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The role of government intervention in financial development: micro-evidence from China

Lingbing Feng[a], Tong Fu[b], Nicholas Apergis[c], Hu Tao[d], Wu Yan[e]

[a]*Institute of Industrial Economics, China*
[b]*Institute of Industrial Economics/Center for Regulation and Competition, Jiangxi University of Finance and Economics, Nanchang, Jiangxi, China*
[c]*School of Business, Law and Social Sciences, University of Derby, Derby, UK*
[d]*School of Business Administration, Shandong University of Finance and Economics, Jinan, Shandong, China*
[e]*School of Finance, Jiangxi University of Finance and Economics, Nanchang, Jiangxi, China*

Abstract

This paper distinguishes between different forms of government intervention upon a firm, including the firm's tax burden, sales to the government and state shares. We investigate how these types of government intervention affect micro-financial development. With evidence from China, we confirm that the micro-financial development is promoted by the firm's tax burden and sales to the government but constrained by the firm's state shares. The findings remain robust to the endogeneity issue. The findings offer applications for government policies or a firm's financing strategies.

Key words: Government intervention; Financial development; Plausible exogeneity theory

JEL classification: D22, G28

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1. Introduction

Governments play a very important role in promoting well-functioning financial systems (Demirgüç-Kunt, 2010). However, what is the role of governments for financial development? This paper is motivated by this question to distinguish between different functions of government intervention and to explore how these types of government intervention functions affect financial development.

Please address correspondence to Tong Fu via email: canjianft@hotmail.com

An additional novelty of the paper is that it observes both government intervention and financial development at the micro level. For one thing, this paper distinguishes between three types of government intervention upon a firm, i.e., government redistribution, government purchases and public entrepreneurship (Stiglitz, 1989). The corresponding types of government intervention on a firm are in the forms of the firm's tax burden, sales to the government and state shares, respectively. For another, this paper captures the micro-financial development with a firm's *positive change* of financial access (Wang and You, 2012). To the best of our knowledge, this paper offers a first attempt to investigate how multiple dimensions of government intervention affect micro-financial development.

Using evidence from China, the empirical findings confirm that micro-financial development is promoted by the firm's tax burden and sales to the government, but it is constrained by the firms' state shares. Considering that government intervention may be endogenous to corporate finance, the analysis makes use of the instrumental methodological approach (IV) to remove the potential endogenous bias. Considering that former tax burden and sales to the government have a reverse causality issue with corporate finance, we use external IVs for estimations. Specifically, we use the number of taxation-interaction days to instrument tax burden and instrument sales to the government with the degree of computerisation. Conventionally speaking, these two IVs have no direct effect on micro-financial development (see more in Section 4). Moreover, we use a generated IV for state shares. Given that state shares are the historical product of political intervention in China's economy such that they are exogenous in the short run for corporate finance, we follow the heteroscedasticity-IV method suggested by Lewbel (2012) to generate an IV for state shares. Our IV estimates confirm a positive effect of tax burden (or sales to the government) on micro-financial development and a negative one on micro-financial development.

It is worth noting that the identification strategy in this paper is also of the frontier. Considering that 'the requirement of perfect exogeneity is a knife requirement that, strictly speaking, is unlikely to hold exactly' (Nunn and Wantchekon, 2011: 3243), we adopt the Plausible Exogeneity Theory of Conley *et al*. (2012) to document that our IV estimates of government intervention (in three forms) to financial development are robust to violations of the exclusion restriction.

To justify our expectations, we repeat estimations with financial access as the dependent variable in the robustness tests. Specifically, we measure a firm's financial access with the information regarding favourable terms on an overdraft or a loan quota, which is a standard measure of financial access in the existing micro-literature (Ayyagari *et al*., 2010). As a result, those (three) types of government intervention have the same effect on financial access as they do on financial development. Recall that our measure of micro-financial development is captured by the *change* in financial access. Given that the effect of

government intervention on financial development is shown to be the same as that on financial access, our findings regarding financial development are empirically founded.

This paper collects evidence from China because China provides a suitable institutional background for our investigation. As the largest developing economy, legal regimes (La Porta *et al*., 2004; Ayyagari *et al*., 2013) and financial institutions (Linton, 2008; Cull *et al*., 2015) in China are underdeveloped. This characteristic is representative of most developing countries. Our data come from the Investment Climate Survey undertaken by the World Bank in 2005. First, the survey follows a stratified random sampling methodology, so the data are of high quality. The data are also relevant to the most recent period. The survey provides information in 2004, but it captures the trends that are still persistent to China's present-day economy. More practically, the survey is far more representative than other available data (see more about data in Section 3).

We admit there are a large number of studies on the issue of government intervention in corporate finance (see Fan et al., 2011; Cull *et al*., 2015), but, as mentioned before, this paper first attempts to distinguish different types of government intervention and then explores their impact on micro-financial development. Since the public choice school, the academic world has viewed government intervention as a 'grabbing hand' (Becker, 1983; Alesina *et al*., 1992; Tanzi and Schuknecht, 2000). The view of this 'grabbing hand' hypothesis has been challenged (Hopkin and Rodriguez-Pose, 2007). A 'helping hand', instead of government intervention, has been studied for economic development (Li *et al*., 2008; Fu, 2017). This paper contributes to the government intervention literature by providing an in-depth analysis and more credible evidence. Given that governments in most countries explicitly or implicitly direct financial resources (Hart *et al*., 1997; Ayyagari *et al*., 2013), this paper offers applications to different types of government intervention.

This paper also contributes to the literature on financial development. The current financial/development economics literature focuses on macro-financial development. Precisely, the existing literature uncovers multiple sources of macro-financial development, including economic growth (La Porta *et al*., 1997, 1998; Boyd *et al*., 2001; Beck *et al*., 2003; Djankov *et al*., 2007), foreign direct investment (Alfaro *et al*., 2009), portfolio investment (Bussière and Fratzscher, 2008) and institutional reforms (Haselmann *et al*., 2010). However, there is a dearth of literature about the role of governments. Therefore, the various effects of government intervention uncovered in this paper could shed more light on the financial development consequences of the government's role.

The remainder of the paper is structured as follows. Section 2 provides a theoretical framework to explain how micro-financial development is determined by government intervention in the form of tax burden and sales to the government or state shares. Section 3 provides the data description, and Section 4 reports the main results to test the relevant hypotheses. Section 5 checks out the robustness of the estimates, and Section 6 concludes.

2. A theoretical framework

This section first illustrates the institutional background of China's financial system and then uncovers why various types of government intervention can affect financial development in a micro-economy.

2.1. Background

Government intervention is crucial to China's financial system. First, credits dominate other forms of capital in China's financial system (Allen *et al*., 2005; Ayyagari *et al*., 2010) and credits were almost the unique source of external finance in 2004 (see Fu, 2017).[1] China's open-door policy empowers local governments and especially delegates financial institutions (the credit supplier) to local governments.[2] As a result, local governments have the power to intervene in the credit supply. Second, local governments have an incentive to intervene in corporate finance because local governments are required to actively create a business-friendly environment for firms (Huang, 1998). Third, financial institutions are also incentivised to accept government intervention in their credit extension activities. If firms are financed through the intervention of local governments and then fall into financial distress, these firms or the corresponding financial institutions can be bailed out by local governments (Linton, 2008).

The above factors contribute to local governments building an alliance structure with financial institutions and firms (Wang, 2007). The alliance guarantees the important role of government intervention for corporate finance. In fact, the interventional role of a government in corporate finance can be also generalised for other countries (Hart *et al*., 1997). The effect of government intervention on micro-financial development is explained in detail in the following subsection.

2.2. Hypotheses tested

In principle, local governments contribute 'critical inputs' in financial markets (Naughton, 1992, 1994; Chang and Wang, 1994), such that government intervention can determine corporate finance. Moreover, government intervention can encourage the improvement of information infrastructure (Djankov, *et al*., 2007), property rights protection and contract enforcement (Haselmann *et al*., 2010) to promote corporate finance. To uncover the foundations of financial development, the later contents focus on micro-

[1]The data in this paper are embedded in 2004, and do not include listed companies.

[2]In fact, the whole financial system is partially or wholly controlled by the government (Linton, 2008).

financial development, i.e., financial development for a firm. For expositional ease, we use hereafter the term 'financial development' to imply 'micro-financial development' or 'financial development for a firm'. The following will distinguish how the distinct types of government intervention affect financial development.

2.2.1. Financial development and government redistribution

In terms of redistribution, governments impose a tax burden on a firm. In comparison with other tax indicators, we choose to focus on the tax burden because it objectively reflects the degree of government expropriation on a firm. Moreover, tax burdens can be precisely quantified by a firm's accounting report. Due to its objectiveness, tax burdens have been used to explain firms' performance or behaviour in the current literature (Cai *et al*., 2011).

We predict a promotion effect of the tax burden on a firm's financial development (i.e., micro-financial development). First, because the access to finance is a critical mechanism for income equality and economic growth (Demirgüç-Kunt, 2010), governments intervene in micro-financial development. When firms contribute taxes to local governments, local governments are incentivised to support firms' operations and growth (Wang, 2007). In the case of sustainable growth, incentivised local governments (and the corresponding officials) will breed a business-friendly environment for firms (Huang, 1998). As mentioned before, China's local governments construct a strategic alliance with financial institutions and firms; as such, local governments more actively intervene in financial institutions' credit extension to guarantee firms' access to finance. In fact, this alliance-constructing phenomenon is not only limited to China but it also occurs in certain developed countries, such as Japan, Singapore, and other high-developing economies. According to Teng and Das (2008), the strategic alliance strategically allocates resources to form a joint competition.

H1: The tax burden of a firm as a form of government redistribution upon a firm promotes financial development for the firm.

If ignoring the alliance issue, we tend to hypothesise the negative effect of a firm's tax burden on the firm's financing. It is intuitive that the tax burden is a governmental expropriation (Du *et al*., 2015). We may not know how government expropriation directly affects a firm's access to finance, but it is expected that the tax burden on a firm deteriorates a firm's financial constraint and then worsens a firm's financing. Thus, tax burden can impede the development of a firm in terms of access to finance. As a benchmark, we do not overlook this possibility.

H1′: The tax burden of a firm constrains financial development for the firm.

2.2.2. Financial development and government purchases

In the purchase aspect, governments intervene to pay for sales from firms. Government expenditure is always used to capture the size of government intervention in the relevant macro literature (Scully, 1991; Nitzan, 1994; Goel and Nelson, 1998). At the level of micro-economies, government intervention in the form of purchases is captured by the government purchases from the firm. To clarify our focus, we do not use the word 'government expenditure' in this paper, which is mainly used to refer to macro government consumption. Instead, we interchangeably use 'government purchases' and 'sales to the government' because we use the latter to measure the former (see Section 3).

We predict the promotion effect of government purchases on the firm's financial development. According to the creditor power theory pioneered by Aghion and Bolton (1992) and Hart and Moore (1994, 1998), when creditors more easily force repayments, grab collateral or gain the control of firms, they will extend more credit. If firms have a direct economic connection, such as sales to the government, creditors (financial institutions) can seek help from the government for debt disputes. For instance, even when governments have no obligation for corporate finance under a public-private participation scheme, private partners under financial distress are bailed out by the government (European Commission, 2004; Fu, 2014). Moreover, according to the creditor information theory pioneered by Jaffe and Russell (1976) and Stiglitz and Weiss (1981), when creditors have more information about borrowers, they require smaller information rent. If governments choose to purchase from a particular firm, they actually transmit a signal that the firm is trustworthy. Thus, the firm obtains a favourable condition for external finance.

Djankov *et al*. (2007) have already confirmed that credit is extended by creditors' power and information. Given that firms with sales to the government help creditors obtain power and information, the financial development of a firm is guaranteed by government intervention.

H2: Government purchases from a firm (or sales to a firm) promote the financial development for the firm.

2.2.3. Financial development and public entrepreneurship

In the entrepreneurship aspect, governments intervene as the owners of state shares. According to the current literature (Ades and Di Tella, 1997; Tanzi, 2000), the standard measure of government intervention in ownership is the state share. On the one hand, state shares can improve financial development. State shares indicate a firm's political connections (Dong *et al*., 2016), which enable firms to obtain government support (Agrawal and Knoeber, 2001; Li *et al*., 2008) and favourable treatment to financial access (Khwaja and Mian, 2005; Faccio, 2006). The core logic is that state shares represent the close tie of

a firm with the government, so they tend to help firms to obtain a favourable position in access factors and resources, especially to credit (Cull *et al*., 2015).

On the other hand, because the property rights attached to state shares are unclearly specified, state-owned enterprises have a principal-principal problem (Dharwadkar *et al*., 2000; Young *et al*., 2008). Governments need to delegate a particular official to undertake the role of the state-share owner. Even when the government delegation can deal with the principal-principal problem, the government delegator has weak incentives to monitor corporate governance. Accordingly, the principal-agent problem is inherently unavoidable (Guo *et al*., 2015). Therefore, state shares can result in information rents due to asymmetric information between principals or between principal and agent, thereby impeding the allocation of credit to the firm (Djankov *et al*., 2007).

We predict that government intervention in the form of state shares constrains micro-financial development. State shares, as a proxy for political connections, may represent an advantage for corporate finance, but governments' financial support must be based on effective corporate governance. Due to the potential presence of weak entrepreneurship, state shares lead to ineffective internal and external monitoring, such that China's firms choose other financing methods, rather than loan borrowing (Liao *et al*., 2014). In particular, the financial sector dominates in the financial system (Ayyagari *et al*., 2010). The abandonment of loan borrowing indicates that the weak public entrepreneurship attached to state shares seriously constrains the financial development of a firm.

H3: State shares in the ownership of a firm (as public entrepreneurship at a firm) constrain financial development for the firm.

We do not deny, however, the likelihood that the positive effect of state shares on financial development due to political connections may exceed the negative effect of state shares due to weak entrepreneurship. This may be possible when the profit due to scarce resources/factors is greater than the profit resulting from efficiency. This scenario cannot be ignored in most transitional countries whose factor markets are underdeveloped and affected by the government (Peng, 2003; North, 2005). Accordingly, there is a counterpart hypothesis here yielding:

H3′: State shares in the ownership of a firm promote the financial development of the firm.

3. Data

Data come from the Investment Climate Survey, which was undertaken by the National Bureau Statistics of China in 2005. The World Bank provides other surveys for China's investment climate, but we select the survey in 2005. For one thing, this survey provides adequate information on multiple types of

government intervention and micro-financial development. For another, it investigates micro-financial development. In particular, we distinguish the macro/traditional financial development from 'micro-financial development', which is defined as the positive change of financial access (Wang and You, 2012). Macro-financial development can be measured by the size/depth of the banking sector (Levine, 1997; Beck *et al*., 2003; La Porta *et al*., 2008), whereas, to the best of our knowledge, only this survey data provide available information on the micro-change of financial access.

Despite information availability, the data are theoretically credible for three reasons. First, the survey samples from the universe of registered businesses and follows a stratified random sampling methodology. Hence, subjects may misreport their attitudes or relevant information, but the survey data are not subject to self-selection bias. Second, compared with other surveys, this survey is most representative. In this survey, there are 12,400 sample firms located across 120 cities in 30 provinces of China's mainland. Only Tibet is excluded from the survey. This is desirable because the institutional background in Hong Kong, Macao, Taiwan or Tibet is clearly different from that in the surveyed provinces. Other surveys only provide information for some specific regions. For example, the survey undertaken by the World Bank in 2012 for investment climate only provides samples in 25 cities that are located in southeastern China.

Finally, the survey provides information in 2004, but it captures the trends that are still persistent in China's present-day economy. The Chinese government has been strongly intervening in corporate finance, so the findings from the data are still applicable to the most recent period. Given the important role of governments in financial systems (Demirgüç-Kunt, 2010), this paper should be able to offer some general insights for most developing countries. Governments in countries in economic transition play an important role in factor markets (Peng, 2003; North, 2005), so policy suggestions apply broadly, not just to China. Thus, even if our data do not capture information after the global financial crisis after 2007, the corresponding applications are still valuable.

3.1. Financial development (dependent variable)

Financial development is measured by how easy the firm is able to obtain formal loans (in 2004) compared to in 2003. In other words, we measure micro-financial development with a positive change in access to finance. The survey requires the manager to select a response from 5 options: 1 represents 'cannot get a loan', 2 proxies for 'much more difficult', 3 is 'a little more difficult', 4 reflects 'no change' and 5 indicates easier access to loans. Thus, a higher value indicates a more positive change in access to loans. The definitions of the main variables are provided in Table 1. As mentioned before, the survey follows a

Table 1
Definitions of variables

Variable	Definition	Notes
Dependent variable (*Y*)		
Financial development	'Has it become more or less difficult to apply for loans from the legal financial and banking institutions?'	Five ascending options
Ability of access to finance (dummy)	'Does your company enjoy favourable terms on overdraft or have a loan quota?'	Just used in robustness tests
The variables of interest (*X*)		
Tax burden	Log (tax/employee number)	
Sales to government	The ratio of sales to the government in 2004	
State shares (ratio)	The ratio of state shares in the surveyed firm's ownership structure.	
Control variables (*Z*)		
Firm age	Log of (2004 − established year)	
Firm size	Log of employee number	
Exports	Only if the surveyed firm has export sales, the dummy of exports equals 1.	
Foreign shares	The percentage of foreign shares	
Incentive for the CEO (dummy)	Only if CEO's annual income is directly related to the company's performance, the dummy of CEO incentive equals 1	
Group affiliation (dummy)	Only if the firm is group affiliated, the dummy equals to 1.	
External instrumental variable (IV)		
Tax-interaction days	Log(1 + tax interaction days)	An IV for tax burden
The utilisation of computer	The ratio of staff regularly using computers	An IV for sales to government

stratified random sampling methodology, so the measure of micro-financial development with the responses of subjects is credible.

The question reflects the surveyed firm's change in access to finance. We especially provide evidence to justify the measurement. As mentioned above, data do not include listed firms. Moreover, the scale of China's bond market (the People's Bank of China, 2006) or its venture capital market (Zero2IPO, 2005) is smaller than 5 percent of the size of its banking sector before 2005. For the sampled firms, credit is therefore the almost unique source of external finance. Thus, the survey question actually reflects the change in financial access though it focuses on access to credit. Given the survey question reflects a firm's change in access to finance, it provides information on the financial development of a firm, i.e., micro-financial development. Our measurement is in agreement with the existing literature. In particular, Wang and You (2012) use the same survey and the same measurement for micro-financial development.

3.2. Various types of government intervention

We measure the tax burden of a firm with the firm's tax per capita, based on standard criteria in the current literature (Cai *et al*., 2011). The survey provides information about the actual tax and the number of employees. For econometric reasons, we calculate the tax burden using the natural logarithm of tax per capita.

Next, we measure government purchases from a firm using the ratio of the firm's sales to the government. According to Burguet and Che (2004), government intervention in the form of public purchases can lead to the presence of over-competition in the market. Accordingly, this form of government intervention for a firm cannot be overlooked.

We also measure state shares of a firm through the ratio of state shares in the firm's ownership. The survey provides information about ownership structure in each surveyed firm. The ratio of state shares is the standard measure of government entrepreneurship in the literature (Tanzi, 2000).

3.3. Control variables

We control for relevant firm characteristics. We first control for the firm's age (Cai *et al*., 2011). We calculate the logarithmic value of 2004 minus the year of establishment. Second, we calculate the logarithm of the number of employees to control for the firm size (Lin *et al*., 2010a). In particular, we select the total number of employees in 2003 to lessen any potential reverse causality. We also control for whether the firm has exports and control the ratio of the foreign share in the ownership structure because exporting firms and foreign shares in the firm can gain the support of preferential policies for corporate finance (Lemoine, 2000). At the same time, we control for the characteristic of the firm's CEO. Specifically, we measure whether the firm has an incentive (payment) for its CEO. Precisely, if CEOs' annual income is directly related to the company's performance, the incentive dummy equals 1. Incentive payoffs motivate CEOs to seek better firm treatment (Berk *et al*., 2004; Lin *et al*., 2010b). Finally, we also control for whether the firm is affiliated in a group, because such firms have the advantage of conducting firms' key business operations (Zhao, 2006). The descriptive statistics and the correlation matrix for the main variables are reported in Tables 2 and 3, respectively.

4. Empirical analysis

4.1. Baseline estimates

We test the relationship between financial development and government intervention by estimating the following equation through the ordinal logit modelling methodology:

Table 2
Descriptive statistics

Variable	Obs	Mean	Std. dev.	Min	Max
Financial development	11,881	2.936	1.179	1	5
Tax burden	12,388	2.524	1.408	−6.043	13.205
Sales to the government	12,399	0.023	0.100	0	1
State shares	12,400	0.134	0.316	0	1
Firm age	12,400	2.128	0.880	0.693	4.934
Firm size	12,395	5.553	1.491	0	11.700
Export dummy	12,400	0.377	0.485	0	1
Foreign shares	12,400	0.146	0.317	0	1
CEO-incentivise dummy	12,243	0.668	0.471	0	1
Group affiliation (dummy)	12,400	0.307	0.461	0	1

$$FD_i = aGI_i + bZ_i + city_i + industry_i + e_i \quad (1)$$

where *FD* refers to financial development, *GI* is government intervention (including tax burden, state shares or government purchases) and Z_i represents the matrix of control variables introduced in the last section. We control for city and industry fixed effects to avoid omitting relevant variables at the city and industry levels. To estimate Equation (1), we use two types of standard errors. First, we use robust standard errors to avoid the heterogeneity issue. Second, we cluster standard errors at the city level.

Table 4 reports that the coefficients of the tax burden and government purchases are positive and highly significant, whereas the coefficients of state shares are negatively significant. Therefore, these findings support Hypotheses 1–3. Moreover, all control variables are statistically significant and obtain expected theoretical signals, indicating that our control variables include important relevant factors.

4.2. IV estimates

Our baseline estimations mitigate the endogeneity issue. For one thing, our (exogenous) control variables at the firm level (such as a firm's age) can partially capture endogenous firm heterogeneity (such as the firm's profit). For another, fixed effects actually control for the institutional factors at the city or industry level. The institutional difference that affects firms' behaviour or performance is controlled by local governments at the city level (Du *et al.*, 2008) or the regulator in the industry (Levchenko, 2007). Thus, both city and industry fixed effects help to address the issue of the omitted institutional factors.

However, we admit that the tax burden (or sales to the government) has a potential reverse causality issue with financial development. Precisely, with

Table 3
correlation matrix

		1	2	3	4	5	6	7	8	9	10
1	Financial development	1									
2	Tax burden	0.137	1								
3	Sales to the government	−0.094	0.025	1							
4	State shares	−0.003	−0.019	0.102	1						
5	Firm age	−0.057	0.043	0.096	0.332	1					
6	Firm size	0.069	0.129	0.048	0.241	0.303	1				
7	Export dummy	0.131	0.010	−0.048	−0.027	0.052	0.356	1			
8	Foreign shares	0.194	0.030	−0.059	−0.144	−0.063	0.113	0.333	1		
9	CEO-incentive dummy	0.032	0.092	0.026	0.035	0.028	0.122	0.022	−0.129	1	
10	Group affiliation (dummy)	0.091	0.190	0.156	0.041	0.054	0.288	0.127	0.178	0.114	1

Table 4
Baseline estimates (ordinal logit method)

Hypothesis:	H1 A firm's tax burden promotes financial development		H2 A firm's sales to government promotes financial development		H3 A firm's state shares constrain financial development	
Tax burden	0.151***	0.151***				
	(0.013)	(0.015)				
Sales to the government			0.436***	0.436***		
			(0.167)	(0.165)		
State shares					−0.435***	−0.435***
					(0.065)	(0.069)
Firm age	−0.118***	−0.118***	−0.125***	−0.125***	−0.085***	−0.085***
	(0.021)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)
Firm size	0.032**	0.032**	0.039***	0.039***	0.057***	0.057***
	(0.014)	(0.015)	(0.014)	(0.015)	(0.014)	(0.015)
Exports (dummy)	0.125***	0.125***	0.113***	0.113***	0.101**	0.101**
	(0.041)	(0.042)	(0.041)	(0.042)	(0.041)	(0.042)
Foreign shares	0.779***	0.779***	0.813***	0.813***	0.752***	0.752***
	(0.067)	(0.080)	(0.067)	(0.086)	(0.067)	(0.083)
CEO-Incentive dummy	0.124***	0.124***	0.147***	0.147***	0.145***	0.145***
	(0.039)	(0.041)	(0.039)	(0.041)	(0.039)	(0.041)
Group affiliation (dummy)	0.112***	0.112***	0.161***	0.161***	0.192***	0.192***
	(0.040)	(0.041)	(0.040)	(0.042)	(0.040)	(0.043)
Constant	Yes	Yes	Yes	Yes	Yes	Yes
City	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Std errors	Robust	Clustered†	Robust	Clustered†	Robust	Clustered†
R^2	0.048	0.048	0.045	0.045	0.046	0.046
No. of obs.	11,736	11,736	11,746	11,746	11,747	11,747

For these estimations, we use robust/clustered standard errors. Standard errors of estimate are given in brackets. †We cluster standard errors at the city level. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

better financial development, a firm can obtain higher revenues or profits that can enlarge the firm's tax burden or promote the firm to win public procurements. Moreover, some firm heterogeneity must be omitted because our data are across firms. Therefore, we need to address the endogeneity issue due to reverse causality and omitted variables for hypotheses. We estimate the following equation to remove the potential presence of endogenous bias by using the IV methodological approach:

$$FD_i = a\widehat{GI}_i + bZ_i + city_i + industry_i + e_i \quad (2)$$

$$\widehat{GI}_i = cIV_i + dZ_i + city_i + industry_i + e_i \quad (3)$$

where $\widehat{GI}$ in Equation (2) is the fitted value of *GI* estimated from Equation (3). In particular, *GI* is the tax burden (sales to the government or state shares). We also use robust/cluster standard errors in IV estimations. In particular, our IV estimations use a two-stage least squares (2SLS) methodological approach for two reasons. First, there is no generally acceptable ordinal logit methodology in an IV framework, and second, 2SLS is consistent, though it turns out to be inefficient. More practically, as our estimates will show, the variable of interest is still significant even when we use the inefficient 2SLS.

IV in Equation (3) is the instrumental variable used for the variable of interest. First, the IV of tax burden is the interaction days for tax issues. Precisely, our survey asks the manager how many days the firm needs to interact with the taxation department for tax issues. We use the natural logarithm of [1 plus the number of days] to measure tax-interaction days. In principle, tax-interaction days are positively associated with the firm's tax burden.[3] However, tax-interaction days are irrelevant for corporate finance, because the tax interaction involves only tax issues. Even if the taxation department affects firms' behaviour, it can only expropriate firms directly or indirectly. Thus, it is unreasonable to believe that the taxation department can directly intervene in the business of financial loans. In particular, we will relax the exclusion restriction assumption in the next subsection.

Second, the IV of sales to the government is the degree of computerisation. We measure the degree of computerisation through the ratio of staff that regularly uses computers. The degree of computerisation partially reflects the degree of technical equipment, but the effect of this IV on the financial development of a firm is negligible. Precisely, financial institutions pay little attention to the ratio of the staff that regularly use computers for their decisions on credit extension.

Third, we follow the heteroscedasticity-IV method suggested by Lewbel (2012) to generate an IV for state shares. Given state shares are the historical products of political intervention in China's economy such that they are inherently exogenous for corporate R&D in the short run,[4] we only need to use the generated IV to address the omitted variables issue. To deal with this issue, Lewbel (2012) suggests a heteroscedasticity-based IV that is equal to $\Omega(z-\overline{z})\hat{\varepsilon}_2$. $\hat{\varepsilon}_2$ is the residuals of the first-stage regression, whereas z is an exogenous variable that can be a subset of the control variable. $\overline{z}$is the average value of z. In particular, we choose to use the firm age, which is clearly an exogenous firm heterogeneity.

[3]In the relevant literature, interaction is always used to measure the degree of government intervention (Du *et al*., 2008).

[4]State shares may not be exogenous in the long run, but they should be exogenous for our research. First, state shares are politically sensitive (Wang and Chen, 2006) and then exogenous for a firm's financing. More relevantly, this research uses cross-sectional data in one year (see our data in later description); the variables will be exogenous as long as they are stable in the short run.

We report first-stage estimates in Table 5. All of our IVs are positively and significantly related to the variables of interest, respectively. The corresponding *F*-statistics are larger than 11, indicating that these IVs have good explanations on their respective dependent variables in the first-stage regressions.

We report second-stage estimates in Table 6. As the table shows, we obtain the same findings as before. Specifically, the coefficient of the tax burden (or sales to the government) is significant and positive; that of state shares is significantly negative. Therefore, the estimates confirm that both the expected effects behind Hypotheses 1–3 tend to be robust to the potentially endogenous bias. Moreover, all control variables in the second-stage estimates carry the same signals as those in Table 4, except that in relevance to firm size, the CEO-incentive dummy and the group affiliation dummy for the IV estimates of the

Table 5
First-stage estimates (OLS)

Dependent variable	Tax burden		Sales to government		State shares	
Tax intervention	0.060***	0.060***				
	(0.012)	(0.012)				
Computer utilisation			0.034***	0.034***		
			(0.006)	(0.008)		
Firm age × 1st-stage residuals					0.022***	0.022***
					(0.001)	(0.001)
Firm age	−0.027**	−0.027*	0.008***	0.008***	0.071***	0.071***
	(0.013)	(0.015)	(0.001)	(0.001)	(0.003)	(0.004)
Firm size	0.043***	0.043***	0.002***	0.002**	0.035***	0.035***
	(0.010)	(0.013)	(0.001)	(0.001)	(0.002)	(0.003)
Exports (dummy)	−0.120***	−0.120***	−0.008***	−0.008***	−0.019***	−0.019***
	(0.028)	(0.036)	(0.002)	(0.002)	(0.006)	(0.007)
Foreign shares	0.226***	0.226**	−0.018***	−0.018***	−0.121***	−0.121***
	(0.051)	(0.088)	(0.003)	(0.003)	(0.007)	(0.014)
Incentive for the CEO (dummy)	0.160***	0.160***	0.001	0.001	−0.004	−0.004
	(0.025)	(0.026)	(0.002)	(0.002)	(0.005)	(0.005)
Group affiliation (dummy)	0.346***	0.346***	0.001	0.001	0.082***	0.082***
	(0.029)	(0.036)	(0.002)	(0.003)	(0.007)	(0.008)
Constant	0.954***	0.954***	−0.028***	−0.028***	−0.195***	−0.195***
	(0.147)	(0.100)	(0.005)	(0.006)	(0.027)	(0.019)
City	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Std errors	Robust	Clustered†	Robust	Clustered†	Robust	Clustered†
F-statistics	27.984	45.057	39.37	11.648	46.822	74.837
R^2	0.24	0.24	0.07	0.07	0.37	0.37
No. of obs.	12,155	12,155	12,237	12,237	12,236	12,236

For these estimations, we use robust/clustered standard errors. Standard errors of estimate are given in brackets. †We cluster standard errors at the city level. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 6
Second-stage estimates

Hypothesis:	H1 A firm's tax burden promotes financial development		H2 A firm's sales to government promotes financial development		H3 A firm's state shares constrain financial development	
Tax burden	1.483***	1.460***				
	(0.323)	(0.325)				
Sales to government			13.712***	11.432***		
			(2.944)	(2.901)		
State shares					−0.241***	−0.241***
					(0.046)	(0.046)
Firm age	−0.035	−0.037+	−0.182***	−0.164***	−0.054***	−0.054***
	(0.024)	(0.025)	(0.032)	(0.029)	(0.014)	(0.014)
Firm size	−0.040*	−0.037+	−0.010	0.008	0.041***	0.041***
	(0.023)	(0.024)	(0.016)	(0.015)	(0.009)	(0.009)
Exports (dummy)	0.235***	0.235***	0.193***	0.160***	0.059**	0.059**
	(0.059)	(0.060)	(0.049)	(0.045)	(0.025)	(0.026)
Foreign shares	0.139	0.171	0.694***	0.678***	0.456***	0.456***
	(0.112)	(0.122)	(0.067)	(0.070)	(0.039)	(0.048)
CEO-incentive dummy	−0.151**	−0.150**	0.079**	0.068**	0.090***	0.090***
	(0.068)	(0.068)	(0.035)	(0.033)	(0.023)	(0.025)
Group affiliation (dummy)	−0.400***	−0.391***	0.070*	0.068*	0.122***	0.122***
	(0.119)	(0.117)	(0.042)	(0.039)	(0.025)	(0.026)
Constant	1.237***	1.600***	3.046***	3.333***	2.953***	2.953***
	(0.448)	(0.396)	(0.159)	(0.162)	(0.280)	(0.241)
City	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Std errors	Robust	Clustered†	Robust	Clustered†	Robust	Clustered†
No. of obs.	11,674	11,674	11,746	11,746	11,745	11,745

For these estimations, we use robust/clustered standard errors. Standard errors of estimate are given in brackets. †We cluster standard errors at the city level. $+p < 0.15$; $*p < 0.1$; $**p < 0.05$; $***p < 0.01$.

tax burden. Specifically, these three control variables become significantly negative at the second-stage estimations when the variable of interest is tax burden. This may indicate that the endogenous bias of the tax burden in the first stage affects the coefficients of those control variables. The negative signals of those control variables are also explainable; they reflect that a larger/grouped/CEO-incentivised firm has a radical growth and then receives less support from the financial sector.

4.3. Robustness to violations of the exclusion restriction

We realise that our IVs may be imperfectly exogenous. For one thing, our external IVs (i.e., tax-interaction days and degree of computerisation) may have some unknown direct effects on financing. For another, the heteroscedasticity-

based IV is plausibly exogenous according to its definition. We examine the direct effect of our IV on political connections according to the mediation method (Goodman, 1960; Sobel, 1982; Baron and Kenny, 1986).

$$FD_i = C + \alpha GI_i + \gamma IV + \beta Z_i + city_i + industry_i + \varepsilon_i \quad (4)$$

Equation (4) differs from Equation (1) in the inclusion of *IV* in the regression. If the coefficient of *IV* is significant, the imperfect exogeneity assumption of IV is violated; otherwise, our IV estimates are robust to the imperfect exogeneity (see Nunn and Wantchekon, 2011; Conley *et al*., 2012). As Table 7 shows, our IVs of the tax burden and sales to government have a direct effect on financial development, respectively. Thus, our IV violates the imperfect exogeneity assumption.

When the coefficient of IV in Equation (4) is significant, we follow the procedure implemented by Conley *et al*. (2012) to relax the exclusion restriction. The procedure is based on an assumption on this violation, $\gamma \in [\gamma_{min}, \gamma_{max}]$. We can obtain the union of all confidence intervals in the assumed range of γ by conducting the regression according to the following equation (Clarke and Matta, 2018).

$$(FD - Z\gamma) = aGI + \varepsilon \quad (5)$$

where γ refers to values from its range $[\gamma_{min}, \gamma_{max}]$. Equation (5) can be estimated by 2SLS. Ultimately, we can obtain confidence intervals with consideration of the direct effect of the instrument. If the obtained confidence intervals are below (above) zero, the IV estimates are robustly negative (positive).

In fact, the range $[\gamma_{min}, \gamma_{max}]$ can be identified because we have actually obtained the distribution of γ from Table 6 (see Eqn (4)), $\gamma \sim F(\gamma, se^2)$. Namely, the direct effect follows the distribution whose mean is the coefficient of IV and whose variance is the square of standard errors. Given the distribution of γ identified in Table 6, we can draw confidence intervals of IV estimates in Figure 1. We draw the confidence intervals ($\alpha = 0.05$) for the IV estimates of interest for financial development.

As Figure 1 shows, the potential confidence interval when the potential direct effect (γ) of the tax burden on financial development equals 0.086, i.e., the real estimate of the direct effect (see Columns 1 and 2 of Table 7),[5] the real confidence interval in our research approaches, but not reach, zero. The

[5]Namely, our IV still has the direct effect on our dependent variable (here, financial development) after controlling the variable of interest (here, regulatory burden); the corresponding coefficient comes from the regression result and it equals 0.086. Recalling that the coefficient at the baseline estimates (see Columns 1 and 2 of Table 4) equals 0.151, this indicates that the unexpected direct effect accounts for half of the total effect. We have to deal with the potential endogeneity bias. The later coefficient of IVs in Table 6 can be explained in the same way.

Table 7
Direct effects of our IVs (OLS)

Dependent variable	Financial development					
Tax burden	0.091***	0.091***				
	(0.008)	(0.009)				
Tax intervention	0.086***	0.086***				
	(0.011)	(0.013)				
Sales to government			0.231**	0.231**		
			(0.101)	(0.097)		
Computer utilisation			0.407***	0.407***		
			(0.058)	(0.061)		
State shares					−0.283***	−0.283***
					(0.043)	(0.046)
Firm age × 1st-stage residuals					0.001	0.001
					(0.002)	(0.002)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
City	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Std errors	Robust	Clustered†	Robust	Clustered†	Robust	Clustered†
R^2	0.14	0.14	0.13	0.13	0.13	0.13
No. of obs.	11,674	11,674	11,746	11,746	11,747	11,747

For these estimations, we use robust/clustered standard errors. Standard errors of estimate are given in brackets. †We cluster standard errors at the city level. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

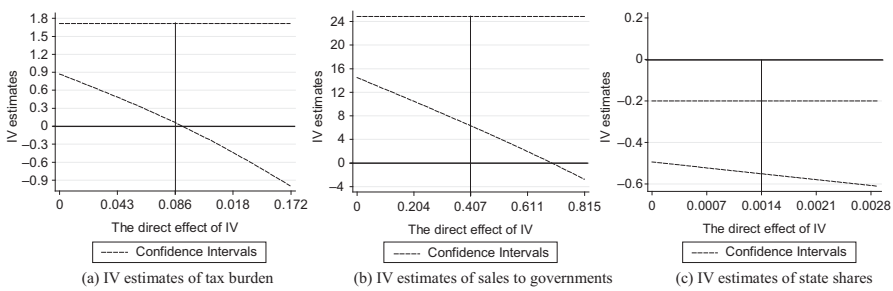

Figure 1 IV estimates with relaxation of perfect exogeneity. (a) IV estimates of tax burden. (b) IV estimates of sales to government. (c) IV estimates of state shares.

confidence interval is stably positive. This indicates our IV estimates of tax burden are positive with robustness to the violation of the exclusion restriction. Moreover, the confidence intervals of IV estimates are far from zero when the direct effect of sales to the government (or state shares) to financial development is equal to the real one (0.407 or 0.0014). In particular, our IV of state shares has no significant direct effect on financial development, but we still relax the exclusion restriction to justify the robustness of our results. Thus, the IV

Table 8
Second-stage estimates (GMM) using the ability of access to finance as dependent variable

Hypothesis:	H1 A firm's tax burden promotes financial development		H2 A firm's sales to government promotes financial development		H3 A firm's state shares constrain financial development	
Tax burden	0.549***	0.549***				
	(0.129)	(0.132)				
Sales to government			5.682***	9.367***		
			(1.433)	(0.528)		
State shares					−0.083***	−0.083***
					(0.017)	(0.015)
Firm age	−0.039**	−0.039**	−0.105***	−0.099***	−0.011**	−0.011**
	(0.019)	(0.019)	(0.015)	(0.014)	(0.005)	(0.005)
Firm size	0.136***	0.136***	0.141***	0.063***	0.063***	0.063***
	(0.031)	(0.033)	(0.023)	(0.018)	(0.003)	(0.004)
Exports (dummy)	0.240***	0.240***	0.227***	0.161***	0.069***	0.069***
	(0.030)	(0.031)	(0.028)	(0.026)	(0.010)	(0.011)
Foreign shares	0.013	0.013	0.240***	0.222***	0.043***	0.043**
	(0.067)	(0.073)	(0.042)	(0.032)	(0.016)	(0.021)
Incentive for the CEO (dummy)	0.065	0.065	0.149***	0.053**	0.053***	0.053***
	(0.051)	(0.053)	(0.034)	(0.027)	(0.008)	(0.009)
Group affiliation (dummy)	−0.099+	−0.099+	0.090***	0.020	0.042***	0.042***
	(0.065)	(0.066)	(0.033)	(0.030)	(0.010)	(0.012)
Constant	−1.960***	−1.960***	−1.397***	−0.431***	−0.183	−0.183
City	(0.152)	(0.140)	(0.244)	(0.157)	(0.311)	(0.314)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Std errors	Robust	Clustered†	Robust	Clustered†	Robust	Clustered†
No. of obs.	12,155	12,155	12,237	12,237	12,236	12,236

For these estimations, we use robust/clustered standard errors. Standard errors of estimate are given in brackets. †We cluster standard errors at the city level. $+p < 0.15$; $*p < 0.1$; $**p < 0.05$; $***p < 0.01$.

estimates of sales to the government (state shares) to financial development are robust even when our IVs do not satisfy the exclusion restriction.

In sum, we confirm that a firm's tax burden (and sales to the government) causally promotes financial development but state shares have a causal constraint effect on financial development. These causal effects are justified when our IV estimates of interest are significant and robust to the endogenous bias with a release of the exclusion restriction assumption.

5. Robustness tests

We have confirmed the predicted effects of government intervention on financial development; if our predictions are really theoretically founded, then government intervention will have the same effect on the surveyed firms' access to finance. This section tests the expected effect of government intervention on

financial access to test the robustness of our estimates. The survey enquires whether the firm has favourable terms on overdraft or loan quota (see Table 1); we use information regarding this question to measure financial access. In particular, this is a standard measure of financial access in the existing micro-literature (Ayyagari *et al*., 2010); it reflects the ability of the surveyed firm to obtain financial access.

The following uses the financial access variable to repeat previous estimations. To save space, we report second-stage estimates. As Table 8 shows, government intervention has the same role in financial access as it does in financial development. Specifically, as our IV estimates document, a firm's tax burden and sales to the government are positively and significantly related to financial access while state shares are negatively and significantly associated with financial access. In particular, we also realise that the IVs may also be imperfectly exogenous to financial access. The corresponding IV estimates are also robust to violations of the exclusion restriction.[6]

6. Conclusion

To explore the mechanism of government interventions in financial development, this paper distinguished between various types of government intervention, including the tax burden, government purchases (sales to the government) and state shares. The former two types involve the redistribution and public purchases in terms of consumption, whereas the latter refers to the public entrepreneurship in terms of production. In comparison with most existing literature, the analysis focused on the role of financial development at the micro level. Precisely, it measured the micro-financial development by the positive change in a firm's financial change.

Using evidence from China, the findings confirmed that micro-financial development was promoted by a firm's tax burden and sales to the government (i.e., government purchases from the surveyed firms), but it was constrained by the firms' state shares. Thus, government intervention in the functions of a redistribution mechanism and government purchases improved the financial environment of a firm, whereas government intervention in the function of (the public) entrepreneurship constrains micro-financial development. The estimates are robust to the potential endogeneity issue, as well as violations of the exclusion restriction.

Additionally, we show that a firm's tax burden and sales to the government have positive causal effects on financial access, while state shares have a negative causal effect on that. In other words, the three types of government intervention have a role in financial access as they do in financial development. Thus, the expected effect of government intervention on financial development is empirically founded.

[6]The results are available upon request.

Our findings at least offer the following practical implications to firms and policymakers (or implementers) in a developing country. For one thing, firms need to distinguish their potential connections with the government. Their tax burden and business with the government (i.e., sales to the government) help firms to better access external finance than before. By contrast, firms with state shares tend to have a disadvantage in the competition for financial development. This suggests that firms may need to make full use of their connections with the economic/business rather the political department of the government. For another, this paper suggests that political officials (e.g., the officials in the National Committee of the Political Consultative Conference) not intervene in the design or implementation of financial policies. As pointed out, state shares theoretically promote financial development as a firm's political ties can help firms to seek support from the government, whereas it can have a negative effect because it tends to introduce red tape and other inefficiencies. As this paper shows, the negative effect dominates, so the design or implementation of financial policies needs to avoid the involvement of purely non-economic departments of the government.

We admit that our data are relatively old. As mentioned before, to the best of our knowledge, only these data provide available information on the micro-change of financial access. We hope to see some research on micro-financial development based on new data. As the current reality has not witnessed any structural change in economic systems in most developing countries, the data limitation does not impede us from offering insights on the theoretical findings. At the same time, considering that our policy suggestions are generally meaningful, they are also valuable.

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