

# Does culture matter in corporate cash holdings?

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## Abstract

This paper identifies culture as an important factor affecting corporate cash holdings by using China and its national culture, Confucianism, as the setting. We find that firms located in regions with stronger Confucian culture hold persistently higher levels of cash. We employ an instrumental variable to draw causal inference. Confucian culture strengthens the effect of cash flow risk on cash holdings of financially-constrained firms, suggesting precautionary motives as the underlying mechanism. We find that the culture effect remains intact after controlling for corporate governance heterogeneity, which rules out the agency motives. Lastly, firms' operating performance indicates that high cash holdings is an efficient outcome.

## KEYWORDS

agency conflicts, cash holdings, China, culture, precautionary motives

## JEL CLASSIFICATION

G30, G32, M14

## 1 | INTRODUCTION

Corporate cash holdings are strategically important for a firm to maintain smooth operation as well as to realize valuable investment opportunities (Denis & Sibilkov, 2010; Duchin, 2010; Harford et al., 2014). There is a large literature dating back to Baumol (1952) exploring the determinants of corporate cash holdings. This literature presents three motives to hold cash, that is, the transaction cost motives, the precautionary motives, and the agency motives.<sup>1</sup>

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Despite these extensive studies on the determinants of corporate cash holdings, some puzzling phenomena are observed that there are huge discrepancies in corporate cash holdings among countries which cannot be well explained. For instance, in developed economies where highly developed capital markets and good institutions are both in place, median cash holding ratios (cash divided by net assets) for the past 20 years (2000–2019) are 0.201 (Hong Kong), 0.187 (Japan), and 0.174 (Singapore), while for western counterparts, they are 0.158 (United States),<sup>2</sup> 0.117 (Germany), 0.114 (United Kingdom).<sup>3</sup> What draws our attention is that these three high cash holding economies are all, more or less, Confucian culture societies. Cultural differences have already been documented to affect an impressive array of financial decisions and outcomes, both on the corporate side and on the investment side (e.g., Ahern et al., 2015; Chui et al., 2010; Pan et al., 2020; Pursiainen, 2022). Enlightened by this, in our paper, we are motivated to study whether culture matters in corporate cash holdings.

We focus on a single country and use China and its dominant national culture, Confucianism, as the setting to identify the culture effect. Although studying the relationship between national cultures and corporate cash holdings using a cross-sectional samples at the country level provides valuable insights (Chen et al., 2015), it faces the potential risks of omitted variables. In other words, it is hard to identify the effect of culture from confounding effect of country-level institutions, since culture affects the formation of institutions and statutory laws (Alesina & Giuliano, 2015; Licht et al., 2005; Stulz & Williamson, 2003). By focusing on a single country, we are able to hold constant the institutions and exploit the within-country variances in culture density across regions to identify the effect of culture.

As the dominant culture in China, Confucianism can be dated back to the Chinese philosopher *Confucius* (551–479 BC) 2000 years ago. The teachings of *Confucius* are referred to as Confucian culture or Confucianism. Despite the fact that China has endured radical socioeconomic transformation over the past century, Confucianism retains its far-reaching influence in modern China<sup>4,5,6</sup> (Allen et al., 2005; Chen, Kung, & Ma, 2020). Thus, studying the financial implications of Confucianism is independently significant.<sup>7</sup> Confucianism is a culture type characterized by risk-aversion and uncertainty-avoidance, embodied in its almost absolute emphasis on social stability (Chen & Ma, 2022; Chen, Ma, & Sinclair, 2022). To quote *Confucius*, "... the head of a state or a noble family worries not about scarcity but about uneven distribution, not about poverty but about insecurity. For ... where there is harmony there is no such thing as scarcity and where there is security there is no such thing as overturning" (*The Analects*, Lau, 1992). *Confucius* and his followers chose to prescribe supportive norms and structure the society in a way that ensure the state and society operate with lowest risks and greatest stability. In view of the deep-rooted risk-aversion mentality of Confucianism, we hypothesize that firms located in regions with stronger Confucian culture hold higher levels of cash due to stronger precautionary motives, because these firms may be more conservative about future earnings prospects and/or more cautious about potential adverse shocks.

In this paper, we use the number of Confucian temples around firm headquarters to measure the regional Confucian culture density. These Confucian temples were built from the Tang Dynasty to the Qing Dynasty (618–1912 AD) and are extant tourist attractions as well as cultural heritage protection units. In imperial China, Confucian temples served two functions: a place of worship for *Confucius* as well as an official academy for teaching Confucianism. These two functions make Confucian temples the most important vehicles to propagate Confucianism in imperial China.

Looking at a sample of all Chinese listed firms (excluding financial firms) from 2000–2020, we find that firms located in regions with stronger Confucian culture hold higher levels of cash. A one-standard-deviation increase in Confucian culture density increases corporate cash holdings by 2.9%–4.8% (compared with the mean) depending on the model specification, which is an economically significant magnitude. In a robustness test using the number of Confucian scholars to measure the strength of Confucian culture, the results are similarly significant. Besides, we also find that these firms' high cash holding status is persistent over time.

To establish causality, we employ an instrumental variable (IV) developed by Chen, Ye, et al. (2020), that is, the shortest river distance of a prefecture to its nearest pine and bamboo forests, the two key ingredients required for

producing ink and paper in woodblock printing in ancient China. Confucian temples as official schools to teach Confucian classics and prepare students for the civil exam “*keju*” (an exam system in imperial China to test Confucian orthodoxy and select public officials), and as official libraries (every Confucian temple had a built-in library “*zunjing ge*”), crucially relied on access to books. Chen, Ye, et al. (2020) demonstrate that as natural habitats, the locations of pine and bamboo forests are exogenous. Chen, Ye, et al., 2020 also show that this IV is orthogonal to historical economic prosperity, geographic conditions, agriculture development, and economic prosperity at modern times. Employing the IV to perform a two-stage least squares (2SLS) estimation, we confirm that higher Confucian culture leads to higher corporate cash holdings, with a larger economic magnitude: a one-standard-deviation increase in Confucian culture density increases corporate cash holdings by 12% (compared with the mean).

We then examine the mechanism by which Confucian culture affects cash holdings with following Han & Qiu, 2007. We present heterogeneity analysis on firms' financial constraint levels. We use firm size and age as proxies for financial constraint levels (Hadlock & Pierce, 2010) and find that the culture effect strengthens the effect of cash flow risk on cash holdings of financially-constrained firms, consistent with the predictions of precautionary motives that firms will hold higher levels of cash when access to external financing is limited and costly (Almeida et al., 2004; Han & Qiu, 2007). This analysis lend strong support to precautionary motives as the underlying mechanism, which is consistent with the nature of Confucianism as a risk-averse culture type.

We proceed with heterogeneity analyses on assessing whether the culture effect might result from agency motives. We follow the literature to construct three variables to measure severity of potential agency conflicts, including the ratio of independent directors on the board, insider share holdings and total shares held by the second to the fifth largest shareholders (Chen et al., 2012; Mikkelsen & Partch, 2003). We do not see a significant difference in the culture effect for firms with different agency conflict severity, suggesting that the agency motives are unlikely to be the underlying mechanism. Moreover, we look at firm operating outcomes for further evidence. We first show that Chinese listed firms suffer from some agency issues of over-investment, as firms with worse investment opportunities (proxy by market-to-book ratio) invest more. We find that the culture effect helps to alleviate this agency issue as firms in stronger Confucian culture regions make less but better investments (i.e., only invest more when investment opportunities are good). Consistent with this point, we find that stock market investors evaluate the acquisition events more positively of these firms, measured as the 3 day cumulative abnormal returns (CAR) for acquisition announcements. As a result of better investment choices, we find that these firms also have higher profitability return on assets (ROA) and lower profit volatility (standard deviation of ROA). Finally, we also find that high Confucian culture firms pay out more cash dividends, which is also contrary to the predictions of agency motives where entrenched management will hoard excess cash and use for their own benefits. All these evidence about firm operating performance suggests that high cash holdings, to some extent, is an efficient outcome of less agency conflicts.

Apart from heterogeneity at the corporate level, we further look at heterogeneity at the prefecture level to rule out possibilities that our Confucian culture measures are just somehow proxies for local economic and financial development. We examine whether local credit market development (proxy by total bank loans scaled by local gross domestic product (GDP), Levine et al., 2000) and openness (proxy by foreign direct investments (FDIs) scaled by local GDP), affect cash holdings and the culture effect. We do not find any significant effects of local financial and economic conditions on the culture effect. Lastly, we examine how the firm headquarter's regional cultural environment interacts with the firm's top decision maker's (i.e., chief executive officer (CEO) and board chairman) cultural background. We find that both cultural sources matter. CEO/chairman with stronger Confucian background also leads to higher corporate cash holdings, and corporate headquarters' cultural effect remains significant at 1% level, but the economic magnitude becomes weaker as the CEO/chairman's cultural background becomes stronger.

Our paper contributes to a number of related literature. First, with regard to the corporate cash holdings literature, our paper shows how a culture of risk-aversion can shape a company's cash holdings in a single country setting. Our identified culture effect has a significant economic magnitude, even within the same country where different

regions share the same culture, but with varying cultural density. In view of this, our paper contributes to the literature that tries to explain huge discrepancies in corporate cash holdings around the world (e.g., Chen et al., 2015; Dittmar et al., 2003; Kalcheva & Lins, 2007; Pinkowitz et al., 2016) as well as adds to the literature exploring determinants of corporate cash holdings (Almeida et al., 2004; Begeau & Palazzo, 2021; Cunha & Pollet, 2020; Duchin, 2010; Faulkender et al., 2019; Harford et al., 2014; Jensen, 1986; Opler et al., 1999; among others). Dittmar et al. (2003) and Kalcheva and Lins (2007) try to explain cash holding discrepancies among countries on the ground of institutions (e.g., different levels of shareholder rights protection), but still cannot explain some puzzling phenomena that listed firms in some developed economics with good institutions hold high levels of cash. Closer to our study, Chen et al. (2015) find that firms in countries with collectivism and uncertainty-avoidance culture are associated with higher corporate cash holdings, but their findings are generally correlation due to difficulties to identify the culture effect from confounding country-specific elements (e.g., institutions, legal environment, government quality, information environment, among others). Chen, Ye, et al. (2020) also study the relationship between Confucian culture and corporate cash holdings, however, they find completely opposite results based on a different Confucian culture density measure. In their paper, they measure local Confucian culture density as the distance between the firms' headquarters and the seven largest Confucian temples in China; however, our measure as the number of Confucian temples (Confucian academies) within 100 km radius around firm headquarters can more precisely capture the regional variation of the culture density in the local level (mainly in the prefecture level). Our measure of Confucian culture density in the prefecture level by counting the number of Confucian symbols has been adopted in studies published in leading journals (Chen, Ma, & Sinclair, 2022; Chen, Ye, et al., 2020). Furthermore, our IV results also corroborate the validity of our measure and our main findings. Apart from finding opposite effects of Confucian culture on cash holdings, our paper also pin down the channels and investigate the efficiency implications.

Our paper is also related to a growing literature that studies how cultural differences affect financial decisions (Ahern et al., 2015; Bereskin et al., 2018; Berger et al., 2021; Chui et al., 2010; Hilary & Hui, 2009; among others). Many of these prior culture literature focuses on religion or culture value measures from Hofstede and Hofstede (1984) and the World Values Survey. We contribute to this literature by studying another specific type of culture, Confucianism, which has far-reaching influence in the East and Southeast Asian economies.<sup>8</sup> The broad influences of Confucianism makes studying its financial implications independently important. Our study also differs from prior literature that only focus on the cultural background of CEO (e.g., Nguyen et al., 2018; Pan et al., 2020) by focusing on corporate headquarters' regional cultural environment. We follows a similar argument as Bloom et al., 2012 that firm headquarters' regional cultural environment shapes firms' corporate culture, and thus influences corporate decisions. In our paper, we find that both top decision makers' cultural background and firm headquarters' cultural environment matter in corporate cash holdings.

Lastly, our paper speaks to the literature on the economic and financial influences of Chinese culture. In their influential paper, Allen et al. (2005) posit that Confucian culture shapes social values, orders and trust, which is the main mechanism for China's private sector to achieve astonishing growth despite the almost nonexistence of formal governance mechanisms (see, also, Zhang, 2020; Chen, Lin, & Zhang, 2024; Chen, Ma, & Sinclair, 2022). Our paper adds to this literature by showing a direct Confucian culture effect on corporate decisions. Wei and Zhang (2011) show that the Chinese culture of parental preference for sons and parents' competitive saving to improve their son's relative attractiveness for marriage explains China's high and rising household savings rate. Our paper differs by looking at how culture affects corporate cash holding behaviors.

The remainder of the paper proceeds as follows. Section 2 describes the background that provides the setting for our analyses and the development of our hypotheses. Section 3 describes the data and main variables construction. Section 4 provides main empirical results of the culture effect on corporate cash holdings. Section 5 investigates the culture effect heterogeneity and tries to identify the underlying mechanisms. Section 6 shows evidence on the relationship between regional culture and corporate culture. Section 7 concludes the paper.

## 2 | BACKGROUND AND HYPOTHESIS DEVELOPMENT

### 2.1 | Confucianism and risk-aversion

Confucianism has over 2000 years of history in China and originates from the teachings of the Chinese philosopher *Confucius* (551–479 BC). Confucianism had been endorsed as the only national orthodoxy since emperor *Han Wu Di* (157–87 BC) and became the dominant culture throughout the entire imperial China. Despite the fact that China has endured radical socioeconomic transformation in the past century, Confucianism still retains its far-reaching influence in modern China. For example, Allen et al. (2005) posit that Confucianism serves as the alternative mechanism to support China's astonishing private sector growth despite the deficiency of formal law system.

Confucianism is a culture type characterized by risk-aversion and uncertainty-avoidance, which put paramount emphasis on social stability. We can find much evidence in *The Analects* to support this view.<sup>9</sup> To quote *Confucius*, "... the head of a state or a noble family worries not about scarcity but about uneven distribution, not about poverty but about insecurity. For ... where there is harmony there is no such thing as scarcity and where there is security there is no such thing as overturning." Confucianism was born out of a time when China endured incessant warfare and chaos (*the Warring States period*, 475–221 BC), so *Confucius* and his followers sought to regulate human relations to promote stability (social, economic, and political). This very nature of stability-centric makes Confucianism favored by emperors in imperial China, so Confucianism was promoted as the only national orthodoxy to govern the state since emperor *Han Wu Di*. Apart from being a cultural system or a philosophy of life, Confucianism had also been transformed into a clan-centered institution to mitigate risks among clan members by subsequent Confucian scholars (Chen, Lin, & Zhang, 2024; Chen & Ma, 2022; Chen, Ma, & Sinclair, 2022). Against these facts, we can see clearly that Confucianism is a culture type of high risk-aversion, and we are interested in whether this risk-aversion mentality has any implications for corporate decisions in modern times.<sup>10</sup>

### 2.2 | Functionalities of Confucian temples

The establishment of the first Confucian temple can date back to 478 BC, the year after the death of *Confucius*, when emperor *Lu Ai Gong* built a temple at the site of *Confucius*' former residence for future generations to worship. Beginning from emperor *Han Gao Zu* (in year of 195 BC), it became a convention for the emperor to worship *Confucius* with the highest level of ceremony, and since then, all the scholar officials had to worship *Confucius* before they could teach Confucianism.

At first, Confucian temples were just sites to worship *Confucius*. The emperor *Tang Tai Zong* in the year of 630 AD demanded that all Confucian temples should also serve as official academies to teach Confucianism. From then on, Confucian temples were expanded to include a teaching building (i.e., *ming lun tang*, in Chinese) and a library (i.e., *zun jing ge*, in Chinese). Besides, Confucian temples begun to be built all over the country, serving double functionalities as both worship sites and official schools, until the end of Qing Dynasty (1636–1912 AD). Confucian temples were also tightly linked to the civil exam system in imperial China by teaching and preparing students for the *keju*.<sup>11</sup>

Due to these double functionalities, Confucian temples were the most important vehicles in imperial China to propagate Confucianism. Thus, we expect that regions with more Confucian temples had stronger Confucian culture in history and this stronger Confucian culture was also more likely to sustain throughout history to current times. Besides the historical importance, we expect Confucian temples are continuing to serve as vehicles to preserve and promote Confucian culture at current times as they are now preserved as cultural heritage units and cultural attraction sites for tourists. Due to this modern functionality, we expect that regions with more Confucian temples not only have stronger Confucian culture at historical times, but also at current times.

We also use another measure of regional Confucian culture density, that is, the number of Confucian scholars (Jinshi)<sup>12</sup> in Ming and Qing dynasties. The advantage of using the number of Jinshi as a measure of Confucian culture is that this measure is not subject to “destruction” over-time, while a significant number of Confucian temples were destroyed during the Cultural Revolution in the 1960s and 1970s.

## 2.3 | Determinants of corporate cash holdings

Prior literature have identified three motives for firms to hold cash. In this section, we briefly review these theories and evidence on the three motives.

### 2.3.1 | The transaction cost motives

In the early literature dating back to Baumol (1952), transaction costs are considered as the major determinants of corporate cash holdings. When a firm has more needs to use cash for transactions and entails higher costs of converting non-cash financial assets to cash for the payment of transactions, it should optimally hold higher levels of cash (Meltzer, 1963; Miller & Orr, 1966; Mulligan, 1997). In the framework of transaction cost motives, there are economies of scale, suggesting that larger firms can optimally hold lower levels of cash (Mulligan, 1997).

### 2.3.2 | The precautionary motives

Firms would hold higher levels of cash to better deal with potential adverse shocks when access to external financing is limited. Consistent with this prediction, Opler et al. (1999) find that firms with riskier cash flows and poor access to external capital hold more cash. The precautionary motives also suggest that firms with better investment opportunities would hold more cash, because in case of cash shortfalls, the opportunity costs for these firms are larger. Also consistent with this prediction, Opler et al. (1999) find that firms with higher market-to-book ratios and higher research and development (R&D) expenditures hold more cash.

### 2.3.3 | The agency motives

Entrenched managers would rather hoard excess cash than increasing payouts to shareholders when the firm has poor investment opportunities, and these entrenched managers would usually use the cash for their own benefits rather than maximizing shareholder values (Jensen, 1986). Dittmar et al. (2003) find cross-country evidence that in countries with poorer shareholder rights protection, and thus worse corporate governance and more severe agency conflicts, firms hold higher levels of cash. Dittmar and Mahrt-Smith (2007) find that cash is valued at lower worth by investors for firms with more severe agency conflicts.

## 2.4 | Hypothesis development

This section discusses the relationship between regional Confucian culture density and corporate cash holdings based on the discussions of Confucian virtues in Section 2.1 and theoretical determinants of cash holdings in Section 2.3.

We hypothesize that firms in regions with higher Confucian culture density hold higher levels of cash. As Section 2.1 discusses in detail, Confucianism is a culture type characterized by risk-aversion and uncertainty-avoidance. Firms located in regions with stronger Confucian culture are more likely to form corporate culture that is more conservative and risk-averse.<sup>13</sup> We hypothesize that firms with more conservative culture would have stronger precautionary motives to hold higher levels of cash to deal with potential adverse shocks and hold higher levels of cash to better prepare for future investment opportunities.

However, high cash holdings can also be due to the agency motives. Confucianism, as a clan-centered culture type, highly emphasizes on family and social ties. Studies have shown that cultural norms that emphasize on family ties can lead to inefficient outcomes, because decision makers usually prioritize family interests at the expense of outsiders (Bertrand & Schoar, 2006). Studies using China as the setting are often pointing to the clan-centered nature of Confucianism as the reason for the prevalence of relational transactions or tunneling activities (Cheung et al., 2006; Jiang et al., 2010; Wong, 2016).

Taken together, although the very nature of Confucianism, that is risk-aversion and uncertainty-avoidance, are expected to lead firms to hold higher levels of cash, but the underlying mechanism remains an empirical question. Even if higher cash holdings is due to stronger precautionary motives, we still need further investigation to answer the question of whether stronger precautionary motives is efficient or just another type of agency conflicts in the sense that managers choose to hold excess cash to satisfy their personal preferences instead of maximizing shareholder values. Our empirical analyses follow will tackle these questions.

### 3 | DATA AND VARIABLES

Our sample consists of all firms (excluding financial firms<sup>14</sup>) listed on the Shanghai and Shenzhen stock exchanges covering fiscal years from 2000 to 2020.<sup>15</sup> We begin our sample in the year of 2000, which was the first year China applied a unified set of accounting standards for listed firms. We obtain all the financial information on listed firms and economic indicators from China stock market & accounting research (CSMAR). We exclude peculiar observations with negative shareholders' equity. Our final sample consists of a maximum number of 31,236 firm-year observations and 3098 unique firms, and the exact number of observations may vary according to model specifications due to missing values on some variables.

Information on Confucian temples is collected from internet search and historical documents, such as local gazetteers, and there are a total of 491 Confucian temples all over the country. We collect information on temple names, locations, historical building time, and cultural heritage protection levels at current times. Information on historical Confucian academies are collected from *Chinese Academies Dictionary (Zhongguo Shuyuan Cidian, in Chinese)*, which compiles information on all Confucian academies built from the Tang Dynasty to the Qing Dynasty (618–1912 AD). There are a total of 7206 Confucian academies all over the country.

We use the Baidu Map Geocoding API to identify the latitude and longitude of headquarters of all listed firms, Confucian temples, and Confucian academies. We measure a region's Confucian culture density as the number of Confucian temples (Confucian academies) within 100 km radius around firm headquarters, which are our main explanatory variables (raised to the natural log [plus 1]), Confucian100 (ConfuAcademy100). The choice of 100 km recognizes the fact that the effect of culture is likely to be local, due to transportation difficulty and lack of cultural exchange in ancient times (Fei, 1992). We also check the robustness of our results using a 200 km radius.

Although the use of the number of Confucian temples as a measure of Confucian culture has been widely adopted in the literature (Du, 2015; Kung & Ma, 2014), this measure may be imperfect because a significant number of Confucian temples were destroyed during the Cultural Revolution in the 1960s and 1970s. Thus, following Gu et al., 2024, we use the number of Confucian scholars (Jinshi) during Ming and Qing dynasties in the prefecture level where the firm is located as an alternate measure for the strength of Confucian culture. As Gu et al., 2024 mentions,

the number of Jinshi is derived from historical texts and therefore not subject to “destruction” over time. We use both these two measures in our following empirical analysis where being more appropriate.

The main interest of our paper is to identify the culture effect on corporate cash holdings. The literature employs several alternative definitions of cash ratio, including (1) cash to assets, (2) cash to net assets (i.e., total assets minus cash), (3) both ratios raised to the natural log. We focus primarily on using cash to assets as the dependent variable, but check the robustness of our main results using other alternative definitions.

Other explanatory variables are motivated by the transaction cost motives and precautionary motives for corporate cash holdings. The variables used are as follows:

- Market-to-book, market value of equity plus book value of liabilities, divided by book value of total assets. This ratio is a proxy for investment opportunities, and firms with better investment opportunities would hold more cash.
- Size, natural log of book value of assets. There are economies of scale to hold cash.
- Cash flows, earnings before extraordinary items and depreciation minus dividends, divided by net assets. Firms with higher cash flows would accumulate more cash.
- Cash flow volatility, standard deviation of cash flows (defined above) over the last 3 years. Firms with higher cash flow risks would hold more precautionary cash.
- Net working capital, current assets minus current liabilities minus cash, divided by net assets. Net working capital might be substitutes for cash.
- Capital expenditures (Capex), Capex divided by net assets. The relationship between Capex and corporate cash holdings is not clear. Higher Capex can lead firms to save less cash, which would lead to lower level of cash holdings (Riddick & Whited, 2009).
- Leverage, total debt divided by net assets. Based on the hedging argument of Acharya et al., 2007, leverage should be positively correlated with cash holdings.
- Dividend payout, a dummy that equals one if a firm pays cash dividends in a year and zero otherwise. Firms using cash to pay dividends may decrease the levels of cash holdings.
- R&D, R&D expenditures divided by total sales. This variable is a proxy for growth opportunities. Firms with larger R&D are assumed to have greater costs of financial distress, so would hold higher levels of cash. We follow the literature and set R&D equal to zero when missing.

We winsorize all continuous variables at 1% and 99%. Table 1 tabulates summary statistics for all variables used in the analysis. Our main explanatory variable Confucian100, has mean value of 1.753, and has a large enough standard deviation of 0.752, which makes studying within-country culture density differences across regions viable and meaningful. Figure 1 shows the geographic distribution of Confucian temples in mainland China. While the other explanatory variable Jinshi also has a sufficiently large standard deviation.

## 4 | EMPIRICAL ANALYSIS

### 4.1 | The average effect of culture

Our main analyses explore the relationship between cultural density and corporate cash holdings, including a range of controls for transaction cost motives and precautionary motives for holding cash. Our main specification takes the following form:

$$\text{Cash}_{it} = \beta_0 + \beta_1 \text{Confucian100}_{it} \text{ or } \text{Jinshi}_{it} + \Gamma' X_{it} + \mu_j + \nu_t + \varepsilon_{it}, \quad (1)$$



**TABLE 1** Summary statistics.

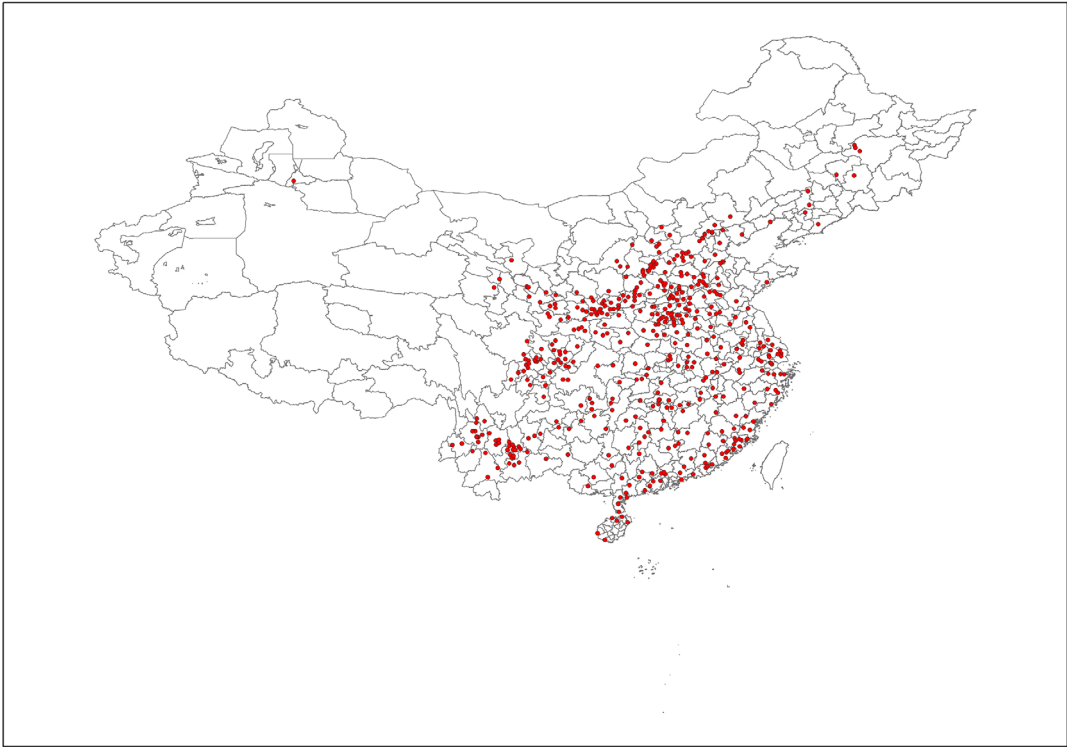
	N	Mean	SD	P25	P50	P75
Cash/Assets	31,236	0.156	0.109	0.079	0.130	0.204
Cash/Net Assets	31,236	0.211	0.206	0.086	0.150	0.257
Confucian100	31,236	1.753	0.752	1.386	1.946	2.398
Confucian200	31,236	2.620	0.832	2.565	2.773	3.178
ConfuAcademy100	31,236	4.154	1.237	3.892	4.489	4.963
ConfuAcademy200	31,236	5.262	1.286	4.984	5.756	6.033
Jinshi (ln 1000)	29,329	0.494	0.518	0.078	0.300	0.603
SalesGrowth	31,198	0.194	0.617	-0.045	0.097	0.265
Market-to-book	31,150	2.309	1.762	1.254	1.730	2.636
Leverage	31,235	0.570	0.238	0.395	0.570	0.735
Net working capital	31,235	-0.011	0.254	-0.169	-0.009	0.158
Capex	31,228	0.042	0.079	0.005	0.023	0.064
Age	31,236	11.865	5.989	7.000	11.000	16.000
R&D	31,236	0.022	0.050	0.000	0.001	0.033
Size	31,236	22.119	1.362	21.222	21.988	22.884
Cash flows	31,235	0.044	0.080	0.022	0.048	0.080
Cash flow volatility	31,224	0.050	0.062	0.017	0.030	0.056
Dividend payout(0/1)	31,236	0.581	0.493	0.000	1.000	1.000
Dividend	31,235	0.013	0.027	0.000	0.004	0.016
ROA	31,235	0.056	0.092	0.028	0.054	0.091
StdROA	20,271	0.056	0.071	0.017	0.032	0.064
CEO	9804	5.417	1.211	5.170	5.759	6.349
Chair	17,114	5.422	1.209	5.231	5.759	6.273
RiverDistance	31,236	1.180	1.171	0.000	0.557	2.433
IndBoard	31,104	0.366	0.061	0.333	0.333	0.400
Monitor	31,233	7.328	2.889	5.517	7.934	9.577
InsiderHolding	30,083	0.054	0.114	0.000	0.000	0.021
Credit	23,434	0.156	0.339	0.087	0.142	0.192
Openness	24,682	0.035	0.040	0.016	0.029	0.045

Note: This table reports descriptive statistics for the key variables of our empirical analyses. All variables are defined in Table A1.

Abbreviation: Capex, capital expenditures.

where  $i$  and  $t$  denote firm and year, respectively.  $Cash_{it}$  is the dependent variable, measured as the amount of cash and equivalents as a percentage of total assets;  $X_{it}$  represents a vector of control variables defined in Section 3;  $\mu_j$  and  $\nu_t$  represent industry and year fixed effects. The main explanatory variable is  $Confucian100_{it}$ , the number of Confucian temples within 100 km radius around corporate headquarters raised to the natural log (plus 1). Standard errors are clustered at firm levels to control for an arbitrary firm-level correlation structure (double clustered at year and firm levels gives very similar results).

Table 2 tabulates results of estimating Equation (1), where columns (1) and (2) use  $Confucian100$  as the independent variable, and columns (3) and (4) use  $Jinshi$ . Column (1) is the estimation result without any controls and fixed effects. The result shows a positive relation between regional Confucian culture density and corporate cash holdings



**FIGURE 1** Geographic distribution of Confucian temples.

(significant at 1% level). The coefficient of the main explanatory variable, Confucian100, is 0.01, representing a 4.8% increase in corporate cash holdings from the sample average if the regional Confucian culture density is one standard deviation higher, which is also economically significant. In column (2), we control for all variables and the coefficient of our main explanatory variable remains intact, significant at 1% level. The magnitude of the coefficient now stands at 0.006, representing a 2.89% increase in corporate cash holdings from the sample average if the regional Confucian culture density is one standard deviation higher. The regression coefficients for the independent variable Jinshi in columns (3) and (4) are also both significant at the 1% level. The regression coefficient for Jinshi in column (4) is 0.011, indicating that for every 1000 increase in the number of Confucian scholars, cash holdings of contemporary firms increase by 7%. The results concerning our main explanatory variables in Table 2 are consistent with our prediction that in regions with stronger Confucian culture, firms hold higher levels of cash.

As for other control variables, all of them are significant at the 1% level, and the effects are basically consistent with the predictions of theories and prior literature (Bates et al., 2009; Opler et al., 1999). We mainly focus on specification (2) as it has the highest  $R^2$ . We find that firms with better investment opportunities (proxy by higher Market-to-book and higher R&D), and higher cash flow risks, hold more cash, which is consistent with the prediction of precautionary motives. Firms with higher net working capital hold less cash, which confirms that net working capital and cash are substitutes. Firms with higher cash flows hold more cash because they can accumulate more cash out of higher cash flows. Firms with larger size hold less cash because of economies of scale. Firms with higher levels of Capex hold less cash, supporting the argument that firms spend more and thus, save less cash as a result of larger Capex. Firms with higher leverage hold more cash, consistent with the hedging argument of Acharya et al. (2007). Somewhat strange is that firms paying out cash dividends in a year ends up with higher cash holdings, which is different from the findings of Opler et al. (1999), but consistent with the findings in Chen et al. (2014), who argue that Chinese listed firms may want to keep sufficient cash to maintain a “sticky” dividend payout.

**TABLE 2** Confucian culture on corporate cash holdings.

	(1)	(2)	(3)	(4)
Confucian100	0.010*** [0.002]	0.006*** [0.002]		
Jinshi			0.018*** [0.003]	0.011*** [0.003]
Net working capital		-0.020*** [0.007]		-0.021*** [0.007]
Market-to-book		0.005*** [0.001]		0.005*** [0.001]
Cash flows		0.377*** [0.017]		0.376*** [0.017]
Cash flow volatility		0.241*** [0.022]		0.252*** [0.023]
Size		-0.010*** [0.001]		-0.011*** [0.001]
R&D		0.114*** [0.034]		0.102*** [0.032]
Capex		-0.094*** [0.010]		-0.090*** [0.010]
Leverage		0.082*** [0.008]		0.080*** [0.008]
Dividend payout		0.033*** [0.002]		0.032*** [0.002]
Year F.E.	No	Yes	No	Yes
Industry F.E.	No	Yes	No	Yes
Observations	31,236	31,133	29,329	29,329
R-squared	0.005	0.209	0.008	0.207

Note: This table examines the relation between corporate cash holdings and regional Confucian culture density with the following specification:

$$\text{Cash}_{it} = \beta_0 + \beta_1 \text{Confucian100}_{it} + \Gamma' X_{it} + \mu_i + \nu_t + \varepsilon_{it},$$

where  $i$  and  $t$  denote firm and year, respectively.  $\text{Cash}_{it}$  is the dependent variable, measured as the amount of cash and equivalents as a percentage of total assets, and  $X_{it}$  represents a vector of control variables defined in Table A1.  $\mu_i$  and  $\nu_t$  denote industry fixed effects and year fixed effects respectively. The main explanatory variable is  $\text{Confucian100}_{it}$ , the number of Confucian temples within 100 km radius around the corporate headquarters, raised to the natural log (plus 1). The vector of control variables include market-to-book, net working capital, size, cash flows, cash flow volatility, R&D, capex, leverage, dividend payout. Standard errors, reported in brackets, are clustered at firm levels. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, 10% level, respectively.

Abbreviation: Capex, capital expenditures; FE, fixed effects.

## 4.2 | Robustness checks

In this subsection, we perform a variety of tests to make sure our main findings are robust. The results are tabulated in Table 3.

TABLE 3 Confucian culture on corporate cash holdings: robustness checks.

	(1) Cash/Net Assets	(2) log(Cash/Assets)	(3) log(Cash/Net Assets)	(4) Cash/Assets	(5) Cash/Assets	(6) Cash/Assets	(7) Pooled Cross-Sectional	(8) Fama-Macbeth
Confucian100	0.008** [0.003]	0.005*** [0.001]	0.007*** [0.002]				0.009*** [0.001]	0.010*** [0.001]
Confucian200				0.004** [0.002]				
ConfuAcademy100					0.002* [0.001]			
ConfuAcademy200						0.002** [0.001]		
Net working capital	-0.060*** [0.013]	-0.014*** [0.006]	-0.035*** [0.009]	-0.020*** [0.007]	-0.020*** [0.007]	-0.020*** [0.007]	-0.009*** [0.003]	-0.015*** [0.004]
Market-to-book	0.011*** [0.002]	0.004*** [0.001]	0.008*** [0.001]	0.005*** [0.001]	0.005*** [0.001]	0.005*** [0.001]	0.007*** [0.001]	0.005*** [0.001]
Cash flows	0.698*** [0.036]	0.310*** [0.013]	0.505*** [0.024]	0.376*** [0.017]	0.377*** [0.017]	0.376*** [0.017]	0.363*** [0.011]	0.414*** [0.025]
Cash flow volatility	0.523*** [0.047]	0.188*** [0.018]	0.349*** [0.032]	0.240*** [0.022]	0.239*** [0.022]	0.240*** [0.022]	0.259*** [0.015]	0.218*** [0.023]
Size	-0.019*** [0.003]	-0.009*** [0.001]	-0.014*** [0.002]	-0.010*** [0.001]	-0.010*** [0.001]	-0.010*** [0.001]	-0.009*** [0.001]	-0.011*** [0.001]
R&D	0.199*** [0.067]	0.095*** [0.027]	0.148*** [0.046]	0.115*** [0.034]	0.116*** [0.034]	0.116*** [0.034]	0.221*** [0.040]	0.284*** [0.063]
Capex	-0.184*** [0.019]	-0.076*** [0.008]	-0.130*** [0.013]	-0.095*** [0.010]	-0.095*** [0.010]	-0.095*** [0.010]	-0.130*** [0.008]	-0.131*** [0.005]
Leverage	0.140*** [0.016]	0.069*** [0.007]	0.106*** [0.011]	0.082*** [0.008]	0.082*** [0.008]	0.082*** [0.008]	0.083*** [0.004]	0.093*** [0.006]
Dividend payout	0.056*** [0.004]	0.028*** [0.002]	0.043*** [0.003]	0.033*** [0.002]	0.033*** [0.002]	0.033*** [0.002]	0.033*** [0.001]	0.033*** [0.001]

TABLE 3 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Cash/Net Assets	log(Cash/Assets)	log(Cash/Net Assets)	Cash/Assets	Cash/Assets	Cash/Assets	Pooled Cross-Sectional	Fama-Macbeth
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Industry F.E.	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Observations	31,133	31,133	31,133	31,133	31,133	31,133	31,133	31,133
R-squared	0.199	0.209	0.206	0.208	0.208	0.208	0.155	0.173

Note: This table performs a battery of robustness checks on the relation between corporate cash holdings and regional Confucian culture density with the following specification:

$$Y_{it} = \beta_0 + \beta_1 \text{Confucian}_{it} + \Gamma' X_{it} + \mu_j + \nu_t + \varepsilon_{it},$$

where  $i$  and  $t$  denote firm and year, respectively.  $Y_{it}$  and  $\text{Confucian}_{it}$  are the dependent variable and main explanatory variable to be specified below.  $\text{Cash/Assets}$  is measured as the amount of cash and equivalents as a percentage of total assets.  $\text{Cash/Net Assets}$  is measured as the amount of cash and equivalents as a percentage of net assets.  $\log(\text{Cash/Assets})$  is  $\text{Cash/Assets}$  raised to the natural log (plus 1).  $\log(\text{Cash/Net Assets})$  is  $\text{Cash/Net Assets}$  raised to the natural log (plus 1).  $\text{Confucian100/Confucian200}$  is the number of Confucian temples within 100/200 km radius around the corporate headquarters raised to the natural log (plus 1).  $\text{ConfuAcademy100/ConfuAcademy200}$  is the number of Confucian academies within 100/200 km radius around the corporate headquarters raised to the natural log (plus 1).  $X_{it}$  represents a vector of control variables the same as those in Table 2.  $\mu_j$  and  $\nu_t$  denote industry fixed effects and year fixed effects respectively. Columns (1)–(6) are panel regressions with standard errors clustered at firm levels. In column (7), pooled cross-sectional estimation method is employed, with robust standard errors. In column (8), Fama–MacBeth estimation method is employed. Standard errors are reported in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, 10% level, respectively.

Abbreviation: Capex, capital expenditures.

#### 4.2.1 | Alternative definitions of cash holdings

As discussed in Section 3, the literature uses different definitions of corporate cash holdings. We follow the literature and employ these alternative definitions in the regression. The alternative definitions include: cash and equivalents divided by net assets; cash and equivalents divided by total assets and then raised to the natural log; cash and equivalents divided by net assets and then raised to the natural log. The regression results are presented in columns (1), (2), and (3) in Table 3. Across these different regressions, the results are largely identical to those obtained using the original definition of cash holding ratio.

#### 4.2.2 | Alternative measures of regional Confucian culture density

As argued by Fei (1992), in ancient China, due to transportation difficulties, cultural exchange was limited, so culture was likely to be local, which justifies our choice of 100 km radius around corporate headquarters to measure regional culture. As a means of robustness check, we enlarge the range to 200 km around the corporate headquarters, and the result is reported in column (4) in Table 3. The coefficient of our main explanatory variable is significant at 5% level, and the coefficient of 0.004 represents a 2.13% increase in corporate cash holdings from the sample average if the regional Confucian culture density is one standard deviation higher, smaller than that obtained using the 100 km range, but is still economically significant.

Another alternative measure of regional Confucian culture density is the number of Confucian academies around the corporate headquarters in historical times, and the regression results are shown in columns (5) (6) in Table 3. The coefficients of our main explanatory variables are both significant at 10% level or better. The coefficient of 0.002 of ConfuAcademy100 represents a 1.58% increase in corporate cash holdings from the sample average if the regional Confucian culture density is one standard deviation higher, which is smaller than that obtained using Confucian100 as the measure (i.e., 2.89%).<sup>16</sup>

#### 4.2.3 | Alternative estimation methods

In this subsection, we employ several alternative estimation methods to make sure our findings are not sensitive to the estimation methods that we use in Table 2. We follow Opler et al. (1999) to re-estimate Equation (1) using pooled cross-sectional regression and Fama–MacBeth regression methods. The pooled cross-sectional estimation results are shown in column (7) of Table 3. The coefficient of our main explanatory variable is significant at 1% level, and the economic magnitude becomes larger than in the fixed effect regression in Table 2. Finally, we employ the Fama–MacBeth method (Fama & MacBeth, 1973) and report the estimation results in column (8). This method solves the problem of serial correlation in the residuals of a panel data set. The coefficient of our main explanatory variable is significant at 1% level, and the economic magnitude also becomes larger, representing a 4.8% increase in corporate cash holdings from the sample average if the regional Confucian culture density is one standard deviation higher.

### 4.3 | Persistence of high cash holdings

We have found that higher regional Confucian culture density leads to higher corporate cash holdings, and the next question interests us is whether this high cash holdings status is more persistent over time for firms in these regions. In order to study this question, we employ a two steps regression approach following (Opler et al., 1999):

$$1^{\text{st}} \text{ Step: } \text{Cash}_{it} = \alpha + \Gamma' X_{it} + \varepsilon_{it}, \quad (2)$$

$$2^{\text{nd}} \text{ Step: } \text{ExcessCash}_{it} = \beta_0 + \beta_1 \text{ExcessCash}_{it-1} + \beta_2 \text{Confucian100}_{it} \times \text{ExcessCash}_{it-1} + \nu_{it}, \quad (3)$$

where  $i$  and  $t$  denote firm and year, respectively.  $\text{Cash}_{it}$  is the 1<sup>st</sup> Step dependent variable defined the same as in Equation 1, and  $X_{it}$  represents a vector of control variables.  $\text{ExcessCash}_{it}$  is a dummy variable that equals one if the residual of the 1<sup>st</sup> Step regression is larger than zero, and zero otherwise.

The 1<sup>st</sup> Step regression is intended to determine the excess cash holdings of a firm in a year. Excess cash holdings are defined as the residuals of the 1<sup>st</sup> Step regression, in the sense that after controlling for the theoretical determinants of corporate cash holdings based on the transaction cost motives and precautionary motives, excess cash holding is considered as high cash holding status. The theoretical target cash holdings (fitted value of Equation (2) in the 1<sup>st</sup> Step) is obtained each year from a cross-sectional regression, so this theoretical target estimate for a given year is obtained without using information from subsequent years. As a means of robustness check, we also estimate the theoretical target with the Fama–Macbeth model. This model is also estimated annually, so that all information required to estimate the target is available in the year in which the target is estimated.

The 2<sup>nd</sup> Step is a first-order autoregression model, which is employed to find out whether the high cash holdings (excess cash holdings) status is persistent over time and how they differ cross firms. The 2<sup>nd</sup> Step estimation results are tabulated in Table 4. Column (1) is estimated by cross-sectional regression in the 1<sup>st</sup> Step and considers only size

**TABLE 4** Time series analysis of corporate cash holdings.

	(1) Size and Cash flow volatility	(2) Full set of controls	(3) Full set of controls (Fama–Macbeth)
Excess_t-1	0.449*** [0.012]	0.429*** [0.012]	0.414*** [0.011]
Confucian100 × Excess_t-1	0.029*** [0.006]	0.021*** [0.006]	0.027*** [0.006]
Intercept	0.200*** [0.003]	0.220*** [0.003]	0.227*** [0.003]
Observations	31,219	31,077	31,077
R-squared	0.253	0.218	0.215

Note: This table examines whether firms hold high (excess) cash persistently over time. Two steps of regression analyses are performed as follows, and only the 2<sup>nd</sup> Step results are reported.

1<sup>st</sup> Step:  $\text{Cash}_{it} = \alpha + \Gamma' X_{it} + \varepsilon_{it}$ .

$$2^{\text{nd}} \text{ Step: } \text{ExcessCash}_{it} = \beta_0 + \beta_1 \text{ExcessCash}_{it-1} + \beta_2 \text{Confucian100}_{it} \times \text{ExcessCash}_{it-1} + \nu_{it}.$$

where  $i$  and  $t$  denote firm and year, respectively.  $\text{Cash}_{it}$  is the 1<sup>st</sup> Step dependent variable, and  $X_{it}$  represents a vector of control variables the same as in Table 2.  $\text{Cash}_{it}$  is measured as cash and equivalents as a percentage of total assets.  $\text{Confucian100}_{it}$  is the number of Confucian temples within 100 km radius around the corporate headquarters raised to the natural log (plus 1).  $\text{ExcessCash}$  is a dummy variable that equals one if the residual of the 1<sup>st</sup> Step regression is larger than zero, and zero otherwise. In column (1), residuals from the 1<sup>st</sup> Step regression is obtained each year from a cross-sectional regression of cash holdings on size and cash flow volatility. In column (2), residuals from the 1<sup>st</sup> Step regression is obtained each year from a cross-sectional regression of cash holdings on full set of control variables. In column (3), residuals from the 1<sup>st</sup> Step regression is obtained each year from Fama–Macbeth regression of cash holdings on full set of control variables. Robust standard errors are reported in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, 10% level, respectively.

(transaction cost motives) and cash flow volatility (precautionary motives) as the determinants of theoretical target cash holdings. In column (2), we also employ the cross-sectional regression method in the 1<sup>st</sup> Step, but with a full set of controls as in Table 2. While in column (3), we employ the Fama–Macbeth method with a full set of controls in the 1<sup>st</sup> Step. Across all these estimations in the 1<sup>st</sup> Step, we find that firms show high persistence in high (excess) cash holdings status, with the autoregressive coefficient  $\beta_1$  larger than 0.4, which means that the probability of being at high (excess) cash holdings status is more than 40% higher for firms that hold excess cash a year before. The coefficient of the interaction term is significant at 1% level cross three estimations, which means that the persistence of high cash holdings status is even stronger for firms in regions with stronger Confucian culture.

#### 4.4 | Instrumental variable analysis

Endogeneity problem in our setting is less of a concern than in a cross-country analysis. Prior literature finds that national culture affects the formation of institutions and statutory laws (Alesina & Giuliano, 2015; Doidge et al., 2007; Stulz & Williamson, 2003), which makes omitted variable bias a serious concern in a pure cross-country study. In our setting of a single country study, we can keep constant the institutions and other country-specific environment. However, it can still be possible that our measure of regional culture density captures other unobserved factors influencing corporate cash holdings. So we employ an instrumental variable approach to further corroborate our findings as causal effects.

We follow Chen, Ye, et al. (2020) and use a prefecture's river distance to the nearest pine and bamboo forests in the Ming–Qing period (1368–1912 AD) as the IV for our measure of regional Confucian culture density. As discussed in Section 2.2, Confucian temples served as official schools in imperial China to teach Confucian classics and prepare students for the civil exam (*keju*), and as official libraries to collect and store tons of books. These two facts determined that Confucian temples heavily relied on access to books, so the availability of books in a region would be a major, if not the most important, determinant of the number of Confucian temples in that region. The same reasoning applies for Confucian academies.

However, there were only 19 printing centers at that time and these 19 printing centers accounted for 80% of all printed books across the country. Another fact was that transportation costs were enormously expensive at that time. These two facts resulted in large differences in access to books in ancient China. In order to save the transportation costs, these printing centers were purposely set up in places with close proximity to printing ingredients, that is, pine and bamboo forests, for woodblock printing. Moreover, at that time, the major transportation means was shipping along rivers. Against these facts, the river distance to the nearest pine and bamboo forests is a reasonable IV for the number of Confucian temples in a region. Chen, Ye, et al. (2020) demonstrate that the pine and bamboo forests were exogenously given, and people at that time did not plant them for economic purposes. They also demonstrate that this IV is orthogonal to historical economic prosperity, geographic and agricultural conditions, as well as current economic prosperity.

The instrumented results are tabulated in Table 5. In column (1), we first perform a reduced form estimation, and as the results show, river distance is significantly negative with corporate cash holdings. The reasoning is that farther away a prefecture was from pine and bamboo habitats, it would have worse access to books, thus would have fewer Confucian temples (academies) built at ancient times, resulting in weaker regional Confucian culture density. Next, we perform a 2SLS estimation and report the results in columns (2) and (3). The results show that the first-stage IV estimates are significant at 1% level for both our Confucian culture density measures, and the *F*-statistics being much larger than 10 shows that our IV is by no means a weak instrument. The second-stage results show that our instrumented Confucian culture density measure is significant at 1% level, and the economic magnitude is much larger than the ordinary least squares estimates. The coefficient of our instrumented Confucian100 is 0.025, representing a 12% increase in corporate cash holdings from the sample average if the regional Confucian culture density is one standard deviation higher. While for our instrumented ConfuAcademy100, the coefficient is 0.016,



**TABLE 5** Confucian culture on corporate cash holdings: instrumented results.

	(1) Reduced form	(2) 2SLS(Confucian100)	(3) 2SLS(ConfuAcademy100)
Confucian100		0.025*** [0.004]	
ConfuAcademy100			0.016*** [0.003]
RiverDistance	-0.007*** [0.001]	-0.271***(first stage) [0.013]	-0.438***(first stage) [0.023]
Controls	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes
Observations	31,133	31,133	31,133
R-squared	0.212	0.191	0.185

Note: This table examines the relation between corporate cash holdings and the number of Confucian temples (academies) using two-stage least square regressions (2SLS). The regression model is;

$$1^{st} \text{ Step: } \text{Confucian}_{it} = \delta_0 + \delta_1 \text{RiverDistance}_{it} + \Delta' X_{it} + \mu_j + v_t + \eta_{it},$$

$$2^{nd} \text{ Step: } \text{Cash}_{it} = \beta_0 + \beta_1 \widehat{\text{Confucian}}_{it} + \Gamma' X_{it} + \mu_j + v_t + \varepsilon_{it},$$

where  $i$  and  $t$  denote firm and year, respectively.  $\text{Cash}_{it}$  is the dependent variable, measured as the amount of cash and equivalents as a percentage of total assets.  $\text{RiverDistance}_{it}$  is the instrumental variable, measured as the corporate headquarter prefecture's river distance to its nearest bamboo and pine habitats in the Ming-Qing period, raised to the natural log (plus 1).  $X_{it}$  represents a vector of control variables the same as those in Table 2;  $\mu_j$  and  $v_t$  denote industry fixed effects and year fixed effects respectively.  $\text{Confucian100}_{it}$  is the number of Confucian temples within 100 km radius around the corporate headquarters raised to the natural log (plus 1).  $\text{ConfuAcademy100}_{it}$  is the number of Confucian academies within 100 km radius around the corporate headquarters raised to the natural log (plus 1). In column (1), a reduced form estimation is performed and reported. In column (2), the 2SLS estimation is performed and  $\text{Confucian100}_{it}$  is instrumented. In column (3), the 2SLS estimation is performed and  $\text{ConfuAcademy100}_{it}$  is instrumented. Standard errors, reported in brackets, are clustered at firm levels. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, 10% level, respectively.

representing a 12.68% increase in corporate cash holdings from the sample average if the regional Confucian culture density is one standard deviation higher.

In view of the economic magnitude of the culture effect, we can see that culture plays even such an important role in explaining cash holdings for firms within the same country. It is not surprising to see countries with entirely different cultural attributes around the world would have firms show large discrepancies in cash holdings.

#### 4.5 | Precautionary savings motives

Han & Qiu, 2007 find that when the risk of future cash flows is not fully diversified, financially constrained firms have an incentive to engage in precautionary cash holdings, that is, to increase cash holdings when cash flow volatility increases. For financially constrained firms, the model predicts a positive relationship between cash holdings and cash flow volatility; while for financially unconstrained firms, there is no systematic relationship between cash holdings and cash flow volatility. To verify that firms influenced by the risk-aversion nature of the Confucian culture to hold more cash, we follow Han & Qiu, 2007 to test whether firms hold more cash due to precautionary motives.

**TABLE 6** Confucian culture on corporate cash holdings by financial constraint.

Sample:	(1) Small size	(2) Large size	(3) Young firms	(4) Old firms
Confucian100 × Cash flow volatility	0.085*** [0.027]	0.036 [0.036]	0.116*** [0.029]	0.025 [0.030]
Cash flow volatility	0.103* [0.054]	0.208*** [0.074]	0.116* [0.061]	0.151*** [0.058]
Controls	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes	Yes
Observations	15,533	15,600	15,361	14,206
R-squared	0.182	0.282	0.206	0.234

Note: This table examines the relation between corporate cash holdings and regional Confucian culture density as well as its interaction with cash flow volatility with the following specification:

$$\text{Cash}_{it} = \beta_0 + \beta_1 \text{Confucian100}_{it} \times \text{Cash flow volatility}_{it} + \beta_2 \text{Cash flow volatility}_{it} + \beta_3 \text{Confucian100}_{it} + \Gamma' X_{it} + \mu_j + \nu_t + \varepsilon_{it}, \quad (4)$$

where  $i$  and  $t$  denote firm and year, respectively.  $\text{Cash}_{it}$  is the dependent variable, measured as the amount of cash and equivalents as a percentage of total assets,  $\text{Cash flow volatility}_{it}$  is firm's standard deviation of cash flows over the last 3 years.  $X_{it}$  represents a vector of control variables the same as those in Table 2.  $\mu_j$  and  $\nu_t$  denote industry fixed effects and year fixed effects respectively.  $\text{Confucian100}_{it}$  is the number of Confucian temples within 100 km radius around the corporate headquarters, raised to the natural log (plus 1). Standard errors, reported in brackets, are clustered at firm levels. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, 10% level, respectively.

There are numerous financial constraint measures in the finance literature, such as KZ index (Kaplan & Zingales, 1997), WW index (Whited & Wu, 2006) and others, but also a lot of debates about their validity. Hadlock & Pierce, 2010 find that firm size and age are particularly useful predictors of financial constraint levels, and a lot of other firm characteristics are largely proxies for size and age. So we use firm size, defined the same as in Table 2, and age (number of years since initial public offering (IPO)) as the financial constraint measures.<sup>17</sup> Larger firm size and older firms are considered as less financially constrained. After classifying firms into two groups based on median firm size and age, we add an interaction term for Confucian100 and Cash flow volatility to the Equation (1) to test firms' precautionary cash holding motives.

We present these results in Table 6. We find that both the two interaction terms are positive at the 1% level in the financially constrained groups, while they are insignificant in the financially unconstrained groups. The results show that for financially constrained firms, firms influenced by Confucian culture hold more cash for the same cash flow volatility. This suggests that firms influenced by Confucian culture hold more cash safety margin for the risk associated with cash flow, confirming our hypothesis.

#### 4.6 | Evidence from industrial enterprises

Given that public companies often operate nationwide, measuring Confucian cultural density around the headquarters of public companies may be biased because the headquarters of public companies in China tend to be administrative organs rather than involving in daily business operations. To mitigate this bias, we re-test the hypotheses based on the financial data of private firms in the China Industrial Enterprises Database (CIED). Our sample includes

**TABLE 7** The impact of confucianism on the current asset ratio of industrial enterprises.

Variables	Current asset/Asset		log(Current asset/Asset)	
	(1)	(2)	(3)	(4)
Jinshi	0.055*** [0.004]	0.055*** [0.006]	0.038*** [0.003]	0.038*** [0.003]
Controls	No	Yes	No	Yes
Year F.E.	Yes	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes	Yes
Observations	3,294,170	3,294,170	3,294,170	3,294,170
R-squared	0.366	0.374	0.102	0.104

Note: This table examines the relation between corporate cash holdings of industrial enterprises and regional Confucian culture density with the following specification:

$$Y_{it} = \beta_0 + \beta_1 \text{Jinshi}_{it} + \Gamma' X_{it} + \mu_j + v_t + \varepsilon_{it},$$

where  $i$  and  $t$  denote firm and year, respectively.  $Y_{it}$  and  $\text{Jinshi}_{it}$  are the dependent variable and main explanatory variable to be specified below. *Current asset/Assets* is measured as the amount of current asset as a percentage of total assets.  $\log(\text{Current asset/Assets})$  is *Current asset/Assets* raised to the natural log (plus 1).  $X_{it}$  represents a vector of control variables including Net working capital, Cash flow, Capex and Leverage.  $\mu_j$  and  $v_t$  denote industry fixed effects and year fixed effects respectively. The main explanatory variable is *Jinshi*, the number of scholar (*Jinshi*) in each prefecture level city during Ming and Qing dynasties. Standard errors, reported in brackets, are clustered at firm levels. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, 10% level, respectively.

over 900,000 private industrial firms in China, which is more geographically representative than the 3098 public firms.

Restricted by the financial disclosure of private firms, in this subsection we use the ratio of current assets to total assets (*Current assets/Assets*) and its logarithm as the dependent variables. The mean value of *Current assets/Assets* in the sample is 0.557, which is more than three times the mean value of *Cash/Assets* in the main results. Again, due to the limitations of earnings data, in the regressions in this subsection, the control variables only include Net working capital, Cash flow, Capex, and Leverage.

The results in Table 7 show that the ratio of liquid assets to total assets of Chinese private firms and the number of confusion scholars during the Ming and Qing dynasties are positively correlated in all four different specifications. This suggests that the effect of Confucianism on the precautionary holding of highly liquid assets remains significant for smaller and non-national private firms, consistent with the main hypothesis of the paper.

## 5 | HETEROGENEITY IN THE CULTURE EFFECT

Having identified the culture effect on corporate cash holdings, we now turn to exploring how this culture effect varies with firm characteristics in order to better understand the underlying mechanisms. We thus begin by laying out potential explanations for the culture effect, and what patterns each may imply in the data.

Confucianism as a culture type that put much emphasis on family or social ties could lead to higher corporate cash holdings by exacerbating the agency motives. Literature has documented that cultural norms that emphasize on family ties can lead to inefficient outcomes, because decision makers usually prioritize family interests at the expense of outsiders (Bertrand & Schoar, 2006; Jiang et al., 2010). If agency conflicts play the main role, we expect that the culture effect is stronger for firms with severer agency problems. Besides, we expect to see worse operating outcomes for these firms since managements tend to make investment or other corporate decisions benefiting themselves instead of maximizing shareholder values.

## 5.1 | Heterogeneity in firm agency conflicts levels

The previous section provides strong support for precautionary motives as the underlying mechanism of the Confucian culture effect, but we cannot be sure whether agency motives also play a role. In this subsection, we examine how the culture effect varies as a function of potential agency conflicts. To do so, we include three firm agency conflict measures and their interaction terms with the culture density measure. Since we are also interested in finding out whether agency conflicts cause higher cash holdings, we include these three measures alone before adding interaction terms. We follow the literature and construct three agency conflict measures, *IndBoard*, *InsiderHolding*, and *Monitor* (Bertrand & Schoar, 2006; Jiang et al., 2010). *IndBoard* is defined as the ratio of independent directors in the board, and we expect that outside directors exercise more effective oversight of managers. *InsiderHolding* is defined as ratio of share holdings by insiders (board directors and top management), and we expect that when insiders' interests are more aligned with outsiders (i.e., higher share holdings by insiders), agency conflicts would be less severe. *Monitor* is defined as the product of total shares (as a percentage of total shares outstanding) held by the second to the fifth largest shareholders and a Herfindahl index for the concentration of shares among these shareholders. This captures monitoring intensity by large shareholders other than the controlling shareholder, since these large shareholders have more at stake and have more power.<sup>18</sup>

We present the results in Table 8. We see that across these specifications, the coefficients of our main explanatory variable remains positive and significant, except in the last specification, which is noisily estimated. This suggests that high cash holdings is unlikely due to agency motives. Moreover, all the interaction terms are not significant at the conventional level, and the signs of these coefficients are mixed. This fact indicates that the Confucian culture effect does not vary with agency conflicts levels, arguing against the agency motives as the main underlying mechanism.

## 5.2 | Firm operating outcomes

However, having documented that the Confucian culture effect does not vary with the level of agency conflict, we cannot completely rule out agency motives. Excessively strong precautionary motives are also a type of agency conflict in the sense that decision makers hoard excess cash to satisfy their personal preferences instead of making the best use of the firm's resources, leading to inefficient operational outcomes. To shed light on this alternative interpretation, we examine how firm performance varies with regional cultural density.

We present the results of this section's exercise in Table 9. We first look at firms' investment decisions. *Capex* in column (1) and (2) is defined as *Capex* divided by net assets. As shown in column (1), Chinese listed firms on average experience some levels of agency issues of over-investment (i.e., empire building), because firms with worse investment opportunities (lower market-to-book ratio) invest more. Next, we add the culture measure and its interaction with market-to-book to examine how the culture would affect firms' investment choices. As shown in column (2), firms in high Confucian culture density regions invest less, and they make better investment decisions (a positive interaction term, significant at 1% level). This result suggests that the culture effect attenuates firms' agency issues of over-investment, and as a result, these firms spend their cash more cautiously and efficiently. Then we examine firms' payout policies. *Dividend* in column (3) is defined as cash dividends in a year divided by net assets. Jensen (1986) argues that entrenched management would hoard excess cash for their own benefits instead of paying out when investment opportunities are low. We do not find evidence compatible with this entrenched management hypothesis, but on the contrary, we find that firms in stronger Confucian culture regions pay out more cash dividends (significant at 5% level) to shareholders.

Having examined firms' operating decisions, we next turn to firms' operating outcomes. Since we have shown that firms in stronger Confucian culture regions make better investment decisions, then we should expect to see these firms achieve better profitability, in the sense that better investment projects are those that yield either higher returns or less risky returns. The results shown in columns (4) and (5) confirm our expectations. Firms in stronger

**TABLE 8** Confucian culture on corporate cash holdings by agency conflicts.

	(1)	(2)	(3)	(4)	(5)	(6)
Confucian100	0.006*** [0.002]	0.017* [0.009]	0.006*** [0.002]	0.006*** [0.002]	0.006*** [0.002]	0.006 [0.004]
IndBoard	-0.000 [0.018]	0.055 [0.053]				
Confucian100 × IndBoard		-0.031 [0.026]				
InsiderHolding			-0.022** [0.011]	-0.040 [0.026]		
Confucian100 × InsiderHolding				0.010 [0.013]		
Monitor					-0.000 [0.000]	0.000 [0.001]
Confucian100 × Monitor						-0.000 [0.000]
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	31,010	31,010	29,986	29,986	31,131	31,131
R-squared	0.207	0.208	0.210	0.210	0.209	0.209

Note: This table examines the relation between corporate cash holdings and regional Confucian culture density as well as its interaction with potential agency conflicts with the following specification:

$$\text{Cash}_{it} = \beta_0 + \beta_1 \text{Confucian100}_{it} + \beta_2 \text{Agency}_{it} + \beta_3 \text{Confucian100}_{it} \times \text{Agency}_{it} + \Gamma' X_{it} + \mu_j + \nu_t + \varepsilon_{it},$$

where  $i$  and  $t$  denote firm and year, respectively.  $\text{Cash}_{it}$  is the dependent variable, measured as the amount of cash and equivalents as a percentage of total assets.  $\text{Agency}_{it}$  is firm's potential agency conflicts measures to be specified below.  $X_{it}$  represents a vector of control variables the same as those in Table 2.  $\mu_j$  and  $\nu_t$  denote industry fixed effects and year fixed effects respectively. The main explanatory variable is  $\text{Confucian100}_{it}$ , the number of Confucian temples within 100 km radius around the corporate headquarters, raised to the natural log (plus 1).  $\text{IndBoard}$  is as the number of independent board directors divided by total number of directors.  $\text{InsiderHolding}$  is the ratio of shares held by the board and management teams to total shares.  $\text{Monitor}$  is the product of total shares (as a percentage of total shares outstanding) held by the second to the fifth largest shareholders and a Herfindahl index for the concentration of shares among these shareholders.  $\text{IndBoard}$ ,  $\text{InsiderHolding}$ , and  $\text{Monitor}$  are used to represent  $\text{Agency}_{it}$  in columns (1)&(2), (3)&(4), (5)&(6) respectively. Standard errors, reported in brackets, are clustered at firm levels. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, 10% level, respectively.

Confucian culture regions achieve higher ROA (earnings before extraordinary items and interest expenses, divided by net assets), and lower profitability volatility (i.e.,  $\text{StdROA}$ , standard deviation of ROA for a 5-year window), both of which are significant at 5% level. Finally, we provide further evidence from market investors' perceptions. If firms in stronger Confucian culture regions indeed make better investment decisions, then market investors should react more positively to these firms' acquisition decisions. We consider the three-day ( $t-1$  to  $t+1$ )<sup>19</sup> market reaction around the announcement day of acquisitions, and calculate the 3 day CAR based on a market model estimated from a 250-day window ( $t-21$  to  $t-270$ ). The results in column (6) show that market investors indeed react more positively to these firms' acquisition announcements (significant at 10% level).

Taken together, the evidence shown in this subsection and the previous sections jointly confirm that our identified Confucian culture effect on corporate cash holdings is due to stronger precautionary motives. The stronger precautionary motives is not associated with severer agency conflicts, but on the contrary, these firms make better

**TABLE 9** Confucian culture and firm operating outcomes.

	(1) Capex	(2) Capex	(3) Dividend	(4) ROA	(5) StdROA	(6) AquiReturn
Confucian100		-0.003** [0.001]	0.001** [0.000]	0.001** [0.000]	-0.005*** [0.001]	0.012* [0.007]
Cash flows	0.131*** [0.007]	0.131*** [0.007]	0.109*** [0.004]	1.003*** [0.009]	-0.227*** [0.015]	0.057* [0.034]
SalesGrowth	0.020*** [0.001]	0.020*** [0.001]	-0.002*** [0.000]	0.001*** [0.001]	0.002** [0.001]	0.001 [0.001]
Market-to-book	-0.005*** [0.000]	-0.007*** [0.001]	0.002*** [0.000]	0.004*** [0.000]	0.011*** [0.001]	0.008 [0.005]
Confucian100 × Market-to-book		0.002*** [0.000]				
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	31,122	31,122	31,122	31,122	20,183	4631
R-squared	0.117	0.118	0.161	0.785	0.157	0.009

Note: This table examines the relation between firm operating outcomes and regional Confucian culture density with the following specification:

$$Y_{it} = \beta_0 + \beta_1 \text{Confucian100}_{it} + \Gamma' X_{it} + \mu_j + v_t + \varepsilon_{it},$$

where  $i$  and  $t$  denote firm and year, respectively.  $Y_{it}$  is firm corporate decisions and operating outcomes to be specified below.  $X_{it}$  represents a vector of control variables.  $\mu_j$  and  $v_t$  denote industry fixed effects and year fixed effects respectively. The main explanatory variable is Confucian100<sub>it</sub>, the number of Confucian temples within 100 km radius around the corporate headquarters, raised to the natural log (plus 1). The control variables include market-to-book, cash flows, and sales growth rate. Capex is measured as capital expenditures divided by net assets. Dividend is measured as cash dividends divided by net assets. AquiReturn is a three-day window (1 day before the acquisition announcement to 1 day after the acquisition announcement) cumulative abnormal returns for an acquisition event based on a market model estimated from a 250-days window. ROA is calculated as earnings before extraordinary items and interest expenses divided by net assets. StdROA is the standard deviation of ROA for a five-year window. Standard errors, reported in brackets, are clustered at firm levels. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, 10% level, respectively.

Abbreviation: Capex, capital expenditures.

corporate decisions and achieve more efficient outcomes. In this sense, higher cash holdings can also be viewed as an efficient outcome.

### 5.3 | Heterogeneity in local conditions

In this subsection, we want to examine how the culture effect varies as a function of firms' local conditions, that is, the economic and financial conditions at the prefecture level. This exercise aims to solve the potential concerns that our identified culture effect is just limited to some prefectures. For instance, in prefectures with under-developed credit markets, firms may have stronger needs to hold more cash, because access to external financing is limited and costly. Another potential concern is that the culture effect is just limited to cities that are more closed and exposed to very limited external cultural exchanges. To solve these two potential concerns, we include measures for local credit market development levels and openness levels respectively. More specifically, we define Credit as total bank loans in a prefecture divided by prefecture GDP, and define Openness as FDI in a prefecture divided by prefecture GDP. The results are presented in Table 10. We see that cross these regressions, the coefficients of our main

**TABLE 10** Confucian culture on corporate cash holdings by local conditions.

	(1)	(2)	(3)	(4)
Confucian100	0.006*** [0.002]	0.006*** [0.002]	0.007*** [0.002]	0.007*** [0.002]
Credit	0.002 [0.002]	0.009 [0.015]		
Confucian100 × Credit		−0.003 [0.007]		
Openness			0.035* [0.021]	0.059 [0.081]
Confucian100 × Openness				−0.013 [0.041]
Controls	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes	Yes
Observations	23,340	23,340	24,589	24,589
R-squared	0.224	0.224	0.219	0.219

Note: This table examines the relation between corporate cash holdings and regional Confucian culture density with additional control variables to proxy for local credit market development and openness:

$$\text{Cash}_{it} = \beta_0 + \beta_1 \text{Confucian100}_{it} + \beta_2 \text{Credit}_{it} + \beta_3 \text{Confucian100}_{it} \times \text{Credit}_{it} + \Gamma' X_{it} + \mu_j + \nu_t + \varepsilon_{it},$$

$$\text{Cash}_{it} = \beta_0 + \beta_1 \text{Confucian100}_{it} + \beta_2 \text{Openness}_{it} + \beta_3 \text{Confucian100}_{it} \times \text{Openness}_{it} + \Gamma' X_{it} + \mu_j + \nu_t + \varepsilon_{it},$$

where  $i$  and  $t$  denote firm and year, respectively.  $\text{Cash}_{it}$  is the dependent variable, measured as the amount of cash and equivalents as a percentage of total assets.  $X_{it}$  represents a vector of control variables the same as those in Table 2.  $\mu_j$  and  $\nu_t$  denote industry fixed effects and year fixed effects respectively. The main explanatory variable is  $\text{Confucian100}_{it}$ , the number of Confucian temples within 100 km radius around the corporate headquarters, raised to the natural log (plus 1).  $\text{Credit}$  is a proxy for local credit market development, measured as total bank loans divided by GDP at the prefecture level.  $\text{Openness}$  is a proxy for local openness, measured as total foreign direct investment divided by GDP at the prefecture level. Standard errors, reported in brackets, are clustered at firm levels. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, 10% level, respectively.

explanatory variable remain significant at 1% level, and the economic magnitude is almost the same. The results suggest that neither higher corporate cash holdings is caused by local economic and financial conditions, nor the culture effect is limited to only some localities.

## 5.4 | Board chairman/CEO culture background

By now, we have mainly focused on the regional cultural environment around firm headquarters, by following the same logic as in Hilary and Hui (2009) that local cultural environment shapes corporate culture, and thus influence corporate decisions. However, board chairman/CEO as the top decision makers of a firm, exert the most important influence over firm decisions. Many of the prior culture literature solely focus on CEO cultural background (Nguyen et al., 2018; Pan et al., 2020). So the question of how chairman/CEO's Confucian culture background interacts with the firm headquarters' local cultural environment is worthy of further investigation. One obstacle of this exercise is that the birthplace information of chairman/CEO is not mandatory to disclose in China. We hand collect this information from numerous sources, including prospectus, annual reports, news, and internet search. Despite these

**TABLE 11** Board chairman/CEO Confucian culture background.

	(1)	(2)	(3)	(4)
Confucian100	0.019*** [0.004]	0.013*** [0.004]	0.023*** [0.006]	0.015*** [0.006]
Chair	0.003** [0.001]	0.002* [0.001]		
Confucian100 × Chair	-0.003*** [0.001]	-0.002*** [0.001]		
CEO			0.004** [0.002]	0.001 [0.002]
Confucian100 × CEO			-0.003*** [0.001]	-0.002** [0.001]
Controls	Yes	Yes	Yes	Yes
Year F.E.	No	Yes	No	Yes
Industry F.E.	No	Yes	No	Yes
Observations	17,071	17,071	9763	9763
R-squared	0.168	0.215	0.159	0.208

Note: This table examines the relation between corporate cash holdings and regional Confucian culture density with additional control variables to proxy for board chairman's and CEO's cultural background:

$$\text{Cash}_{it} = \beta_0 + \beta_1 \text{Confucian100}_{it} + \beta_2 \text{Chair}_{it} + \beta_3 \text{Confucian100}_{it} \times \text{Chair}_{it} + \Gamma' X_{it} + \mu_j + \nu_t + \varepsilon_{it},$$

$$\text{Cash}_{it} = \beta_0 + \beta_1 \text{Confucian100}_{it} + \beta_2 \text{CEO}_{it} + \beta_3 \text{Confucian100}_{it} \times \text{CEO}_{it} + \Gamma' X_{it} + \mu_j + \nu_t + \varepsilon_{it},$$

where  $i$  and  $t$  denote firm and year, respectively.  $\text{Cash}_{it}$  is the dependent variable, measured as the amount of cash and equivalents as a percentage of total assets.  $X_{it}$  represents a vector of control variables the same as those in Table 2.  $\mu_j$  and  $\nu_t$  denote industry fixed effects and year fixed effects respectively. The main explanatory variable is  $\text{Confucian100}_{it}$ , the number of Confucian temples within 100 km radius around the corporate headquarters, raised to the natural log (plus 1).  $\text{Chair}/\text{CEO}$  is a proxy for board chairman's/CEO's birthplace Confucian culture density, measured as the total number of Confucian academies in their birthplace provinces, raised to the natural log. Standard errors, reported in brackets, are clustered at firm levels. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, 10% level, respectively.

efforts, we still only identify about one third of all listed firms' chairman/CEO birthplace information, and in many cases, we only identify their birthplace provinces, but not the prefecture levels.

Notwithstanding these drawbacks, we proceed with this exercise but keep in mind the limitation of the data used. The results are tabulated in Table 11. We measure chairman/CEO's Confucian culture background as the number of Confucian academies in their birthplace provinces. Since we lost a large portion of observations, the statistical power may be weak, so we perform the estimation with and without fixed effects. We see from columns (1) and (3) that, higher chairman/CEO's Confucian culture background also leads to higher corporate cash holdings (significant at 5% level), and our main explanatory variable remains positive and significant at 1% level, which suggests that the chairman/CEO's Confucian culture background and firm headquarters' Confucian culture environment jointly exert an influence on corporate cash holdings. The interaction terms are negative and significant at 1% level, suggesting that as the chairman/CEO's cultural background gets stronger, the effect of firm headquarters' cultural environment becomes marginally weaker. This is intuitively in line with expectation. Since chairman/CEO are the firms' top decision makers, if their Confucian background is already very strong and shape the corporate culture into very "Confucianism", then the marginal contribution of the firm headquarters' cultural environment would be low. In columns (2) and (4), we estimate with both industry and year fixed effects. The results are basically the same, but the estimation precision is a little lower.



**TABLE 12** Confucian culture on corporate cash holdings by ownership nature.

	(1) Non-state owned	(2) State owned	(3) Full sample
Confucian100	0.005** [0.002]	0.006** [0.003]	0.006*** [0.002]
Non-state			-0.004 [0.006]
Confucian100 × Non-state			-0.002 [0.003]
Controls	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes
Observations	13,531	17,602	31,133
R-squared	0.187	0.248	0.210

Note: This table examines the relation between corporate cash holdings and the number of Confucian temples for sub-samples of state owned firms and non-state owned firms with the following specification:

$$\text{Cash}_{it} = \beta_0 + \beta_1 \text{Confucian100}_{it} + \beta_2 \text{Non-state} + \beta_3 \text{Confucian100}_{it} \times \text{Non-state} + \Gamma' X_{it} + \varepsilon_{it},$$

where  $i$  and  $t$  denote firm and year, respectively, while  $\text{Cash}_{it}$  is the dependent variable, measured as the amount of cash and equivalents as a percentage of total assets, and  $X_{it}$  represents a vector of control variables and fixed effects the same as those in Table 2. The main independent variable is Confucian100, the number of Confucian temples within 100 km radius around the corporate headquarters raised to the natural log (plus 1). Non-state is a dummy that equals to one if the ultimate controller of the firm is not governments or government entities. Standard errors, reported in brackets, are clustered at firm levels. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, 10% level, respectively.

## 5.5 | Heterogeneity in firm ownership nature

Our IV analyses corroborate that our regional culture density measure does not capture other unobserved factors influencing corporate cash holdings and alleviate the omitted variables concern. The reverse causality concern, however, may still be possible. It can be that firms endogenously choose to headquarter in places where the regional culture is the most compatible with their corporate culture. For example, a CEO with strong Confucian background may prefer to headquarter in a prefecture where the Confucian culture density is strong, so that they can be easier to build business relationship with parties with similar value orientation.

In order to relieve this reverse causality concern, we look at whether the culture effect is different for state-owned firms and non-state-owned firms. The rationale behind this exercise is that state-owned firms usually headquarter in the prefectures of their governmental shareholders, while non-state-owned firms freely choose where to locate their headquarters. If reverse causality indeed plays a role, then we should see the culture effect does not exist, or much smaller, for state-owned firms. Estimation results are tabulated in Table 12. We see that our main explanatory variable is significant for both groups of firms, and the economic magnitudes are similar. This points to that the regional culture indeed shapes the corporate culture, further supporting our causal inference.

## 6 | REGIONAL CULTURE AND CORPORATE CULTURE

### 6.1 | Confucian culture and college Students' employment intention

Our study is based on the hypothesis that Confucian culture is a cultural type characterized by risk aversion and uncertainty. Although many statements in *The Analects* support such a view, the relationship between Confucian

**TABLE 13** Confucian culture on employment intentions of college students.

	(1) Government job	(2) Business venture
Jinshi	0.044*** [0.013]	-0.044*** [0.016]
Gender	-0.192*** [0.052]	0.569*** [0.049]
Edu	0.180*** [0.041]	0.005 [0.050]
Entrepreneur parents	0.051 [0.070]	0.217*** [0.064]
Business major	0.166** [0.067]	-0.056 [0.041]
Observations	12,546	12,546
Pseudo R-squared	0.007	0.018

Note: This table examines the relation between regional Confucian culture density and employment intentions of college students as well as with the following specification:

$$\text{Employment intention}_{it} = \beta_0 + \beta_1 \text{Jinshi}_{it} + \Gamma' X_{it} + \varepsilon_{it},$$

where  $i$  and  $t$  denote firm and year, respectively. Employment intention $_{it}$  is student's desired employment position to be specified below.  $X_{it}$  represents a vector of control variables including the gender of the student, level of education, whether parents are entrepreneurs and whether the student's major is business related. The main explanatory variable is Jinshi is the number of Confucian scholar (jinshi) at the prefecture level during the Ming and Qing dynasties. In column (1), Governmentjob is a dummy variable that proxies for whether the student's employment goal is a government or public job. In column (2), Businessventure is a dummy variable that proxies for whether the student's employment goal is to start his/her own business. Standard errors, reported in brackets, are clustered at college levels. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, 10% level, respectively.

culture and risk aversion has not been empirically verified. In this subsection, we examine the relationship between Confucian culture and risk aversion using the 2019 survey of college students' job search intentions in Shanghai.

The survey examined the employment intentions of more than 20,000 university students in Shanghai.<sup>20</sup> Choosing to work for a government-related department is often considered a conservative employment goal, while choosing to start a business implies high risk preference. We construct a dummy variable, Governmentjob, which takes 1 when the students choose the government or public institution as the desired employer and 0 otherwise. Similarly, we construct another dummy variable, Business venture, which takes 1 when students choose entrepreneurship as their employment goal and 0 otherwise. We measure the extent to which students are influenced by Confucian culture by the number of Jinshi in their birthplace. About 37% of the students in the survey are from Shanghai. Therefore, to ensure the representativeness of the sample, we drop observations if the student's hometown is Shanghai.

The results of the regression analysis are shown in Table 13. The regression coefficient of Jinshi in column (1) is significantly positive, while the regression coefficient in column (2) is significantly negative. This shows that students from regions with a stronger influence of Confucian culture are more inclined to choose stable government jobs and less inclined to start their own businesses. This suggests that students who are strongly influenced by Confucian culture make career choices revealing risk-aversion, which supports the link between the spread of Confucian culture in history and risk-aversion of contemporary society.

## 6.2 | Confucian culture and corporate risk perception

Corporate culture is believed to be an important driver of firm value among business leaders and executives (Graham et al., 2022), and plays an even bigger role during bad times in helping firms weather through (Li, Liu, et al., 2021). Leadership plays an essential role in shaping corporate culture (Hermalin, 2012), and we also provide evidence on the interaction between CEO or board chairman's cultural background and corporate decisions. However, direct empirical evidence on whether a firm's regional environment also shapes corporate culture is rare. In our paper, we argue that a firm's regional Confucian culture density shapes corporate culture, and thus affects corporate cash holding decision.

In this section, we try to show direct evidence on the relation between corporate culture and a firm's regional cultural environment, which will solidify our argument. As we mention above, Confucianism is a culture type characterized by risk-aversion and uncertainty-avoidance, and we aim to show that firms headquartered in areas with stronger Confucian culture density develop corporate culture that is also more risk-averse. To this end, we focus on the management discussion & analysis (MD&A) session of firms' annual reports and count the frequency of mentioning the word "Feng Xian" ("risk" in English), which is to proxy for how the firm management is concerned about potential business risks. The rationale is that when the management has higher level of risk awareness, then the corporate culture of this firm should be viewed as more risk-averse and uncertainty-avoidance. Conducting textual analysis on firms' regulatory files to measure corporate culture has been employed in leading finance literature (Li, Mai, et al., 2021), and counting target words of annual reports is one of the most commonly employed techniques (Loughran & McDonald, 2011).

We replace the dependent variable in our main regression Equation (1) as Risk\_awareness, which is defined as the word counts of "Feng Xian" in the MD&A session of firms' annual reports. The estimation results are shown in Table 14. We can see that a firm's stronger Confucian cultural environment around its headquarter is associated with a firm's higher level of risk awareness. This exercise further corroborates our argument that a firm's regional Confucian culture density shapes corporate culture, and thus affects corporate cash holding decision.

## 7 | CONCLUSION

In this paper, we identify culture as an important factor affecting corporate cash holdings. Using China and its dominant national culture, Confucianism, as the setting, we find that firms located in stronger Confucian culture regions hold higher levels of cash, and this high level cash holding status is more persistent over time. We use an instrumental variable approach to establish causality of the culture effect.

We then examine heterogeneity in the culture effect and find that it only affects financially constrained firms, suggesting that the culture effect is driven by stronger precautionary motives. The fact that we do not see the culture effect vary with the level of agency conflict of firms argues against agency motives. In addition, we find that a stronger Confucian culture leads to better investment decisions and better operating performance, providing further evidence against agency motives. This evidence suggests that high cash holdings by firms is an efficient outcome. Moreover, we confirm that the culture effect is universal and not limited to some regions or only to public firms. Finally, we show that both the cultural background of top decision makers and the regional cultural environment of the firm's headquarters jointly influence corporate cash holdings.

Our paper examines the impact of inter-regional cultural differences on corporate cash holdings in a context of cultural uniformity, and thus makes a contribution to the literature on how cultural factors affect business operations (Hilary & Hui, 2009; Alesina & Giuliano, 2015; Chen et al., 2015; Du, 2015). For countries around the world with very different cultural characteristics, we expect culture to play an even greater role in explaining differences in corporate cash holdings.

**TABLE 14** Confucian culture on a firm's risk awareness.

	(1)	(2)
Confucian100	0.027** [0.013]	0.019* [0.011]
Net working capital		0.166** [0.070]
Market-to-book		-0.024*** [0.005]
Cash flows		-0.217** [0.080]
Cash flow volatility		-0.008 [0.150]
Size		0.066*** [0.017]
R&D		0.073 [0.284]
Capex		0.009 [0.079]
Leverage		0.178** [0.083]
Dividend payout		0.019 [0.017]
Year F.E.	Yes	Yes
Industry F.E.	Yes	Yes
Observations	29,581	29,485
R-squared	0.324	0.339

This table examines the relation between a firm's risk awareness and regional Confucian culture density with the following specification:

$$\text{Risk\_awareness}_{it} = \beta_0 + \beta_1 \text{Confucian100}_{it} + \Gamma' X_{it} + \mu_j + v_t + \varepsilon_{it},$$

where  $i$  and  $t$  denote firm and year, respectively.  $\text{Risk\_awareness}_{it}$  is the dependent variable, measured as the word counts of "feng xian" in the MD&A session of firms' annual reports, and  $X_{it}$  represents a vector of control variables defined in Table A1.  $\mu_j$  and  $v_t$  denote industry fixed effects and year fixed effects respectively. The main explanatory variable is  $\text{Confucian100}_{it}$ , the number of Confucian temples within 100 km radius around the corporate headquarters, raised to the natural log (plus 1). The vector of control variables include market-to-book, net working capital, size, cash flows, cash flow volatility, R&D, capex, leverage, dividend payout. Standard errors, reported in brackets, are clustered at industry levels. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, 10% level, respectively.

Abbreviation: MD&A, management discussion & analysis.

## ACKNOWLEDGMENTS

We thank Andrew J. Sinclair, Dragon Yongjun Tang, Tse-Chun Lin, Yang You, Darrell Duffie, Hong Zou, Zhiwu Chen, Maxime Couvert, as well as seminar participants at Stanford University, University of Hong Kong and 2022 AFA Poster Session, 2022 FMA, 2022 SFA, 2023 CFRC for valuable advice and comments.

## ENDNOTES

- <sup>1</sup> The transaction cost motives state that a firm would hold more cash if it entails higher costs of cash shortfalls (Meltzer, 1963; Mulligan, 1997). The precautionary motives state that firms hold higher levels of cash to deal with adverse shocks when access to external finance is constrained (Almeida et al., 2004; Duchin, 2010; Duchin et al., 2017; Opler et al., 1999). The agency motives argue that entrenched management would hoard excess cash instead of increasing payouts to shareholders when the firms have poor investment opportunities (Dittmar et al., 2003; Harford, 1999; Harford et al., 2008; Jensen, 1986).
- <sup>2</sup> Despite the fact that US has already experienced a secular growth in cash holdings, more than double from 1980 to 2006 (Bates et al., 2009).
- <sup>3</sup> Among these mentioned economies, United States, United Kingdom, Hong Kong and Singapore have English common law origin; while Japan and Germany have German civil law origin. Thus, differences in cash holding levels may not directly link to differences in legal origin of these economies.
- <sup>4</sup> For example, Allen et al. (2005) posit that Confucian culture shapes social values, orders and trust in the Chinese society, which is the main mechanism for China's private sector to achieve astonishing growth despite the almost nonexistence of formal governance mechanisms.
- <sup>5</sup> Jack Ma, founder of China's e-commerce giant Alibaba Group and one of the most successful entrepreneurs in the world, once said that entrepreneurs in China have to understand the values and ideology of Confucianism so as to survive in the market. See [http://www.ce.cn/xwzx/gnsz/gdxw/201610/21/t20161021\\_17012709.shtml](http://www.ce.cn/xwzx/gnsz/gdxw/201610/21/t20161021_17012709.shtml)
- <sup>6</sup> Confucianism has also shaped broad socioeconomic aspects in many East and Southeast Asian countries (Bell et al., 2003; Morishima, 1982; Rozman, 2014).
- <sup>7</sup> Beginning from 2004, the Chinese Ministry of Education launched the "Confucius Institute Program" and had established a total of 548 Confucius Institutes in 154 nations and districts around the World by the end of 2018. The main purpose of these Confucius Institutes is to teach the Chinese language and promote Chinese culture.
- <sup>8</sup> Including China, Hong Kong, Taiwan, Japan, South Korea, Singapore, among others.
- <sup>9</sup> *The Analects* is an ancient Chinese book that compiles a large collection of sayings and ideas attributed to *Confucius*. It is the central texts of Confucianism, which was widely read and studied in imperial China for 2000 years, as well as being component of the Chinese subject textbooks in modern China.
- <sup>10</sup> For more detailed description of Confucianism and its risk-aversion attributes, please refer to Chen and Ma (2022).
- <sup>11</sup> *Keju* system was established during the mid-Tang Dynasty (618–907 AD) and had exerted a profound influence on the Chinese society. The exam system was invented to allow the emperors to select talented state bureaucrats. Confucianism was the central subject of the exam. Succeeding in the exam was highly rewarding, allowing the degree holders to gain government positions and enjoy lucrative economic benefits.
- <sup>12</sup> In imperial China, the Jinshi held the highest academic degree and was awarded through the civil service examination system used to select public officials. Since the exams tested knowledge of Confucian orthodoxy, earning a Jinshi degree required a deep understanding of Confucian thoughts. As a result, regions rich in Confucian culture produced more Jinshi. These Jinshi, who enjoyed various socio-economic privileges, often promoted Confucianism by establishing Confucian schools and temples in their hometowns. Their success and the resulting improvement in educational resources attracted more citizens to study Confucianism, thus strengthening the influence of Confucianism in the region (Gu et al., 2024).
- <sup>13</sup> See Bloom et al. (2012) and Hilary and Hui (2009) for discussions on how regional cultural environment shapes corporate culture, and thus affects corporate decisions.
- <sup>14</sup> We use the *Shenwan* Industry Classification, the mostly widely used among industry practitioners. Our results hold if we use the China Securities Regulatory Commission (CSRC) Industry Classification.
- <sup>15</sup> Since we use a 3 year window to calculate cash flow volatility, for most of the specifications, the sample periods actually start at 2002.
- <sup>16</sup> The smaller magnitude of the measure using Confucian academies is consistent with our expectations. As discussed in Section 3, Confucian temples are preserved as cultural heritage protection units and cultural attraction sites for tourists, they are expected to continue to propagate Confucian culture at modern times. Confucian academies, on the other hand, have been destroyed and no longer exist at current times. Thus, using Confucian academies as the cultural density measure only captures the historical cultural density, but not at modern times, as a result of which, it should have a smaller effect.
- <sup>17</sup> More complex measures based on, for example, dividend payouts, debt financing costs, and so forth, may not have the same information content as in the US market. For example, there are mandatory dividend payout requirements for Chinese listed firms if they want to do a seasoned equity offerings.

- <sup>18</sup> On the other hand, large shareholders' monitoring effectiveness will be attenuated if they face free rider problem (Shleifer & Vishny, 1986). Thus, we multiply by a Herfindahl index for the concentration of shares among these shareholders.
- <sup>19</sup> Using a 5 day window yields very similar results.
- <sup>20</sup> The six options for employer preference include government, public institutions (Shi Ye Dan Wei), state-owned enterprises, private enterprises, foreign enterprises and entrepreneurship.

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**How to cite this article:** Deng, Y., & Zeng, S. (2024). Does culture matter in corporate cash holdings? *International Review of Finance*, 1–33. <https://doi.org/10.1111/irfi.12473>



## APPENDIX A

TABLE A1 Variable definitions.

Variable name	Description
Confucian100	The number of Confucian temples within 100 km radius around the corporate headquarters raised to the natural log (plus 1). Source: See Section 3.
ConfuAcademy100	The number of Confucian academies within 100 km radius around the corporate headquarters raised to the natural log (plus 1). Source: See Section 3.
Jinshi	The number of scholar (Jinshi) in each prefecture level city during Ming and Qing dynasties divided by 1000. Source: CNRDS.
Market-to-book	The market value of equity plus the book value of liabilities, divided by the book value of total assets. Source: CSMAR.
Networking capital	Current assets minus current liabilities minus cash and equivalents, divided by net assets. Source: CSMAR.
Size	Log of total assets. Source: CSMAR.
Cash flows	Earnings before extraordinary items and depreciation minus dividends, divided by net assets. Source: CSMAR.
Cash flow volatility	Standard deviation of cash flows (defined above) over the last three years. Source: CSMAR.
R&D	R&D expenditures divided by total sales. Source: CSMAR.
Capex	Capital expenditures divided by net assets. Source: CSMAR.
Leverage	Total debt divided by net assets. Source: CSMAR.
Dividend payout	A dummy that equals one if a firm pays cash dividends in a year and zero otherwise. Source: CSMAR.
RiverDistance	The corporate headquarter prefecture's river distance to its nearest bamboo and pine habitats in the Ming-Qing period, raised to the natural log (plus 1). Source: Chen, Ye, et al. (2020)
Age	The number of years since IPO. Source: CSMAR.
IndBoard	The number of independent board directors divided by total number of directors. Source: CSMAR.
InsiderHolding	The ratio of shares held by the board and management teams to total shares. Source: CSMAR.
Monitor	The product of total shares (as a percentage of total shares outstanding) held by the second to the fifth largest shareholders and a Herfindahl index for the concentration of shares among these shareholders. Source: CSMAR.
ROA	Earnings before extraordinary items and interest expenses divided by net assets. Source: CSMAR.
StdROA	The standard deviation of ROA for a five-year window. Source: CSMAR.
SalesGrowth	The growth rate of total sales. Source: CSMAR.
Dividend	The cash dividends payout divided by net assets. Source: CSMAR.
AquiReturn	The three-day window (one day before the acquisition announcement to one day after the acquisition announcement) cumulative abnormal returns for an acquisition event based on a market model estimated from a 250-days window. Source: CSMAR.
Credit	Total bank loans divided by GDP at the prefecture level. Source: CSMAR.
Openness	Total FDI (foreign direct investment) divided by GDP at the prefecture level. Source: CSMAR.
Chair	The total number of Confucian academies in board chair' birthplace provinces raised to the natural log. Source: Hand-collect.
CEO	The total number of Confucian academies in CEO's birthplace provinces raised to the natural log. Source: Hand-collect.

Abbreviation: Capex, capital expenditures.