International Review of Economics and Finance 80 (2022) 835–856

Contents lists available at ScienceDirect

International Review of Economics and Finance

journal homepage: www.elsevier.com/locate/iref

Financial institution shareholding and corporate innovation: Evidence from China

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ARTICLE INFO

JEL classification:
G20
O30

Keywords:
Financial institution shareholding
Corporate innovation
Managerial agency conflict

ABSTRACT

Existing literature on bank-firm ties mainly focuses on the financial decisions of non-financial firms when they are fully or partially owned or controlled by financial institutions (e.g., commercial banks, investment banks, insurance companies). However, there is an alternative pattern of tie between financial institutions and firms; that is, a non-financial firm invests a significant amount in banks or other financial institutions, which we refer to as financial institution shareholding (FIS). Little is known about how the investment decisions of non-financial firms are shaped by this FIS. We fill this gap by investigating the impact of FIS on corporate innovation in China. Our empirical results show that FIS impedes corporate innovation. Using a mediation model, we find that the negative effect of FIS on corporate innovation is brought about through managerial agency conflict. We also show that this negative impact is more pronounced among CEOs with shorter decision horizons, firms with greater analyst coverage, and firms whose stocks are more liquid. Furthermore, we find that FIS simultaneously results in the under-hiring of the highly educated workers critical to corporate innovation. Overall, our findings indicate that FIS causes firms to lose growth potential by exacerbating managerial agency conflict.

1. Introduction

Bank-firm connections are widespread in both developed and developing economies. Existing studies mainly focus on firms' financial decisions when banks control non-financial firms (e.g., Lai, Li, & Chan, 2020; Luo, Zhang, & Zhu, 2011; Jiang, Yao, & Feng, 2013; Mahrt-Smith, 2006; Kang & Shivdasani, 1995). However, there is an alternative pattern of bank-firm tie, that is, a non-financial firm invests a significant amount in banks or other financial institutions, which we refer to as *financial institution shareholding* (FIS hereafter). In many countries, such as Mexico, Brazil, Chile, Turkey, and Russia, a considerable proportion of banks are controlled by non-financial firms (La Porta, Lopez-de-Silanes, & Zamarripa, 2003). In addition, many publicly traded firms have a controlling shareholder that also owns banks, with the percentage being as high as 60% in Asia, while it is 28% in Europe (Faccio, Lang, & Young, 2000). Although therefore prevalent, this reverse pattern of bank-firm tie is relatively under-studied; only a few papers examine how

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https://doi.org/10.1016/j.iref.2022.03.008
Received 31 December 2020; Received in revised form 19 February 2022; Accepted 22 March 2022
Available online 25 March 2022

firms' ownership of banks affects those banks' lending tendencies. For example, La Porta et al. (2003) find that such banks are more likely to issue loans to parties controlled by the banks' owners, and Lu, Zhu, and Zhang (2012) document that firms in China can overcome financing disadvantages through their ownership of banks. However, little is known about how FIS shapes the investment decisions of the non-financial firms involved.[1]

Corporate innovation typically involves high-risk long-term investment; it has a high failure rate but is critical to a country's sustainable growth. Rosenberg (2004) estimates that 85% of a nation's economic growth is attributable to technological innovation, while the OECD (2015) indicates that technological innovation accounts for roughly half of a country's GDP growth. Thus, given the importance of corporate innovation in promoting technological progress and fostering economic growth, we aim to shed more light on the impact of FIS on this aspect of corporate investment.

We hypothesize that FIS could have two opposing effects on corporate innovation. The first effect is that of *financing convenience*. FIS may enhance innovation through alleviating financial constraints and lowering the cost of capital. A significant strand of literature finds that having ownership in commercial banks and having commercial bankers on boards make it easier for a firm to access credit (Kang, Shivdasani, & Yamada, 2000; Gorton & Schmid, 2000; Dittmann, Maug, & Schneider, 2010); similarly, having investment bankers on boards is associated with larger bond issues (Güner, Malmendier, & Tate, 2008). To the extent that innovation requires large and stable capital investment and tolerance of failure, a firm's ownership of financial institutions could encourage innovation by giving it greater access to credit.

The second effect is that of *managerial agency*. FIS may impede corporate innovation through managerial incentives to avoid costly effort and risky decisions. In many developing and certain developed economies, the finance sector is highly concentrated and generates monopolistic profits (Coccorese, 2014). Non-financial firms in such economies can obtain a reliable source of profit growth through investment in this sector.[2] However, the acquisition of such a monopolistic profit source reduces the need to innovate and may tempt CEOs to enjoy a "quiet life" by avoiding the cost and risk associated with innovation. For example, Bertrand and Mullainathan (2003) find that many CEOs seek to reduce long-term capital expenditure, despite its importance to a firm's long-term development, while increasing workers' wages to avoid workforce conflict and buy a more peaceful environment. Thus, CEOs who prioritize short-term comfort over long-term growth are very likely to reduce innovation investment if they have already acquired a source of monopolistic profit. Given that innovation is inherently risk-laden, we predict that when a firm has a larger share of FIS there will be a stronger incentive to reduce corporate innovation activities.

Unlike most other developed countries (e.g., USA, Germany, France, Italy, Japan), the financial sector in China is highly monopolized and is associated with large monopolistic profits. Thus, although financial companies account for only 1.85% of all publicly traded A-share firms, they contribute 49.15% of the net profits of such firms. Coccorese (2014) finds that the Lerner index for the Chinese financial industry is significantly greater than the equivalent average for 87 other countries.[3] Thus, Chinese corporate investments in financial institutions are not only motivated by improved access to lending facilities, prevalent throughout the world, but are also driven by obtaining monopolistic returns from FIS. Thus, FIS can provide Chinese non-financial firms with a valuable profit source as well as greater access to credit. China is, therefore, an ideal setting in which to differentiate between the *financing convenience* and *managerial agency* effects of FIS and to test its impact on the real economy.

Empirically, we find that firms with greater levels of FIS have lower numbers of patents and these patents receive fewer citations, suggesting that FIS reduces both the quantity and quality of corporate innovation. These results lend credence to the managerial agency effect of FIS. We further examine whether the negative effect of FIS on corporate innovation acts through the channel of managerial agency conflict. To this end, we employ a mediation model and find that FIS can result in more severe managerial agency conflict, thereby impeding innovation. We also find that the effect of FIS on corporate innovation is more pronounced in firms whose CEOs have shorter decision horizons, that are covered by more analysts, and are faced with greater stock liquidity. The results imply that CEOs bearing more severe short-term pressure from capital markets are more likely to reduce corporate innovation, at the cost of future competitiveness.

We conduct several sensitivity tests to assess the robustness of our baseline results. First, we exploit a policy change in China as a quasi-natural experiment to establish causality. The policy change exogenously increases the ability of non-state-owned enterprises (non-SOEs) to invest in financial intermediaries but has no incremental effect on state-owned enterprises (SOEs). Therefore, we follow Tan, Tian, Zhang, and Zhao (2020) and assign non-SOEs to a treatment group and SOEs to a control group and study the effect in a difference-in-differences (DID) setting. Detailed information on the policy experiment is provided in Section 4.5.1 and the results show that the FIS of non-SOEs increases by 98% in the year after the policy shock, when compared to their average FIS prior to the treatment. At the same time, non-SOEs experience a 28.0% decrease in patent numbers, and an 11.2% decrease in total non-self citations.[4] In our second sensitivity test, we try to control for omitted variables by including a series of factors in our model; specifically, we include R&D expenditure, the scale of financial assets, and the level of local financial competition. We also incorporate industry-by-year and

[1] Our focus on financial institutions extends beyond traditional banks because in China the latter are prohibited from non-banking activities such as underwriting services in relation to, for example, equities, bonds, and insurance. Chinese financial institutions are, therefore, more representative of banks in other countries.

[2] We further verify this relationship in Section 5.1.

[3] A larger Lerner index is associated with lower competition.

[4] We also find that non-SOE's FIS increase by 111% in two years after the policy shock, compared to non-SOE's average FIS prior to the experiment. Meanwhile, non-SOEs experiences a 29.4% decrease in patent numbers and an 14.6% decrease in total non-self citations in two years after the enactment of these policies.

province-by-year fixed effects into our main regression. We find the effect of FIS on innovation still holds. Third, we conduct other robustness checks, such as adopting alternative measures of corporate innovation and FIS, and excluding non-innovative firms: the results show that these changes do not alter our results.

We conduct two further tests to gather evidence for our paper. First, an implicit assumption throughout our paper is that FIS brings in monopolistic profits, which is the reason why CEOs of firms with FIS can forgo innovation. We seek to test this assumption and demonstrate that FIS is associated with higher profit growth. Second, we examine whether FIS is contemporaneous with underinvestment in highly educated employees, who are key resources in R&D activities. The empirical results are consistent with our expectation that, once they have access to monopolistic profits through FIS, CEOs reduce high-risk innovation by hiring fewer highly educated workers.

Our paper contributes to several strands of the literature. First, it extends the current understanding of FIS. Many studies have shown the upside of FIS, such as lowering firms' interest expenses, enhancing their financial flexibility (Lu et al., 2012), and improving investment efficiency (Wang, Luo, Tian, & Yan, 2020). We shed new light on the darker side of FIS by documenting that access to monopolistic profit through FIS negatively impacts corporate innovation.

Second, our study reveals the managerial agency conflict channel through which financial resources can blight the real economy. Recent literature finds that economic growth is damaged in countries with relatively large active financial sectors (Christensen, Shaxson, & Wigan, 2016). For example, Baker, Epstein, and Montecino (2018) estimate the potential loss due to "too much finance" in the UK between 1995 and 2015 at more than £4.5 trillion, which represents approximately 2.5 years of the country's average annual GDP during that period. However, the channel through which abundant financial resources disadvantage economic growth remains unclear. We find that at firm level, abundant financial resources impede corporate innovation because the monopolistic profits from FIS allow CEOs to reduce innovation levels for a quieter life. Thus, our findings suggest that financial holdings damage the real economy by exacerbating managerial agency conflicts and reducing corporate investment in innovation.

The remainder of the paper is organized as follows: Section 2 introduces the institutional background and develops our theoretical hypotheses; Section 3 describes our sample and methodology and Section 4 reports our empirical results; in Section 5 we describe our supplementary tests, and Section 6 concludes the paper.

2. Institutional background and hypothesis development

2.1. The profitability of the finance industry in China

To control the finance industry, the Chinese government has imposed many restrictions on firms' access to the finance sector. All forms of financial institution, such as commercial banks, investment banks, insurance companies, and trusts, are required to have an administrative license from the central government to franchise their business. In consequence, the finance sector in China is highly monopolized. Although China has allowed a large number of foreign and domestic competitors into its finance sector, the profitability of the sector takes the leading position within the country's economy.

Fig. 1 presents the average return on equity (ROE) at industry level. We categorize industries at the one-digit level and include all such one-digit industries between 2006 and 2014 involving at least five firms in the figure. We find that the average ROE for the finance sector is 13.66%, ranking first among the 17 industries. Fig. 2 reports the percentages of net profit contributed by each industry. During our sample period, the scale of the finance sector's profit is by far the largest. Finance sector firms accounted for only 1.85% of the publicly traded A-share firms, but contributed almost half (49.15%) of the net profits of such firms. Fig. 3 presents the industry-level average net profit per firm for all of the industries. Unsurprisingly, the finance sector ranks first among them and, on average, each financial institution earns 22.75 billion RMB. Another monopolized industry, that of mining, ranks second but its average net profit per firm diminishes to just 5.55 million RMB.[5]

The high returns from the finance industry enable many firms to gain considerable profit from FIS. For example, New Hope (Ticker: SZ000876), a manufacturing firm, holds about 4% of China Minsheng Banking Corporation (CMBC; Ticker: SH600016). Between 2006 and 2018, the return on its CMBC investment contributed 75% of New Hope's net profit, hitting 121% in one particular year (2008), as illustrated in Fig. 4.

2.2. Hypothesis development

In China, firms find it difficult to obtain financial services. Beck, Lin, and Ma (2014) use the depth of credit information and the average number of bank branches per one million adults to measure financial sector outreach. The values of these two indicators are 2 and 0.173, respectively, and are significantly lower than the respective means of 3.129 and 1.363 for 102 other countries. Financial sector outreach affects the extent of corporate access to credit. To enhance their available credit and lower the cost of capital, firms tend to build different kinds of connections with financial institutions. For example, commercial bank ownership and bankers on boards make it easier for a firm to access credit (Kang et al., 2000; Gorton & Schmid, 2000; Dittmann et al., 2010), while investment bankers on firm's boards are positively associated with bond issues in the capital market (Güner et al., 2008). Charumilind, Kali, and Wiwattanakantang (2006) find that firms with connections to banks obtain better access to long-term loans and provide less collateral

[5] Although there are other monopolistic industries, such as utilities and energy supply, the profitability of the finance sector gives it the leading position. Thus, the effect of managerial agency conflict will be more pronounced by only including a firm's investments in the finance industry.

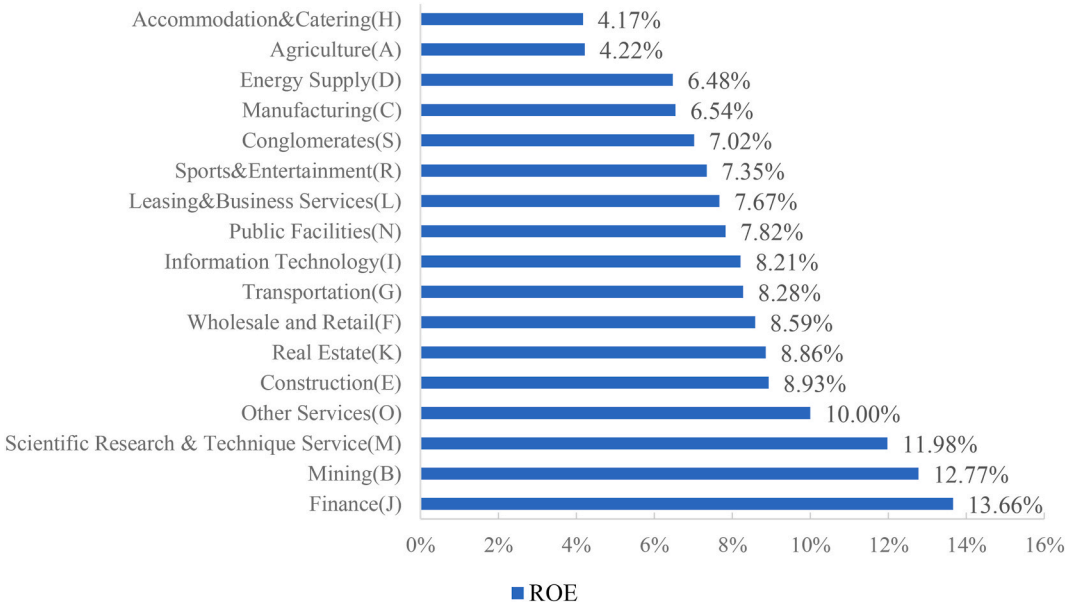


Fig. 1. Average ROE for one-digit industries.

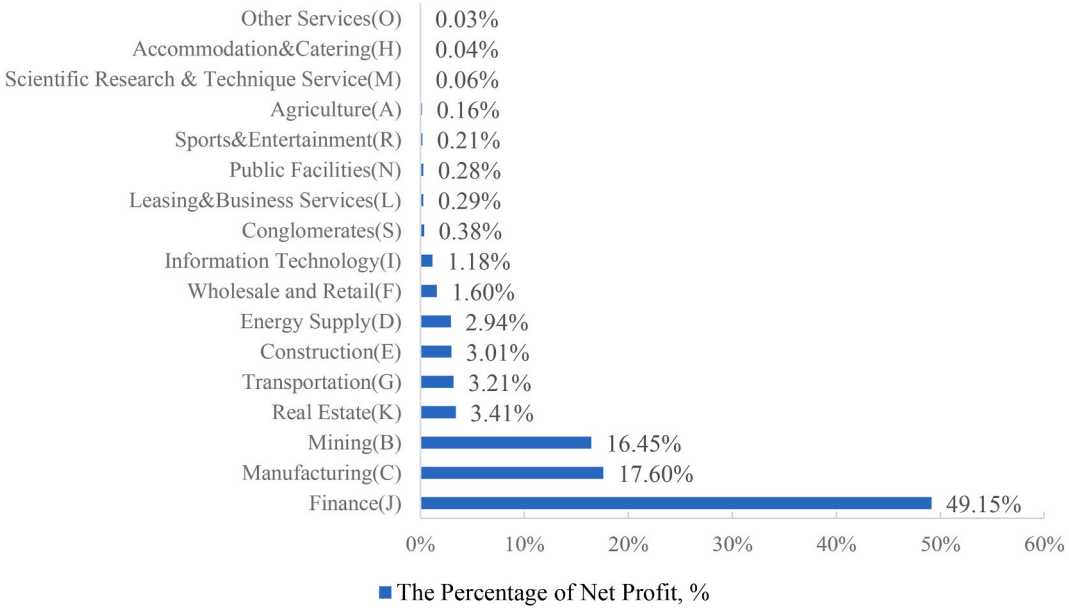


Fig. 2. Percentage of net profit contributed by one-digit industries.

than firms without such connections. In a similar vein, Custódio and Metzger (2014) find that CEOs with finance-related work experience can raise funds even when credit conditions are tight.

FIS is another way to get access to credit resources. In China, one important source of credit is the bank loan. The literature shows that ownership of a bank could strengthen a firm's ability to raise capital either through the assignment of representatives to the bank's board of directors, thereby influencing bank managers' lending decisions (Maurer & Haber, 2007; Wang et al., 2020), or by facilitating the bank's accumulation of soft information about the firm, consequently reducing concerns around loan defaults (Lu et al., 2012). As a result, firms that have ownership of banks enjoy lower credit costs, can choose when and for how long to borrow, and are more likely to receive loans during periods of tight monetary policy (Lu et al., 2012). In addition, shadow banking is particularly prevalent in China, estimated as equivalent to 82% of China's GDP at the end of June 2016 (Allen, Qian, Tu, & Yu, 2019). Thus, other financial institutions, such as investment banks and trusts, help firms raise funds by off-balance-sheet financing (Li, 2014). When monetary policy is tight, this kind of financing source is more important than bank loans (Chen, Ren, & Zha, 2018). Given this evident potential to significantly

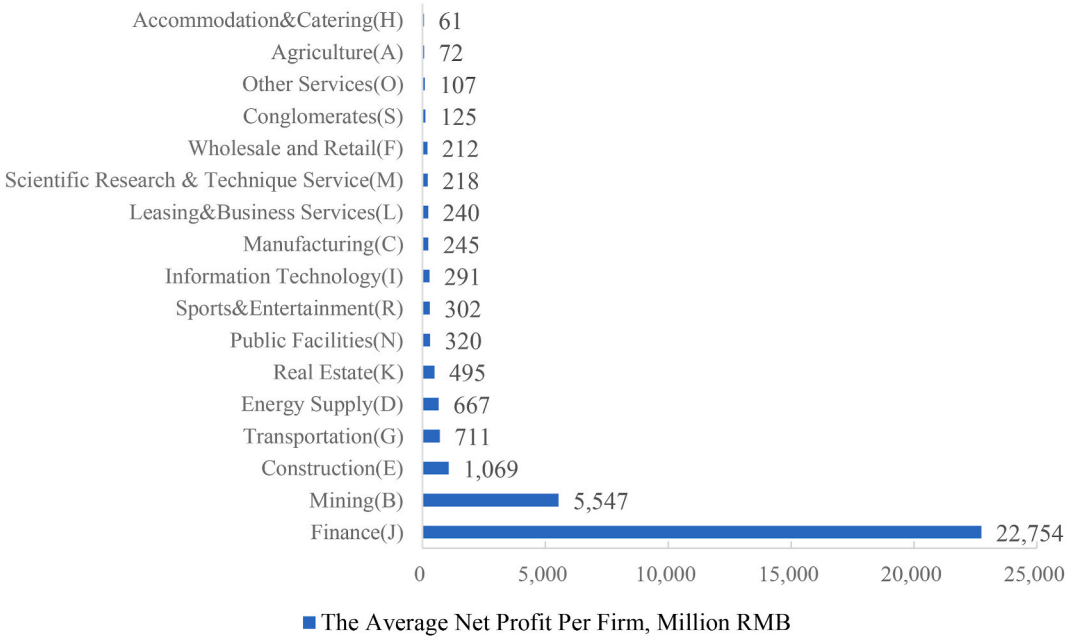


Fig. 3. Industry-level average net profit per firm.

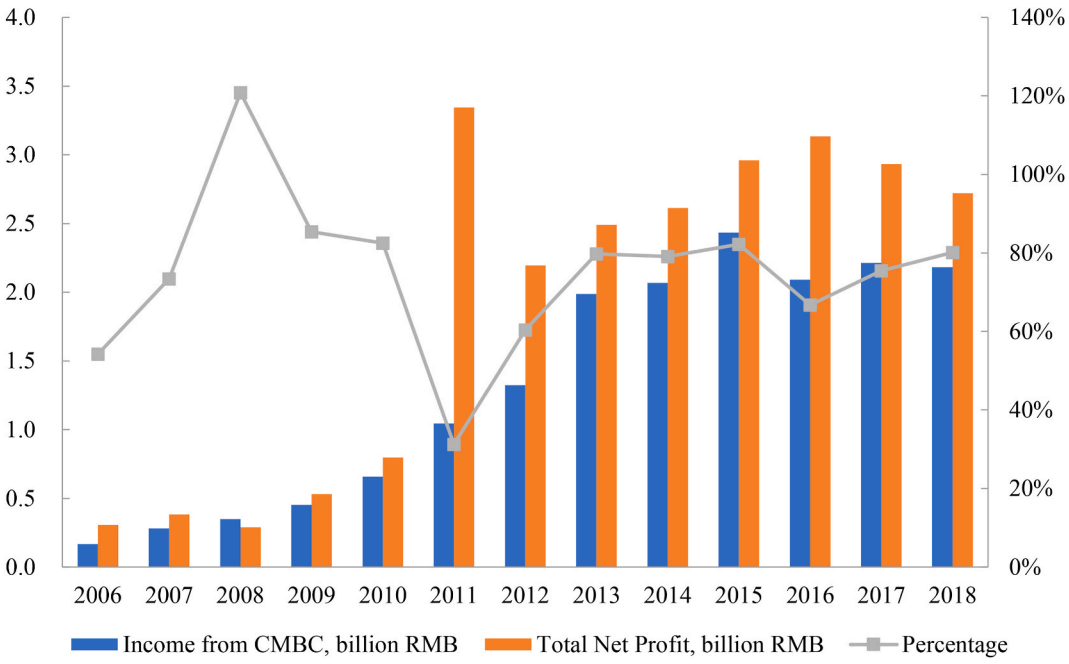


Fig. 4. Return on investment in CMBC for new Hope.

alleviate credit constraints, we predict that FIS should enhance firms' technology investments and innovation outcomes through the channel of financial support, and propose the following Hypothesis accordingly:

Hypothesis 1a. FIS is positively related to corporate innovation.

On the other hand, FIS may impede innovation. As already discussed, one of the largest benefits of FIS is as a monopolistic source of significant profit. According to the theoretical model of Hicks (1935), the best of all monopoly profits for a CEO is a quiet life. In general, CEOs must innovate continuously to maintain and improve their firms' competitive advantages in support of corporate survival and development. However, obtaining a monopolistic profit source reduces the need to innovate and CEOs are tempted to

enjoy a quiet life by avoiding costly effort and risky decisions. For example, Bertrand and Mullainathan (2003) find that CEOs pursue a quiet life by reducing the long-term capital expenditure that is so important for firms' long-term growth. Likewise, CEOs increase workers' wages to avoid conflicts and secure a more peaceful environment. Gormley and Matsa (2016) find that CEOs avoid risky decisions and activities to reduce the incidence of negative outcomes that may be personally costly, even at the expense of their firms' long-term development. Although critical to a firm's competitiveness, innovation involves high risk. Thus, CEOs who prioritize short-term comfort over long-term corporate value are very likely to cut investment in innovative projects if they have already obtained a monopolistic source of profits elsewhere. Following this logic, we predict that CEOs will reduce innovative activities after obtaining FIS, and hypothesize thus:

Hypothesis 1b. FIS is negatively related to corporate innovation.

3. Sample construction, variable definition, and summary statistics

3.1. Sample construction

Our initial sample includes all A-share firms listed on the Shanghai Stock Exchange (SHSE) and Shenzhen Stock Exchange (SZSE) between 2006 and 2014. We choose 2006 as the beginning of our sample period because it is the first year for which the value of financial institution holdings is publicly available. We end our sample in 2014 because it is the last year in which such disclosure was mandatory. We manually collect information about holdings of financial institutions from the management discussion and analysis (MD&A) sections of annual reports. In these sections, firms disclose detailed information regarding equity investments in other companies, especially investments in the finance sector. We exclude firms that (1) have been listed for less than one year, (2) are missing values for control variables, (3) belong to the banking, securities, insurance, trust, futures, and other financial industries, or (4) are marked as ST, *ST or are in other abnormal operating conditions. Our final sample includes 2163 firms and 14,921 firm-year observations.

3.2. Variable definition

3.2.1. Measuring corporate innovation

Following Su, Xiao, and Yu (2019) and Chu, Tian, and Wang (2019), we use patenting activities to measure corporate innovation because they are more likely to capture unobservable input resources that are ignored by measures of R&D expenditure alone. We construct two measures to capture both the quantity and quality of corporate innovation. The first variable, Grant, is the number of patents filed in a year that are eventually granted, which captures the *quantity* of corporate innovation. The second variable, *Citation*, is the total number of non-self citations of a firm's filed patent that is eventually granted, which captures the *quality* of corporate innovation. We measure these two variables for years $t+1$ and $t+2$ and use their natural logarithms because they are right-skewed. Patent information is sourced from the China Security Market and Accounting Research (CSMAR) database, and citation information from the Chinese Research Data Services (CNRDS) platform.

3.2.2. Measuring FIS

We focus on all forms of financial institution, including commercial banks, investment banks, and insurance companies, because they all operate in monopolistic domains with high profits.[6] We measure FIS as the value of total financial institution ownership relative to the book value of a firm's total assets.

3.2.3. Measuring control variables

We follow the innovation literature (e.g., Chang, Fu, Low, & Zhang, 2015; He & Tian, 2013; Jia, Huang, & Man Zhang, 2019; Pan, Yu, Liu, & Fan, 2020) and control for a number of firm characteristics that may affect innovation. Thus, our control variables include *HHI*, *Block_ownership*, *SOE*, *Cash*, *Size*, *ROE*, *Lev*, *Dual*, *Independent_director*, *BM*, *Compensation*, *ManagerOwn*, and *InstOwn*, the explanations of which are provided in Appendix A.

4. Empirical results

4.1. Summary statistics

Table 1 reports the summary statistics for the main variables. In Panel A, our statistics indicate that, on average, a firm produces about 13 patents a year and each patent receives five (non-self) citations. In Panel B, we present the summary statistics for firms with FIS. Nearly a quarter of our firms (24.90%) have ownership of financial institutions. Most such firms (18.38% of the total) invest in only one financial institution and, on average, their FIS represents 1.56% of total assets. Only 0.34% of our firms invest in more than five financial institutions, where FIS accounts for 4.50% of total assets on average. We have described (in Section 2.1) how investing in

[6] We note that our definition is more inclusive than those of Lu et al. (2012) and Wang et al. (2020) because we focus on the profits from these firms, rather than the ability to borrow from them.

Table 1
Summary Statistics.
This table reports summary statistics. Panel A describes the main variables. Panel B further presents the summary statistics of firms that hold shares in financial institutions. Panel C reports the industry distribution of FIS. Variable definitions are provided in Appendix A.

Panel A Summary statistics of the main variables

Variable	Observations	Mean	S.D.	25th	Median	75th
$Grant_{t+1}$	14,921	12.747	37.496	0.000	0.000	8.000
$Citation_{t+1}$	14,921	4.991	15.181	0.000	0.000	3.000
$Grant_{t+2}$	14,886	13.260	38.589	0.000	0.000	8.000
$Citation_{t+2}$	14,886	5.860	16.552	0.000	0.000	4.000
FIS_amount	14,921	0.005	0.015	0.000	0.000	0.000
HHI	14,921	0.175	0.124	0.074	0.147	0.248
Block_ownership	14,921	36.650	15.497	24.038	35.145	48.136
SOE	14,921	0.484	0.500	0.000	0.000	1.000
Cash	14,921	0.044	0.079	0.002	0.044	0.091
Size	14,921	21.856	1.268	20.970	21.700	22.572
ROE	14,921	0.062	0.151	0.030	0.072	0.120
Lev	14,921	0.476	0.206	0.320	0.486	0.634
Dual	14,921	0.810	0.392	1.000	1.000	1.000
Independent_director	14,921	0.366	0.053	0.333	0.333	0.385
BM	14,921	0.989	0.895	0.417	0.699	1.231
Compensation	14,921	0.140	0.144	0.047	0.097	0.184
ManagerOwn	14,921	0.047	0.131	0.000	0.000	0.000
InstOwn	14,921	0.065	0.084	0.006	0.030	0.093

Panel B Summary statistics of firms holding shares in financial institutions

	Obs (%)	Average *FIS_amount* (%)
Investing in one financial institution	18.38	1.56
Investing in two financial institutions	4.64	2.41
Investing in three financial institutions	1.18	3.17
Investing in four financial institutions	0.36	4.13
Investing in five or more financial institutions	0.34	4.50

Panel C Industry distribution of FIS

Industry	Average *FIS_amount* (%)
Agriculture	3.12
Mining	1.33
Manufacturing	1.69
Energy Supply	2.07
Construction	1.12
Wholesale and Retail	2.47
Transportation	1.78
Accommodation & Catering	2.01
Information Technology	2.56
Real Estate	2.01
Leasing & Business Services	2.19
Scientific Research & Technique Services	0.05
Public Facilities	1.85
Education	0.74
Social Service	2.66
Sports & Entertainment	2.38
Conglomerates	3.12

financial institutions brings considerable profits to a firm, so why do the majority of such firms invest in only one financial institution? The reason is that firms, especially non-SOEs, face invisible barriers to investing at scale in financial companies. Bai, Lu, and Tao (2009) verify this view by reporting that, during a large wave of privatization in China, none of the firms in the finance industry was privatized. Thus, firms will invest in financial institutions but only when they have the opportunity.[7] In Panel C, we report the industry distribution of FIS: firms in the agriculture and conglomerates industries have the largest shareholdings in financial institutions, while those in scientific research & technique services have the lowest stakes in FIS.

4.2. Main results

We start by examining the impact of FIS on corporate innovation. On the basis that research and development may take years to manifest in patent form, we examine the dependent variables in year t+1 and t+2. In Columns (1) and (3) of Table 2, we estimate the

[7] Find more details at http://finance.sina.com.cn/money/bank/bank_hydt/20150523/110422250464.shtml (in Chinese).

impact of FIS on corporate innovation in the subsequent year (t+1). The coefficient estimates on *FIS_amount* are negative and significant for patents granted (Grant) and patents cited (*Citation*). In Columns (2) and (4), we examine the dependent variable in year t+2. The coefficient estimates on *FIS_amount* continue to be negative and economically significant for both Grant and *Citation*. The findings suggest that FIS is negatively associated with both the quantity and quality of corporate innovation, suggesting that obtaining a monopolistic revenue source in the form of FIS significantly impedes corporate innovation.

4.3. Underlying channels

The Hypothesis developed in Section 2.2 predicts that FIS reduces the need to innovate and encourages CEOs to enjoy a quiet life by avoiding costly effort and risky decisions. Thus, the underlying channel through which FIS affects innovation can be regarded as managerial agency conflict. In this section, we exploit a mediation model to verify this assumption.

We follow Ang, Cole, and Lin (2000) and use asset-utilization ratios to measure how effectively CEOs deploy firms' assets to generate revenues. A low asset-utilization ratio indicates that a CEO is making insufficient effort to utilize their firm's assets. Thus, asset-utilization ratio could represent CEO's costly effort to create values for shareholders. *Utilization* is the ratio of annual sales to total assets. Table 3 shows empirical results for the mediation model. In Column (1), we investigate the impact of FIS on managerial agency cost. The coefficient on *FIS_amount* is significantly negative, indicating that increased FIS results in higher agency cost. In Columns (2) and (4), we further test whether an increase in managerial agency conflict is an underlying channel through which FIS impedes corporate innovation in year t+1. The coefficients on *Utilization* are significantly positive, suggesting that managerial agency conflict is a plausible channel for the association between FIS and corporate innovation. In Columns (3) and (5), we find a similar pattern when we examine the dependent variable in year t+2. Therefore, the results of the mediation model verify that exacerbation of managerial agency conflict is an underlying channel for this association.

Table 2
Baseline Results.
This table estimates the relation between FIS and corporate innovation through ordinary least squares regressions. *Grant* is the natural logarithm of one plus the firm's total number of filed patent applications that are eventually granted. *Citation* is the natural logarithm of one plus the total number of non-self citations of the firm's filed patent applications that are eventually granted. *FIS_amount* is the value of the firm's financial institution ownership divided by the book value of total assets. All variables are defined in Appendix A. Robust standard errors, clustered at the firm level, are reported in parentheses. Continuous variables are winsorized at the 1st and 99th percentiles. Coefficients marked with *, **, and *** are significant at 10%, 5%, and 1% levels, respectively.

	$Grant_{t+1}$	$Grant_{t+2}$	$Citation_{t+1}$	$Citation_{t+2}$
	(1)	(2)	(3)	(4)
FIS_amount	−3.037***	−2.906***	−2.891***	−2.980***
	(0.913)	(0.950)	(0.765)	(0.837)
HHI	−1.267**	−0.929	−0.605	−0.536
	(0.626)	(0.638)	(0.511)	(0.554)
Block_ownership	1.099**	0.880*	0.308	0.294
	(0.500)	(0.508)	(0.413)	(0.446)
SOE	0.002	0.010	0.055	0.062
	(0.044)	(0.044)	(0.039)	(0.042)
Cash	0.533***	0.608***	0.388***	0.390***
	(0.166)	(0.170)	(0.135)	(0.143)
Size	0.376***	0.375***	0.280***	0.313***
	(0.034)	(0.034)	(0.028)	(0.029)
ROE	0.128	0.166**	−0.043	−0.046
	(0.079)	(0.080)	(0.064)	(0.068)
Lev	−0.524***	−0.573***	−0.230**	−0.260***
	(0.111)	(0.111)	(0.092)	(0.100)
Dual	−0.113**	−0.106**	−0.141***	−0.155***
	(0.048)	(0.048)	(0.042)	(0.045)
Independent_director	−0.046	−0.121	−0.346	−0.380
	(0.372)	(0.373)	(0.321)	(0.345)
BM	−0.095***	−0.078**	−0.104***	−0.117***
	(0.033)	(0.034)	(0.028)	(0.029)
Compensation	0.758***	0.768***	0.530***	0.656***
	(0.158)	(0.160)	(0.139)	(0.151)
ManagerOwn	0.517***	0.481***	0.173	0.272*
	(0.150)	(0.150)	(0.138)	(0.147)
InstOwn	1.099***	1.265***	0.727***	0.812***
	(0.255)	(0.262)	(0.201)	(0.216)
Year, Industry, and Province FE	YES	YES	YES	YES
Adj R^2	0.401	0.398	0.337	0.345
Observations	14,921	14,886	14,921	14,886

Table 3
Underlying Channel Test.
This table presents the results of underlying channel tests. *Utilization* is the ratio of annual sales to total assets. Robust standard errors, clustered at the firm level, are reported in parentheses. Continuous variables are winsorized at the 1st and 99th percentiles. Coefficients marked with *, **, and *** are significant at 10%, 5%, and 1% levels, respectively.

	Utilization	$Grant_{t+1}$	$Grant_{t+2}$	$Citation_{t+1}$	$Citation_{t+2}$
	(1)	(2)	(3)	(4)	(5)
FIS_amount	−1.130**	−2.872***	−2.749***	−2.840***	−2.918***
	(0.477)	(0.918)	(0.955)	(0.772)	(0.844)
Utilization		0.146***	0.137**	0.077*	0.085*
		(0.053)	(0.055)	(0.042)	(0.046)
Control variables	YES	YES	YES	YES	YES
Year, Industry, and Province FE	YES	YES	YES	YES	YES
Adj R^2	0.356	0.402	0.399	0.337	0.345
Observations	14,917	14,917	14,883	14,917	14,883

4.4. Cross-sectional tests

Prior literature finds that short-sighted managers reduce R&D investment when facing pressure from the capital market (Bushee, 1998). Therefore, we predict that the detrimental impact of FIS on innovation is intensified by such managerial myopia.

4.4.1. CEO decision horizon

Our first cross-sectional test is based on a CEO's decision horizon. Antia, Pantzalis, and Park (2010) suggest that a CEO's decision horizon represents their optimal intertemporal choice between short-term and long-term results. They find that CEOs with a shorter decision horizon are more myopic than those with a longer one. Therefore, when CEOs have a shorter decision horizon, FIS should bring about a larger decrease in corporate innovation. To examine this prediction, we follow Antia et al. (2010) and calculate a CEO's decision horizon as:

$$Decision\_horizon_{i,t} = \left[Tenure_{ind,t} - Tenure_{i,t}\right] + \left[Age_{ind,t} - Age_{i,t}\right] \quad (1)$$

where $Tenure_{i,t}$ is the tenure of the CEO and $Age_{i,t}$ their age in year t. $Tenure_{ind,t}$ and $Age_{ind,t}$ are the industry medians of $Tenure_{i,t}$ and $Age_{i,t}$. We create the interaction term by multiplying *FIS_amount* by *Decision_horizon*, where the latter is an indicator variable that equals one if the CEO's decision horizon is shorter than that of the sample average, and zero otherwise.

Panel A of Table 4 presents the results of the estimation. In Columns (1) and (3), the coefficients on the interaction term *FIS_amount*Decision_horizon* are negative and significant for both Grant and *Citation*. In Columns (2) and (4), we provide further results for Grant and *Citation* measured for year t+2. The coefficients on *FIS_amount*Decision_horizon* continue to be negative and significant in both cases. The findings suggest that the negative impact of FIS on innovation is stronger among CEOs who are more myopic.

4.4.2. Analyst coverage

We next focus on analyst coverage. Because an analyst's job is to make near-term earnings forecasts, they tend to focus on short-term rather than long-term performance. As documented in He and Tian (2013), greater analyst coverage decreases a firm's tolerance for short-term failure and increases managerial myopia. Thus, FIS should cause a larger decrease in corporate innovation in firms that receive more analyst coverage.

To test our Hypothesis, we create an indicator variable, *Analyst*, that equals one if a firm's analyst coverage is above that of the sample average, and zero otherwise. We create an interaction term by multiplying *FIS_amount* by *Analyst*. Panel B of Table 4 shows the regression results. In Columns (1) and (3), the coefficients on the interaction term *FIS_amount*Analyst* are negative and significant for both Grant and *Citation*. In Columns (2) and (4), we provide further results for the dependent variables Grant and *Citation* for year t+2: the coefficients on *FIS_amount*Analyst* continue to be negative and significant for Grant and *Citation*. Our findings support the notion that the impact of FIS on corporate innovation is more pronounced when managers face more short-term pressure thanks to analyst coverage.

4.4.3. Stock liquidity

Finally, as another proxy for short-term pressure, we examine stock liquidity. Fang, Tian, and Tice (2014) find that greater stock liquidity attracts more transient institutional investors, who do not actively gather information. Such investors pursue short-term performance and invest more heavily in those firms with better expected near-term earnings. Firms with more transient institutional investors are, therefore, less likely to tolerate short-term failure, which could again exacerbate managerial myopia. Thus, FIS should be associated with a larger decrease in corporate innovation in firms with greater stock liquidity.

To test this prediction, we create the indicator variable *Liquidity*, which equals one if a firm's stock illiquidity is less than that of the sample average, and zero otherwise. Our calculation of stock illiquidity follows Amihud (2002). Panel C of Table 4 presents the empirical results. In Columns (1) and (3), the coefficients on the interaction term *FIS_amount*Liquidity* are negative and both economically and statistically significant for Grant and *Citation*. In Columns (2) and (4), we replace the dependent variables, Grant and

Table 4
Cross-sectional Tests Based on CEO Myopia.
This table examines the effect of FIS on corporate innovation among firms that have CEOs that are more or less myopic, measured by three variables. First, we follow Antia et al. (2010) to calculate a CEO's decision horizon. Thus, *Decision_horizon* is an indicator variable that equals 1 if the CEO's decision horizon is shorter than that of the sample average, and 0 otherwise. Second, we focus on analyst coverage: *Analyst* is an indicator variable that equals 1 if the firm's analyst coverage is above the sample average, and 0 otherwise. Finally, we use stock liquidity, with *Liquidity* being an indicator variable that equals 1 if the firm's stock illiquidity is less than the sample average, and 0 otherwise, consistent with Amihud (2002). Robust standard errors, clustered at the firm level, are reported in parentheses. Continuous variables are winsorized at the 1st and 99th percentiles. Coefficients marked with *, **, and *** are significant at 10%, 5%, and 1% levels, respectively.

Panel A Cross-sectional test based on CEO's decision horizon				
	$Grant_{t+1}$	$Grant_{t+2}$	$Citation_{t+1}$	$Citation_{t+2}$
	(1)	(2)	(3)	(4)
FIS_amount	−0.784	−1.091	−2.053**	−2.150**
	(1.146)	(1.179)	(0.978)	(1.064)
Decision_horizon	0.012	−0.007	0.008	−0.004
	(0.034)	(0.035)	(0.028)	(0.030)
*FIS_amount*Decision_horizon*	−4.827***	−4.430***	−2.050*	−2.249*
	(1.505)	(1.511)	(1.155)	(1.268)
Control variables	YES	YES	YES	YES
Year, Industry, and Province FE	YES	YES	YES	YES
Adj R^2	0.405	0.406	0.328	0.344
Observations	12,414	12,414	12,414	12,414
Panel B Cross-sectional test based on analyst coverage				
	$Grant_{t+1}$	$Grant_{t+2}$	$Citation_{t+1}$	$Citation_{t+2}$
	(1)	(2)	(3)	(4)
FIS_amount	−1.848**	−1.309	−1.503*	−1.498*
	(0.898)	(0.920)	(0.819)	(0.891)
Analyst	0.239***	0.263***	0.149***	0.173***
	(0.037)	(0.039)	(0.033)	(0.034)
*FIS_amount*Analyst*	−3.510*	−5.026**	−4.813***	−5.047***
	(1.984)	(1.986)	(1.428)	(1.492)
Control variables	YES	YES	YES	YES
Year, Industry, and Province FE	YES	YES	YES	YES
Adj R^2	0.404	0.402	0.339	0.348
Observations	14,921	14,886	14,921	14,886
Panel C Cross-sectional test based on stock liquidity				
	$Grant_{t+1}$	$Grant_{t+2}$	$Citation_{t+1}$	$Citation_{t+2}$
	(1)	(2)	(3)	(4)
FIS_amount	−1.063	−1.002	1.011	1.237
	(1.172)	(1.185)	(1.123)	(1.198)
Liquidity	0.035	0.032	0.052*	0.070**
	(0.034)	(0.035)	(0.029)	(0.031)
*FIS_amount*Liquidity*	−2.583*	−2.492*	−5.088***	−5.518***
	(1.342)	(1.342)	(1.129)	(1.216)
Control variables	YES	YES	YES	YES
Year, Industry, and Province FE	YES	YES	YES	YES
Adj R^2	0.401	0.398	0.337	0.346
Observations	14,921	14,886	14,921	14,886

Citation, with those for year $t+2$: the coefficients on *FIS_amount*Liquidity* continue to be negative and significant for both of them. Thus, as anticipated, our results indicate that the impact of FIS on corporate innovation is more pronounced in firms with greater stock liquidity.

4.5. Robustness checks for endogeneity concerns

4.5.1. Difference-in-differences analysis

Our baseline results may be driven by reverse causality and/or omitted variables. For example, less innovative firms deriving lower profits from their core business may be more likely to search for other sources of profit. Alternatively, firms that are able to invest in financial intermediaries may be intrinsically different from others. To alleviate such concerns and establish causality, we use a difference-in-differences model specification centered on a unique policy shock in 2012, when the China Banking Regulatory Commission (CBRC), China Securities Regulatory Commission (CSRC), and China Insurance Regulatory Commission (CIRC) issued three policies to deregulate the financial sector and encourage non-SOEs to invest in or even control financial firms.[8]

Before the enactment of these policies, the government gave more welcome to SOEs when it came to holding shares in financial institutions, with non-SOEs subject to invisible barriers if they wanted to invest at scale in financial companies.[9] Investment by SOEs, as opposed to non-SOEs, in profitable businesses brings more resources to government and enhances economic growth, not to mention the promotion chances of government officials (Li & Zhou, 2005). However, in April 2012, central government removed these barriers and allowed non-SOEs to engage more equally in FIS.

Of course, this policy change did not force firms to increase their FIS. However, as we have illustrated above (Section 2.1), investing in financial firms can deliver sizable profits, and non-SOEs are likely to do so whenever they have the opportunity. Thus, we exploit this policy shock as an exogenous increase to the FIS of non-SOEs, and assign non-SOEs and SOEs, respectively, into treatment and control groups.[10]

First of all, we check the validity of our experiment. If these policies are exogenous shocks to the ability of non-SOEs to invest in financial intermediaries, we should observe a significant increase in their FIS compared to that of SOEs following the enactment of these policies. To this end, we estimate the following equation:

$$FIS\_amount = a + bTreat + cPost + dTreat{*}Post + eControls + error \tag{2}$$

where *Treat* is an indicator that equals one for the treatment group, and zero otherwise, and *Post* is an indicator that equals one for the years after 2012, and zero otherwise.

Panel A of Table 5 presents the results of the estimation of the impact of this policy shock on FIS in years t+1 and t+2. The coefficients on *Treat*Post* are positive and significant, suggesting that non-SOEs experienced a greater increase in FIS than SOEs following the shock. More specifically, compared to their average FIS beforehand, the FIS of non-SOEs increased by 98% (0.0043/0.0044) in year t+1 and by 111% (0.0049/0.0044) in year t+2. We therefore conclude that our treatment, in the form of this policy shock, has indeed facilitated non-SOE investment in FIS.

Next, we estimate the impact of quasi-exogenous increases in FIS on corporate innovation using the same difference-in-differences regression:

$$Grant\ (\text{or } Citation) = a + bTreat + cPost + dTreat * Post + eControls + error \tag{3}$$

where *Grant* is the natural logarithm of one plus the firm's total number of filed patent applications that are eventually granted, and *Citation* is the natural logarithm of one plus the total number of non-self citations of the firm's filed patent applications that are eventually granted. Panel B of Table 5 reports the results of estimating Equation (3). The coefficients on *Treat*Post* are negative and significant for all columns, suggesting that an exogenous increase in FIS leads to a significant decrease in both quantity and quality of innovation by non-SOEs after the shock. In terms of economic significance, the coefficient estimates translate into a 28.0% decrease in patent numbers and an 11.2% decrease in total non-self citations at year t+1, and even larger decreases at year t+2. The results indicate that investment in financial institutions by non-SOEs has a negative causal effect on their innovation; the finding is consistent with our baseline results and lends further credence to the managerial agency effect of FIS.

Further, we test whether our policy experiment satisfies the parallel-trend assumption; that is, in the absence of the shock, the average change in the innovation of non-SOEs and SOEs would have evolved in the same trend. We follow Fang et al. (2014) and decompose the *Post* indicator into years relative to the experiment:

[8] In May 2012, CBRC issued a policy entitled "The Arrangements on the Implementation of Encouraging and Guiding Private Capital into the Banking Industry", and CSRC issued a similar policy. In June 2012, CIRC issued a policy entitled "The Arrangements on Encouraging and Supporting the Development of Private Investment". These policies deregulated the financial sector for their respective fields; more details can be found at the following websites:http://www.cbrc.gov.cn/chinese/home/docDOC_ReadView/35AF2AE678A0439BA5E296C3137A5652.html;http://bxjg.circ.gov.cn/web/site0/tab5216/info206066.htm;http://www.gov.cn/zhengce/2016-05/24/content_5076232.htm.

[9] Bai et al. (2009) verify this view by reporting that none of firms in the finance industry was privatized during a large wave of privatization in China.

[10] In China, many policies or reforms may affect only SOEs or only non-SOEs. For example, Tan et al. (2020) use the split-share structure reform to examine the impact of privatization prospects on corporate innovation; in their study, SOEs represent the treatment group and non-SOEs the control group.

Table 5
Robustness Check: Difference-in-differences Analysis.
This table reports the results of difference-in-differences (DID) analysis. Panel A validates our policy experiment of 2012 by
examining whether the FIS of non-SOEs increases more than that of SOEs after policy enactment, for the sample period 2010–2014. Panel B estimates the relation between FIS and corporate innovation through a DID analysis around the policy experiment. Panel C reports the results of parallel-trend tests for the DID analysis. We follow Fang et al. (2014) to construct our regression framework. Panel D presents the results of a DID analysis of propensity-score-matched samples. The sample period for Panels B, C and D covers 2006 through 2017. Robust standard errors, clustered at the firm level, are reported in parentheses. Continuous variables are winsorized at the 1st and 99th percentiles. Coefficients marked with *, **, and *** are significant at 10%, 5%, and 1% levels, respectively.

Panel A Validating policy experiment (2010–2014)

	FIS_{t+1}	FIS_{t+2}
	(1)	(2)
Treat	−0.00396***	−0.00484***
	(0.001)	(0.001)
Post	0.00039	−0.00037
	(0.000)	(0.000)
*Treat*Post*	0.00423***	0.00465***
	(0.001)	(0.001)
Control variables	YES	YES
Year, Industry, and Province FE	YES	YES
Adj R^2	0.065	0.069
Observations	8529	8421

Panel B Difference-in-differences analysis (2006–2017)

	$Grant_{t+1}$	$Grant_{t+2}$	$Citation_{t+1}$	$Citation_{t+2}$
	(1)	(2)	(3)	(4)
Treat	0.156***	0.159***	0.006	0.031
	(0.053)	(0.056)	(0.042)	(0.047)
Post	−1.207***	−1.320***	−0.570***	−0.634***
	(0.059)	(0.063)	(0.044)	(0.047)
*Treat*Post*	−0.280***	−0.294***	−0.112***	−0.146***
	(0.047)	(0.048)	(0.034)	(0.035)
Control variables	YES	YES	YES	YES
Year, Industry, and Province FE	YES	YES	YES	YES
Adj R^2	0.391	0.392	0.337	0.346
Observations	20,278	17,719	20,278	17,719

Panel C Verifying parallel-trend assumption (2006–2017)

	$Grant_t$	$Citation_t$
	(1)	(2)
$Treat*Post^{-2}$	0.019	−0.032
	(0.067)	(0.042)
$Treat*Post^{-1}$	−0.110	−0.017
	(0.085)	(0.063)
$Treat*Post^{0}$	−0.214**	−0.058
	(0.086)	(0.063)
$Treat*Post^{1}$	−0.220**	−0.049
	(0.088)	(0.067)
$Treat*Post^{2+}$	−0.256***	−0.117*
	(0.083)	(0.063)
Treat	0.136*	0.000
	(0.077)	(0.053)
$Post^{-2}$	0.113***	0.163***
	(0.043)	(0.032)
$Post^{-1}$	0.293***	0.323***
	(0.046)	(0.035)
$Post^{0}$	0.367***	0.470***
	(0.049)	(0.039)
$Post^{1}$	0.379***	0.583***
	(0.053)	(0.042)
$Post^{2+}$	−0.125**	0.029
	(0.060)	(0.048)
Control variables	YES	YES
Year, Industry, and Province FE	YES	YES

(*continued on next page*)

Table 5 (*continued*)

Panel C Verifying parallel-trend assumption (2006–2017)		
	$Grant_t$	$Citation_t$
	(1)	(2)
Adj R^2	0.384	0.321
Observations	20,278	20,278

Panel D Results of PSM-DID (2006–2017)				
	$Grant_{t+1}$	$Grant_{t+2}$	$Citation_{t+1}$	$Citation_{t+2}$
	(1)	(2)	(3)	(4)
Treat	0.184	0.164	0.091	0.083
	(0.129)	(0.141)	(0.095)	(0.106)
Post	−1.552***	−1.639***	−0.821***	−0.930***
	(0.180)	(0.190)	(0.120)	(0.140)
*Treat*Post*	−0.346***	−0.341***	−0.154*	−0.169**
	(0.104)	(0.109)	(0.086)	(0.083)
Control variables	YES	YES	YES	YES
Year, Industry, and Province FE	YES	YES	YES	YES
Adj R^2	0.483	0.478	0.469	0.470
Observations	2428	2212	2428	2212

$$Grant_t \text{ (or } Citation_t) = a + bTreat * Post^{-2} + cTreat * Post^{-1} + dTreat * Post^{0} + eTreat * Post^{1+} + fTreat * Post^{2+} + gTreat + hPost^{-2} + iPost^{-1} + jPost^{0} + kPost^{1+} + lPost^{2+} + mControls + error \quad (5)$$

where $Grant_t$ (or $Citation_t$) denotes the natural logarithm of one plus the firm's total number of patent applications (or non-self citations of patent applications) filed in year t that are eventually granted, and $Post^{-2}$, $Post^{-1}$, $Post^{0}$, $Post^{1+}$, and $Post^{2+}$ are indicators equaling one if an observation is from the years 2007–2010, 2011, 2012, 2013, and 2014–2017, respectively, and zero otherwise.

The results in Panel C of Table 5 show that the coefficients on $Treat*Post^{-2}$ and $Treat*Post^{-1}$ are insignificant, while those on $Treat*Post^{1+}$ and $Treat*Post^{2+}$ are negative and generally significant, suggesting that there did not exist a trend of decline in corporate innovation before the enactment of the policy experiment; the negative impact of FIS on innovation becomes significant only after the experiment. This provides evidence that the relationship between FIS and innovation does not suffer from reverse causality and verifies that the parallel-trend assumption is valid.[11]

One remaining concern is that our linear control variables may fail to control for non-linear distinctions between non-SOE and SOE firms. To alleviate this concern, we create a propensity-score-matched sample in which we match non-SOEs with similar SOEs (Tan et al., 2020). To do this, we first regress *Treat* on the set of control variables used above in a logit model.[12] Second, we estimate the propensity score for each observation. Finally, we match each treatment firm with a control firm based on the closest propensity score. Treatment observations that off common support are dropped, which leads to a reduction of observations in the sample.

The diagnostic test is shown in Appendix B: Columns (1) and (2) present sample averages for firm characteristics of, respectively, non-SOEs and SOEs; Columns (3) and (4) present the values and significance levels of *t*-tests of the differences between these sets of firm characteristics. The values of all the *t*-statistics are relatively small and the corresponding *p*-values are greater than 0.1, suggesting that the non-SOEs and SOEs have similar characteristics, and confirming the validity of the matching process.

Panel D of Table 5 reports estimation results based on the propensity-score-matched sample. The coefficient estimates on *Treat*Post* remain negative and significant, suggesting that policies that encourage non-SOEs to invest in financial institutions have a negative causal effect on these firms' innovation. Overall, our difference-in-differences estimation results are robust when we control for non-linear distinctions between non-SOEs and SOEs.

Finally, we conduct placebo tests as an additional robustness check on our identification. If the results from the difference-in-differences estimation are, indeed, driven by exogenous policy shock that encourages non-SOEs to invest in FIS, we should not observe a decrease in innovation if we consider a placebo sample. Empirically, we conduct simulations that randomly assign SOE or non-SOE status to our sample firms. In our difference-in-differences regression, we have 1642 non-SOE and 1078 SOE firms.[13] Therefore, in each simulation, we randomly select 1642 firms from our sample as "non-SOEs" and treat the remaining 1078 firms as "SOEs". We repeat our difference-in-differences regression using Equation (2) on the simulated sample 1000 times and generate the

[11] If there were other confounding events during our policy experiment, our parallel-trend test would pick up the effect in the pre-period. We also note that any other events that may have affected the relation between FIS and innovation prior to the policy shock would only bias *against* finding results in our setting.

[12] The control variables include *HHI*, the square of *HHI* (HHI^2), *Size*, *ROE*, *Lev*, *Dual*, *Independent_director*, *BM*, *TaxReturn*, *PatentGrowth*, year dummy, industry dummy, and provincial dummy.

[13] Our difference-in-differences analysis covers a sample period from years 2006–2017. Thus, the number of firms is greater than that in our baseline regression, which ends in 2014.

cumulative distribution function of the estimated coefficients on *Treat*Post*. Appendix C shows that the patterns of *Treat*Post* coefficient distribution for the dependent variables Grant and *Citation* are centered around zero, and that our baseline estimations from Columns (1) and (3) of Panel B of Table 5 (red lines in Appendix C) lie toward the edge of our random simulation, far away from zero, suggesting that our experiment captures a causal effect of policy shock.

4.5.2. Potential omitted variables

First, when considering possible omissions, firms with more FIS may also invest more in financial assets, which can be negatively associated with corporate innovation. In order to control for this potential bias, we include a new variable in the baseline regression for a firm's ratio of total financial assets to total assets, denoted as *Financial_assets*. The financial assets include trading assets, derivatives, available-for-sale assets, and held-to-maturity investments. We present the results in Panel A of Table 6. The coefficients on *FIS_amount* continue to be negative and significant, suggesting that the proportion of financial assets is unlikely to affect our baseline estimation.

Table 6

Robustness Checks for Omitted Variables.

This table shows the empirical results of several robustness checks to alleviate concerns around omitted variables. In Panel A, we control for a firm's relative investment in financial assets. In Panel B, we control for the level of local financial competition and, in Panel C, we also control for R&D expenditure. In Panel D, we incorporate industry-by-year and province-by-year fixed effects into our baseline regression. Robust standard errors, clustered at the firm level, are reported in parentheses. Continuous variables are winsorized at the 1st and 99th percentiles. Coefficients marked with *, **, and *** are significant at 10%, 5%, and 1% levels, respectively.

Panel A Controlling for firm's investment in financial assets

	$Grant_{t+1}$	$Grant_{t+2}$	$Citation_{t+1}$	$Citation_{t+2}$
	(1)	(2)	(3)	(4)
FIS_amount	−2.685***	−2.609***	−2.637***	−2.743***
	(0.908)	(0.945)	(0.764)	(0.834)
Financial_assets	−1.216***	−1.014**	−0.878***	−0.806***
	(0.386)	(0.401)	(0.268)	(0.298)
Control variables	YES	YES	YES	YES
Year, Industry, and Province FE	YES	YES	YES	YES
Adj R^2	0.402	0.398	0.337	0.345
Observations	14,921	14,886	14,921	14,886

Panel B Controlling for level of local financial competition

	$Grant_{t+1}$	$Grant_{t+2}$	$Citation_{t+1}$	$Citation_{t+2}$
	(1)	(2)	(3)	(4)
FIS_amount	−3.048***	−2.908***	−2.921***	−3.007***
	(0.913)	(0.950)	(0.765)	(0.838)
FC	−0.046	−0.011	−0.124***	−0.117***
	(0.036)	(0.037)	(0.032)	(0.032)
Control variables	YES	YES	YES	YES
Year, Industry, and Province FE	YES	YES	YES	YES
Adj R^2	0.401	0.398	0.337	0.345
Observations	14,921	14,886	14,921	14,886

Panel C Controlling for R&D expenditure

	$Grant_{t+1}$	$Grant_{t+2}$	$Citation_{t+1}$	$Citation_{t+2}$
	(1)	(2)	(3)	(4)
FIS_amount	−2.721***	−2.632***	−2.528***	−2.619***
	(0.896)	(0.930)	(0.746)	(0.817)
R&D	0.182***	0.158***	0.210***	0.208***
	(0.015)	(0.015)	(0.015)	(0.016)
Control variables	YES	YES	YES	YES
Year, Industry, and Province FE	YES	YES	YES	YES
Adj R^2	0.419	0.411	0.376	0.380
Observations	14,921	14,886	14,921	14,886

Panel D Higher-level fixed effects

	$Grant_{t+1}$	$Grant_{t+2}$	$Citation_{t+1}$	$Citation_{t+2}$
	(1)	(2)	(3)	(4)
FIS_amount	−3.189***	−3.099***	−3.078***	−3.187***
	(0.952)	(0.995)	(0.788)	(0.866)
Control variables	YES	YES	YES	YES
Year FE, Year FE*Industry FE, Year FE*Region FE	YES	YES	YES	YES
Adj R^2	0.389	0.385	0.343	0.343
Observations	14,921	14,886	14,921	14,886

Second, our results may be affected by the level of local financial competition. Firms located in provinces with higher levels of such competition have more opportunities to invest in financial institutions and, thereby, more FIS. Cornaggia, Mao, Tian, and Wolfe (2015) find that banking competition reduces corporate innovation. Therefore, local financial competition levels may affect FIS and corporate innovation concurrently, and so we also control for the level of financial competition, with data collected from the research report "Marketization Index of China's Provinces: NERI Report 2018". We denote the resulting variable as *FC* and present the results of the regression in Panel B of Table 6. The coefficients on *FIS_amount* are significantly negative, indicating that the level of local financial competition is unlikely to be affecting our primary results.

Third, R&D expenditure is an important factor in a firm's granted patents and their subsequent citation. Following Yang, Chou, and Zhao (2020), we use the ratio of R&D expenditure to total assets to measure this factor, denoting the resulting variable as *R&D*. We present the results in Panel C of Table 6. The coefficients on *FIS_amount* remain significantly negative, suggesting that R&D expenditure is unlikely to influence the results of our baseline regressions.

Finally, our results could be explained by omitted time-variant characteristics across the industry and/or the province. For example, industrial investment opportunity is one such potential time-variant omitted variable; specifically, a firm in an industry with fewer investment opportunities is more likely to search for other profit sources and invest less in innovation. To control for these time-variant omitted variables, we incorporate industry-by-year and province-by-year fixed effects into our main regression. Panel D of Table 6 presents the results. The coefficient estimates remain significant, suggesting that our results are not driven by omitted time-

Table 7
Other Robustness Checks.
This table reports the empirical results of several robustness checks. In Panel A, we conduct a robustness check with alternative measures of innovation and FIS. In Columns (1) and (2), following He and Tian (2013), we use the natural logarithm of the number of non-self citations per patent. In Columns (3) to (6), we conduct robustness checks with alternative measures of FIS. We create FIS_num, which is the number of financial institutions in which firms hold ownership. In Panel B, we follow Chu et al. (2019) to exclude non-innovative firms that secure zero patents during our sample period. In Panel C, we rule out the alternative explanation that firms are not patenting their innovations to keep them secure from competitors, as opposed to our "quiet life" Hypothesis; in Columns (1) and (2), we define the variable R&D as the ratio of R&D expenditure to book assets. Robust standard errors, clustered at the firm level, are reported in parentheses. Continuous variables are winsorized at the 1st and 99th percentiles. Coefficients marked with *, **, and *** are significant at 10%, 5%, and 1% levels, respectively.

Panel A Alternative measures of innovation and FIS

	$Cite\_aver_{t+1}$	$Cite\_aver_{t+2}$	$Grant_{t+1}$	$Grant_{t+2}$	$Citation_{t+1}$	$Citation_{t+2}$
	(1)	(2)	(3)	(4)	(5)	(6)
FIS_amount	−0.718**	−0.783***				
	(0.279)	(0.291)				
FIS_num			−0.073**	−0.069**	−0.079***	−0.083***
			(0.029)	(0.030)	(0.024)	(0.026)
Control variables	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Province FE	YES	YES	YES	YES	YES	YES
Adj R^2	0.178	0.176	0.401	0.398	0.337	0.346
Observations	14,921	14,886	14,921	14,886	14,921	14,886

Panel B Exclude non-innovative firms

	$Grant_{t+1}$	$Grant_{t+2}$	$Citation_{t+1}$	$Citation_{t+2}$
	(1)	(2)	(3)	(4)
FIS_amount	−4.102**	−3.641**	−5.112***	−5.066***
	(1.723)	(1.791)	(1.510)	(1.643)
Control variables	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Province FE	YES	YES	YES	YES
Adj R^2	0.317	0.317	0.322	0.311
Observations	9918	9903	9918	9903

Panel C Rule out alternative explanation

	$R\&D_{t+1}$	$R\&D_{t+2}$
	(1)	(2)
FIS_amount	−2.328**	−2.832***
	(0.960)	(1.033)
Control variables	YES	YES
Year FE	YES	YES
Industry FE	YES	YES
Province FE	YES	YES
Adj R^2	0.403	0.414
Observations	14,921	14,885

variant characteristics.

4.6. Other robustness checks

4.6.1. Alternative measures of innovation and financial institution shareholding

We also examine whether our baseline results are robust to alternative measures of corporate innovation and FIS. Following He and Tian (2013), instead of total non-self citations, we use the number of non-self citations per *patent* (variable *Cite_aver*) as an alternative measure of the quality of corporate innovation. The results in Panel A of Table 7 show that the coefficients on *FIS_amount* are always negative and significant, suggesting as before that ownership of financial institutions is negatively associated with corporate innovation.

As an alternative measure of FIS, we use *FIS_num*, the number of financial institutions in which a firm holds shares. Panel A of Table 7 shows that *FIS_num* is negatively and significantly associated with innovation. Overall, the results for these alternative measures suggest that our baseline results are robust in relation to measures of innovation and FIS.

4.6.2. Excluding non-innovative firms

According to our summary statistics (see Table 1), over half of our firms do not grant any patents during our sample period. Thus, our dependent variables, Grant and *Citation*, are zero-inflated and may bias our empirical result. We therefore follow Chu et al. (2019) and exclude such "non-innovative" firms from our regressions. Panel B of Table 7 presents the results. Columns (1) and (3) show, respectively, the results for the dependent variables Grant and *Citation* at year $t+1$. The coefficient estimates on *FIS_amount* continue to be negative and significant. We also examine these dependent variables at year $t+2$, in Columns (2) and (4), and the coefficient estimates on *FIS_amount* remain negative and significant. Overall, the outcomes suggest that our primary results are robust.

4.6.3. Ruling out alternative explanations

Another possible explanation for the negative association between FIS and corporate innovation is the "business secrecy" Hypothesis. It is a commonly held belief that patents are widely adopted as a means by which a firm can appropriate returns from its innovation. In fact, however, patents may not protect a firm's most valuable inventions because the firm must disclose technological information associated with them in order to be granted a patent and secure property rights from the government. Such information disclosure increases the possibility that competitors are made aware of novel knowledge, and firms may decline to patent their inventions, keeping them secret. According to Hall, Helmers, Rogers, and Sena (2014), 45.3% of innovative UK firms treat trade secrets as a highly important way to protect their inventions. Similarly, 67% of R&D-conducting US firms rank trade secrets as the most important means by which to protect their intellectual property. Nevertheless, trade secrets have some shortcomings; for example, it is more difficult for a firm to borrow money when its inventions are kept secret (Mann, 2018). Therefore, a trade-off exists between disclosing technological information and keeping inventions secret. After investing in financial institutions, firms could obtain capital from their FIS profits. In such cases, firms might prefer to keep their inventions secret rather than patenting them. Thus, such a "business secrecy" hypothesis could also explain the negative association between FIS and corporate innovation.

In order to differentiate this latter Hypothesis from that of "managerial agency conflict", we investigate the impact of FIS on innovation input. Theoretically, the "managerial agency conflict" hypothesis posits that CEOs will actively seek to reduce risk. Thus, we should observe that firms reducing R&D expenditure simultaneously obtain fewer patents. However, if the "business secrecy" hypothesis holds, then although firms file fewer patents they will not reduce R&D expenditure as they seek to maintain competitive advantage over their competitors.

From an empirical perspective, therefore, we include the *R&D* variable in our baseline regression, and Panel C of Table 7 shows the results, with Columns (1) and (2) reflective of *R&D* at years $t+1$ and $t+2$, respectively. The coefficient estimates on *FIS_amount* continue to be negative and significant, ruling out the "business secrecy" Hypothesis and supporting our "managerial agency conflict" hypothesis.

5. Supplementary tests

Thus far, we have established a causal effect for FIS on corporate innovation using several identification strategies. However, there are still some gaps in our story, and we attempt to fill these here.

5.1. The effect of FIS on profit growth

An implicit assumption throughout our paper is that FIS delivers monopolistic profits, which is why CEOs of firms with FIS can pursue quiet lives and reduce involvement in projects that might be profitable in the long term but are higher risk. To test whether this underlying assumption is true, we look at whether FIS has a positive effect on firms' profit growth. The dependent variables are the net and pretax profit growth rates (*Net Profit* and *Pretax Profit*), and we control for other determinants of firms' profit growth, which are defined in Appendix A. The results in Panel A of Table 8 show that the coefficients on *FIS_amount* are positive and significant for both variables, suggesting that FIS does bring extra profit for firms.

Table 8
Supplementary Tests.
This table reports the results of supplementary tests. Panel A covers the relationship between FIS and earnings growth. *Net_profit$_t$* is the firm's net profit growth rate in year *t*. *Pretax_profit$_t$* is the firm's pretax profit growth rate in year *t*. Panel B covers the relationship between FIS and a firm's employment decisions. *Under_hire* is the difference between actual and expected hiring of highly educated employees. We take the absolute value of this difference. Expected hiring is calculated following Jung et al. (2014). Under-hiring is defined as a firm underinvests in labor when expected net hiring is positive, and over-firing is defined as a firm underinvests in labor when expected net hiring is negative. Robust standard errors, clustered at the firm level, are reported in parentheses. Continuous variables are winsorized at the 1st and 99th percentiles. Coefficients marked with *, **, and *** are significant at 10%, 5%, and 1% levels, respectively.

Panel A FIS and firm profit growth

	Net_profit$_t$	*Pretax_profit$_t$*
	(1)	(2)
FIS_amount	9.112***	6.531**
	(3.391)	(2.677)
Control variables	YES	YES
Year, Industry, and Province FE	YES	YES
Adj R^2	0.140	0.152
Observations	11,640	11,640

Panel B FIS and employment decisions

	Under_hire$_{t+1}$	*Under_hire$_{t+1}$*	*Under_hire$_{t+2}$*	*Under_hire$_{t+2}$*
	Under-hiring	Over-firing	Under-hiring	Over-firing
	(1)	(2)	(3)	(4)
FIS_amount	0.594**	0.361	0.802**	0.425
	(0.273)	(0.264)	(0.319)	(0.287)
Control variables	YES	YES	YES	YES
Year, Industry, and Province FE	YES	YES	YES	YES
Adj R^2	0.133	0.096	0.130	0.096
Observations	1584	6009	1629	5854

5.2. The effect of FIS on labor investment

We supplement our main analysis of innovation output by examining whether FIS is also associated with hiring decisions, especially in relation to highly educated employees. The rationale is that such employees are particularly important in firms' R&D activities and yield a return over the long term (Schultz, 1961). CEOs who shy away from innovation may reduce the presence and hiring of these high-cost employees, leading to underinvestment in advanced human capital, so we examine whether FIS negatively affects a firm's employment behaviors.

We define highly educated employees as those with a bachelor's degree or above, and investigate the impact of FIS on the level of underinvestment in such employees (*Under_hire*).[14] We follow Jung, Lee, and Weber (2014) and use their model to calculate abnormal net hiring, including overinvestment (positive regression residuals) and underinvestment (negative regression residuals).[15] Because our goal is to examine the effect of FIS on underinvestment in highly educated staff, we only keep observations with negative regression residuals and define their absolute values as *Under_hire*. We further divide the labor underinvestment sample into two groups, "under-hiring" and "over-firing", and see whether the underinvestment derives from the former. Following Jung et al. (2014), we define under-hiring as a firm underinvesting in labor when expected net hiring is positive; over-firing is defined as a firm underinvesting in labor when expected net hiring is negative. It is important to distinguish between the two because over-firing is not consistent with a "quiet life" approach. CEOs who wish to pursue a quiet life avoid firing workers due to the large labor adjustment costs involved. Therefore, we predict that FIS leads to under-hiring of highly educated labor. We estimate the model as follows (all of the control variables are defined in Appendix A):

$$\begin{aligned} Under\_hire = {} & \beta_0 + \beta_1 FIS\_amount + \beta_2 Mb\_equity + \beta_3 Size + \beta_4 Quick + \beta_5 Lev + \beta_6 Divdum + \beta_7 Std\_CFO + \beta_8 Std\_sales \\ & + \beta_9 Tangible + \beta_{10} Loss + \beta_{11} InstOwn + \beta_{12} Std\_net\_hire + \beta_{13} Labor\_intensity + \beta_{14} Ab\_Invest\_other + error \end{aligned} \quad (6)$$

Panel B of Table 8 reports the estimation results. In Columns (1) and (3), we estimate the impact of FIS on under-hiring; the

[14] According to the 2010 national demographic census, only 4.01% of the population have a bachelor degree or higher. Thus, in China, possession of such a degree is indicative of being highly educated. Data source: http://www.stats.gov.cn/tjsj/pcsj/rkpc/6rp/indexch.htm.

[15] The model of Jung et al. (2014) is as follows (all control variables defined in Appendix A). $\text{Net\_hire}_{i,t} = \beta_0 + \beta_1 \text{Sale\_growth}_{i,t} + \beta_2 \text{Sale\_growth}_{i,t-1} + \beta_3 \text{ROA}_{i,t} + \beta_4 \text{ROA}_{i,t-1} + \beta_5 \text{ROA}_{i,t} + \beta_6 \text{Return}_{i,t} + \beta_7 \text{Size\_R}_{i,t-1} + \beta_8 \text{Quick}_{i,t-1} + \beta_9 \text{Quick}_{i,t} + \beta_{10} \text{Quick}_{i,t-1} + \beta_{11} \text{Lev}_{i,t-1} + \beta_{12} \text{Lossbin1}_{i,t-1} + \beta_{13} \text{Lossbin2}_{i,t-1} + \beta_{14} \text{Lossbin3}_{i,t-1} + \beta_{15} \text{Lossbin4}_{i,t-1} + \beta_{16} \text{Lossbin5}_{i,t-1} + \beta_{17} \text{error}_{i,t}$(5)

coefficient estimates on *FIS_amount* are positive and significant in both columns, suggesting that CEOs do not hire enough highly educated employees after obtaining FIS. In Columns (2) and (4), we investigate the impact of FIS on over-firing; the coefficient estimates on *FIS_amount* are again positive but are insignificant, indicating that CEOs are not over-firing highly educated workers following acquisition of FIS. Thus, the results are consistent with our "quiet life" theory.

6. Conclusion

In this paper, we have documented that FIS impedes corporate innovation, and use a mediation model to verify the underlying mechanism. We find that the channel through which FIS affects innovation is managerial agency conflict. Given that prior literature has found that short-sighted managers reduce R&D investment when they face pressure from the capital market, we predict that the impact of FIS on innovation is exacerbated by such myopia, and show that our results are more pronounced when firms are covered by more analysts, when a firm's stock liquidity is higher, and when a firm's CEO has a shorter decision horizon. Supplementary tests show that FIS also leads to underinvestment in human capital, resulting in the under-hiring of the highly educated employees needed for innovation. The results are consistent with the narrative of a quiet life for the CEO; that is, when firms have access to monopolistic profits through FIS, CEOs are more likely to avoid costly effort and risky decisions. Overall, our findings indicate that FIS causes non-financial firms to lose growth potential by exacerbating managerial agency conflict.

Our study provides two significant implications for policymakers. First of all, the bank–firm tie is a double-edged sword. In countries where firms find it difficult to obtain financial services, policymakers encourage firms to build different kinds of connections with financial institutions so as to alleviate such difficulties. However, our paper shows that once firms have access to monopolistic profits through FIS, CEOs are tempted to enjoy a quiet life by reducing corporate innovation. Thus, policymakers should pay attention to the darker side of bank–firm ties and take steps to avoid firms losing growth potential after obtaining such financial resources.

Second, with the rapid development of capital markets, the liquidity of stock markets is increasing and firms are covered by more and more analysts. One potential disadvantage of these stock market improvements is that CEOs bear much more severe short-term pressure from the capital market, making them more likely to reduce corporate innovation at the cost of future competitiveness. Therefore, policymakers should give increased attention to the potential impacts of capital market development on managerial myopia when initiating reforms.

Author declaration

All the authors declare that there is no conflict of interest within our paper submission.

Data availability

Data will be made available on request.

Acknowledgements

We are very grateful to the editor (Prof. Carl Chen) and two anonymous reviewers for their insightful comments. Rui Fan acknowledges the support from National Natural Science Foundation of China (71902025) and Social Science Foundation of the Ministry of Education in China (19YJC630033). Jianping Pan acknowledges the support from National Natural Science Foundation of China (71902024), Social Science Planning Project of Fujian Province (FJ2021C026) and Zhishan Young Scholars Program of Southeast University. Lijun Ma acknowledges the support from the National Natural Science Foundation of China (71802048) and the Fundamental Research Funds for the Central Universities "The Belt and Road" research database construction project of UIBE (TS4-08). All errors are our responsibility.

Appendix A. Variable Definitions

Variable name	Variable description
$Grant_t$	Natural logarithm of one plus the firm's total number of patent applications filed that are eventually granted in year *t*.
$Citation_t$	Natural logarithm of one plus the total number of non-self-citations of the firm's filed patent applications that are eventually granted in year *t*.
$Grant_{t+1}$	Natural logarithm of one plus the firm's total number of filed patent applications that are eventually granted in year $t+1$.
$Grant_{t+2}$	Natural logarithm of one plus the firm's total number of filed patent applications that are eventually granted in year $t+2$.
$Citation_{t+1}$	Natural logarithm of one plus the total number of non-self-citations of the firm's filed patent applications that are eventually granted in year $t+1$.
$Citation_{t+2}$	Natural logarithm of one plus the total number of non-self-citations of the firm's filed patent applications that are eventually granted in year $t+2$.
$Cite\_aver_{t+1}$	The natural logarithm of the number of non-self citations per patent in year $t+1$.
$Cite\_aver_{t+2}$	The natural logarithm of the number of non-self citations per patent in year $t+2$.
$R\&D_{t+1}$	The ratio of R&D expenditure divided by book assets in year $t+1$.

(*continued on next page*)

(*continued*)

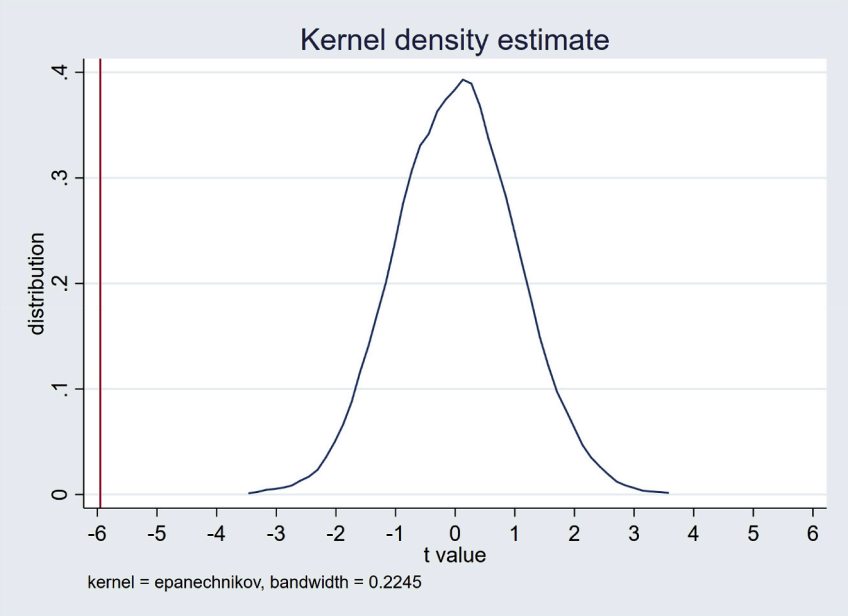
Variable name	Variable description
$R\&D_{t+2}$	The ratio of R&D expenditure divided by book assets in year t+2.
PatentGrowth	Change in the number of firm's patents from year t-1 to year t.
FIS_amount	The value of the firm's financial institution ownership divided by the book value of total assets in year t.
FIS_num	The number of financial institutions in which firms hold ownership.
HHI	The Herfindahl–Hirschman Index based on sales of the firm in the year t.
Block_ownership	The proportion of shares held by the largest shareholder of listed firms in the year t.
SOE	An indicator variable that equals one for state-owned enterprises, and zero otherwise.
Cash	The ratio of net operating cash flow to book value of total assets in the year t.
Size	The natural logarithm of the book value of total assets in the year t.
Size_r	The natural logarithm of the market value of equity, ranked into percentiles.
ROE	The ratio of net profits divided by the book value of equity in the year t.
ROA	The net income scaled by total assets.
Lossbin1	An indicator variable that equals one if prior-year ROA is between −0.005 and 0, and zero otherwise.
Lossbin2	An indicator variable that equals one if prior-year ROA is between −0.010 and −0.005, and zero otherwise.
Lossbin3	An indicator variable that equals one if prior-year ROA is between −0.015 and −0.010, and zero otherwise.
Lossbin4	An indicator variable that equals one if prior-year ROA is between −0.020 and −0.015, and zero otherwise.
Lossbin5	An indicator variable that equals one if prior-year ROA is between −0.025 and −0.020, and zero otherwise.
Loss	An indicator variable that equals one if the firm reported a loss in the previous year, and zero otherwise.
Lev	The ratio of the book value of liabilities divided by the book value of total assets in year t.
Dual	An indicator variable that equals one if the chairman of the board and CEO are the same person, and zero otherwise.
Independent_director	The ratio of the number of independent directors divided by the total number of directors.
BM	The book-to-market ratio.
Compensation	The ratio of total compensation of directors, supervisors and executives divided by total assets in year t.
ManagerOwn	The percentage of shares held by executives in year t.
InstOwn	The institutional shareholdings (percent) in year t.
Treat	An indicator that equals one for the treatment group, and zero for the control group.
Post	An indicator that equals one for a year after 2012, and zero otherwise.
$Post^{-2}$	An indicator variable that equals one if a firm-year observation is from the years 2007–2010, and zero otherwise.
$Post^{-1}$	An indicator variable that equals one if a firm-year observation is one year before deregulation (i.e. for the year 2011), and zero otherwise.
$Post^{0}$	An indicator variable that equals one if a firm-year observation is from the deregulation year (2012), and zero otherwise.
$Post^{1+}$	An indicator variable that equals one if a firm-year observation is one year after deregulation (i.e. for the year 2013), and zero otherwise.
$Post^{2+}$	An indicator variable that equals one if a firm-year observation is from the years 2014–2017, and zero otherwise.
TaxReturn	The ratio of tax return to sales.
Decision_horizon	An indicator variable that equals one if the CEO's decision horizon is shorter than that of the sample average, and zero otherwise; we follow Antia et al. (2010) in calculating a CEO's decision horizon.
Analyst	An indicator variable that equals one if the firm's analyst coverage is larger than the sample average, and zero otherwise.
Liquidity	An indicator variable that equals one if the firm's stock illiquidity is less than the sample average, and zero otherwise; our calculation of stock illiquidity is consistent with Amihud (2002).
Utilization	The ratio of annual sales to total assets.
Financial_assets	(Trading financial assets + derivative financial assets + available-for-sale financial assets + held-to-maturity investment)/total assets.
FC	The level of financial competition that is collected from the research report "Marketization Index of China's Provinces: NERI Report 2018".
Net_hire	The percentage change in employees with a bachelor's degree or above.
Sale_growth	The percentage change in sales revenue.
Quick	The ratio of cash and short-term investments plus receivables to current liabilities.
Under_hire	The difference between the actual and expected change in a firm's highly educated employee numbers.
Mb_equity	The ratio of market to book value of equity.
Divdum	An indicator variable that equals one if the firm pays dividends in the previous year, and zero otherwise.
Std_CFO	The standard deviation of cash flow from operations over the years t-5 to t-1.
Std_sales	The standard deviation of sales revenue over the years t-5 to t-1.
Tangible	The ratio of property, plant, and equipment to total assets.
Std_net_hire	The standard deviation of the percentage change in employees over the years t-5 to t-1.
Labor_intensity	The ratio of employees to total assets.
Ab_invest_other	The absolute value of the residual from the following model: $Investor\_other_{i,t+1} = \beta_0 + \beta_1 Sales\_growth_{i,t} + \beta_2 error_{i,t}$

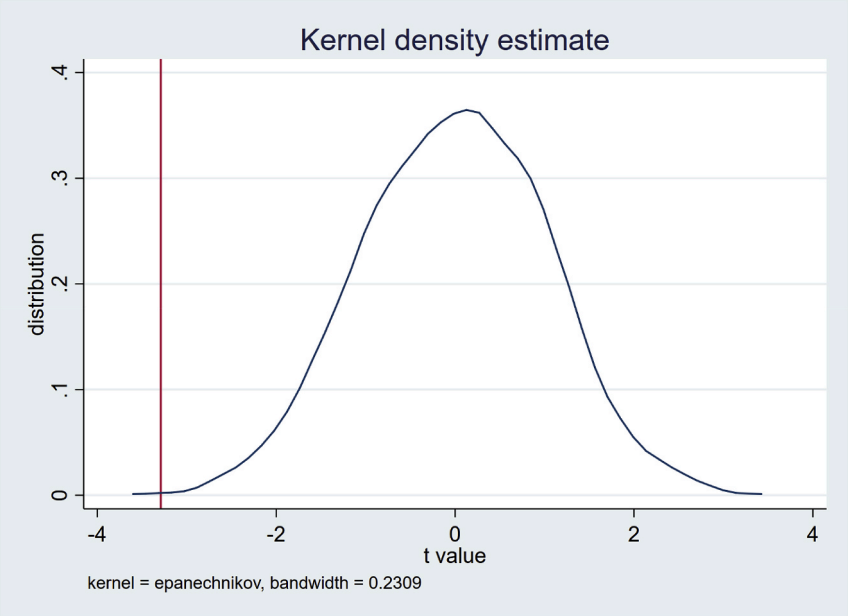
Appendix B. Firm Characteristics Following Propensity Score Matching

Columns (1) and (2) present, respectively, sample averages for firm characteristics in the treated and control groups; Column (3) presents the values of *t*-tests of the differences between Columns (1) and (2); Column (4) presents the significance levels of sample-mean difference tests between Columns (1) and (2). Definitions of all variables are provided in Appendix A.

Variable	Mean		*t*-statistic	*p*-value
	Treated group	Control group		
	(1)	(2)	(3)	(4)
HHI	0.1506	0.1559	−0.38	0.706
HHI^2	0.0352	0.0388	−0.55	0.582
Size	21.411	21.552	−1.35	0.179
ROE	0.0599	0.0838	−1.38	0.168
Lev	0.4228	0.4131	0.42	0.676
Dual	0.8044	0.8333	−0.62	0.534
Independent_director	0.3709	0.3800	−1.26	0.208
BM	0.7977	0.9102	−1.49	0.138
TaxReturn	1.3634	1.1551	0.79	0.428
PatentGrowth	0.7043	0.4811	1.44	0.152

Appendix C. Placebo Tests with Dependent Variables *Grant* (top) and *Citation* (bottom)





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