	18.391%
Sensitivity	0.203	0.146	0.123
Panel B: for time to recovery			
Dependent variable:	During 12 months		
Mediator: internal control index	In 2019	2017-2019	2015-2019
Average causal mediation effect	-0.366**	-0.476***	-0.434***
Ratio of total effect mediated	7.458%	9.698%	8.832%
Sensitivity	0.100	0.101	0.087
	During 18 months		
Mediator: internal control index	In 2019	2017-2019	2015-2019
Average causal mediation effect	-0.564**	-0.707***	-0.658***
Ratio of total effect mediated	8.774%	10.958%	10.195%
Sensitivity	0.117	0.114	0.1007
	During 24 months		
Mediator: internal control index	In 2019	2017-2019	2015-2019
Average causal mediation effect	-0.688**	-0.846***	-0.798***
Ratio of total effect mediated	8.695%	10.644%	10.060%
Sensitivity	0.119	0.113	0.102

Robust standard errors in parentheses and clustered at the city and industry levels;
*** p<0.01, ** p<0.05, * p<0.1

Table 15: Moderation effect estimates (2^{nd}-stage)

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent var.	Severity of loss			Time to recovery		
	12 months	18 months	24 months	12 months	18 months	24 months
	Panel A: the Audition Rate of an Industry (ARI) as moderator					
Confucian	-0.024***	-0.028***	-0.024**	-9.525**	-12.157**	-14.874**
temples	(0.009)	(0.010)	(0.010)	(4.320)	(5.775)	(7.087)
Confucian	0.298***	0.331*	0.363**	480.203***	724.405***	972.556***
temples*ARI	(0.115)	(0.198)	(0.178)	(114.247)	(190.657)	(289.579)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Industries	Yes	Yes	Yes	Yes	Yes	Yes
N	3,515	3,515	3,515	3,515	3,515	3,515
	Panel B: the Institutional Shareholding of an Industry (ISI) as moderator					
Confucian	-0.235***	-0.263*	-0.282**	-349.867***	-525.632***	-704.257***
temples	(0.075)	(0.143)	(0.125)	(63.091)	(129.125)	(209.495)
Confucian	0.534***	0.592*	0.651**	859.677***	1,296.895***	1,741.144***
temples*ISI	(0.184)	(0.358)	(0.312)	(154.906)	(321.882)	(525.103)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Industries	Yes	Yes	Yes	Yes	Yes	Yes
N	3,515	3,515	3,515	3,515	3,515	3,515

Robust standard errors in parentheses and clustered at the city and industry levels;

*** p<0.01, ** p<0.05, * p<0.1