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Abstract

Using a panel of 224,604 Chinese firms over the period 2004-2009, together with a set of unique city-level financial development data, we document a positive and significant association between both bank loans and trade credit and inventory investment. Furthermore, we find that in cities with relatively high (low) financial development, firms rely more on bank loans (trade credit) to finance their inventory investment. Finally, we show that the moderating effect played by financial development on the association between bank loans/trade credit and inventory investment is more pronounced for firms more likely to face financing constraints, namely privately-owned, small firms, with no political connections, located in coastal regions. Our results are robust to using a variety of different specifications and estimation methods.

JEL classifications: D92; E22; G3; O16

Keywords: Financing choice; Trade credit; Bank loans; Inventories; Financial development; Financing constraints

1. Introduction

Inventories are the most volatile component of a country's gross domestic product (GDP). Specifically, even though it constitutes less than 1% of GDP in advanced economies, aggregate inventory investment is 20 times more volatile than GDP (Dasgupta *et al.*, 2019). As a result, it plays a major role in business cycle fluctuations (Blinder and Maccini, 1991; Caglayan *et al.*, 2012; Nikolov, 2013; Maccini *et al.*, 2015)[1], and is frequently considered as a leading indicator (Kim, 2020). Due to their low adjustment costs, inventories are frequently used to absorb economic shocks. A number of studies investigate the extent to which firm-level variations in inventory investment are associated with changes in financial variables, such as cash flow. They find that the sensitivity of inventory investment to financial variables is generally high, especially if compared to fixed investment[2].

A growing literature shows that financial development significantly affects firms' decisions on how to finance their activities. In particular, well-developed financial markets reduce the costs of external finance, making it easier for firms to finance their activities using bank loans or issuing shares (Rajan and Zingales, 1998; Fisman and Love, 2003; Ge and Qiu, 2007). By contrast, informal, and more expensive, sources of finance such as trade credit have been found to be prevalent in less developed financial markets and/or for firms facing tighter financial constraints (Fisman and Love, 2003; Guariglia and Mateut, 2006; Mateut *et al.*, 2006; Ge and Qiu, 2007; Cull *et al.*, 2009) [3].

In this paper, we examine the role of (formal) bank lending and (informal) trade credit in financing Chinese firms' inventory investment, differentiating firms on the basis of the financial development characterizing the cities in which they operate[4]. We aim to assess the extent to which the use of formal financing prevails in cities with

[1] For instance, Nikolov (2013) documents that, in the euro area, the contribution of inventories to GDP growth fluctuations since 2008 has been nearly 19%, even if inventories represented only 0.5% of fixed investment and 0.1% of GDP in 2012. Similarly, Maccini *et al.* (2015) show that in the 2007-09 recession, inventories accounted for one-third of the fall in US GDP.

[2] See, for instance, Carpenter *et al.* (1994; 1998), Guariglia (1999, 2000), Guariglia and Mateut (2006), Guariglia and Schiantarelli (1998), and Daripa and Nilsen (2011) who explain inventory investment as a function of a range of financial variables such as cash flow, the coverage ratio, trade credit, the debt to assets ratio, liquidity, and so on.

[3] Trade credit is also often referred to as accounts payable. Hereafter, we will use these two terms interchangeably. Trade credit appears when customers delay payment of their bills to the suppliers. It can therefore be seen as a short-term loan extended by suppliers to their customers. Petersen and Rajain (1997) and Nilsen (2002) document that trade credit is typically more expensive than other sources of finance, mainly due to price discrimination.

[4] We focus on short-term forms of financing (bank loans and trade credit), as these are typically used to finance working capital investment such as investment in inventories (Restrepo *et al*., 2019).

better financial development, whilst informal finance can be used as a substitute for formal finance in cities with poorer financial development.

The Chinese setting provides an ideal laboratory to address these issues for three main reasons. First, China has been characterized by rapid growth despite a malfunctioning financial system (Allen *et al.*, 2005). It is therefore interesting to understand how Chinese firms finance themselves. Second, in China, changes in inventories are considered as a leading indicator for the overall performance of the economy (Trading Economics, 2020). Third, China's financial development is strongly unbalanced.[5] As a result, firms in cities with different levels of financial development may experience different costs of financing.

The National Bureau of Statistics (NBS) of China provides us with a sizeable dataset, which enables us to test the extent to which Chinese manufacturing firms' inventory investment is affected by the availability of formal and informal credit, differentiating firms according to location. We then construct a unique dataset of city-level financial development indicators and merge it with our firm-level dataset. This enables us to investigate the extent to which firms operating in cities characterized by different levels of financial development use different mixes of bank loans and trade credit to finance their inventories[6]. Our final dataset contains 224,604 mostly unlisted firms operating in 287 cities covering the entire Chinese territory over the period 2004-2009[7].

Our paper contributes to the existing literature in several ways. First, building on Carpenter *et al*. (1994; 1998) and Guariglia and Mateut (2006), who look at the role of financial variables in determining inventory investment in the US and the UK, respectively, we analyze, for the first time, the role played by bank loans and trade

[5] Based on our main measure of city-level financial development (*City_FinDev*), defined as the ratio of total loans in the city's financial system to the city's gross regional product, over our sample period (2004 to 2009), we note a substantial cross-sectional variation in financial development. Specifically, *City_FinDev* ranges from a minimum value of 7.5% to a maximum value of 318.4% and has a mean value of 72.3% and a standard deviation of 41.2%.

[6] One of the key obstacles of conducting research on the substitutability between bank credit and trade credit as financing sources for corporate activities across countries is that different countries are characterized by different accounting standards and institutional settings, making them not strictly comparable. Because we focus on a single country, our study is not affected by this problem.

[7] Our sample starts in 2004 when information on accounts payable became available in the NBS dataset. It stops in 2009 as accounts payable are not available in 2010. Because we estimate dynamic models of inventory investment, we are unable to use the 2011 and 2012 waves of the dataset. Additionally, data collected in 2011 and subsequent years are not compatible with those collected in previous years as the criterion of 'above-scale' industrial firms (i.e. the condition for a firm to be included in the dataset) has changed from 5 million yuan, and above before 2011 to 20 million yuan thereafter.

credit in explaining Chinese firms' inventory investment. Second, we extend Fisman and Love's (2003) country-industry level analysis by investigating, for the first time, the extent to which city-level financial development influences firms' choice of financing within one country. Third, we provide further evidence on the substitution hypothesis, which posits that firms tend to increase their use of trade credit when accessing bank credit becomes more difficult (Meltzer, 1960; Petersen and Rajan, 1997; Burkart and Ellingsen, 2004). Fourth, we provide a comprehensive analysis on how the mix between bank credit and trade credit differs across firms with different characteristics such as ownership, financial conditions, and location. Finally, our study provides microeconomic evidence on the debate surrounding the finance-growth nexus in China (e.g. Allen *et al.,* 2005; Guariglia and Poncet, 2008; Zhang *et al.,* 2012), focusing on inventory investment, which significantly contributes to GDP fluctuations.

We find that Chinese firms make use of both formal and informal credit to finance their investment in inventories. Introducing financial development indicators in our analysis, we then document that financial development strengthens (weakens) the association between bank loans (trade credit) and inventory investment. This suggests that firms located in less financially developed cities tend to use trade credit as a substitute for formal bank loans, whilst in more financially developed cities, cheaper bank loans are preferred. Finally, we show that the moderating effect played by financial development on the association between bank loans/trade credit and inventory investment is stronger for firms more likely to face financing constraints, namely privately-owned, small firms, with no political connections, located in coastal regions. Given that trade credit is typically more expensive than bank credit (Petersen and Rajan, 1997; Nilsen, 2002), by enhancing financial development throughout the country, Chinese authorities could ensure that these firms gain access to cheaper formal finance, which would enhance their inventory investment, and ultimately promote economic growth.

The remainder of the paper is organized as follows. Section 2 summarizes the literature related to inventory investment, trade credit, and financial development. We develop our hypotheses in Section 3. Section 4 presents the dataset and summary statistics. Section 5 describes the specification of our models and the estimation methodology. In Section 6, we discuss our main results and present a variety of robustness tests. Section 7 concludes.

2. Related literature

2.1. Inventory investment and firms' financing choices

Firms' inventory investment decisions have been theoretically and empirically considered as a major economic factor due to the important role they play in explaining the business cycle (Metzler 1941; Benito 2005). In line with this argument, Blinder and Maccini (1991) and Carpenter *et al.* (1994) argue that inventory investment accounts for a large share of the decline in output during economic downturns and, as such, plays a key role in the diffusion of recessions.[8]

Trade credit represents an important source of short-term external finance that suppliers provide to their customers (Petersen and Rajan 1997). For instance, Barrot (2016) argues that the aggregate value of accounts payable for US non-financial firms is three times that of bank loans and fifteen times that of commercial paper. Similarly, based on firm-level data from 34 countries over the period 1990-2011, Levine *et al.* (2018) document that trade credit accounts for 25% of the average firm's total debt liabilities.

Based on an error-correction inventory investment model, Guariglia and Mateut (2006) provide empirical evidence of the coexistence of a trade credit channel and the traditional credit channel in monetary policy transmission in the UK. Specifically, they argue that, in the presence of tight money, firms find it difficult to obtain loans from banks. As a result, they tend to substitute bank loans with trade credit to finance their inventories. This substitution effect is particularly strong for firms more likely to face financing constraints. Nilson (2002), Mateut *et al.* (2006), and Love *et al.* (2007) also provide evidence in favor of a trade credit channel of transmission of monetary policy. More generally, several other authors argue that firms tend to increase their use of trade credit when accessing bank credit becomes more difficult (Meltzer, 1960; Petersen and Rajan, 1997; Burkart and Ellingsen, 2004).

2.2. Financing channels and the finance-growth nexus in China

China has been considered as a counterexample to the traditional view in the finance-growth literature according to which financial development facilitates economic growth

[8] According to Blinder and Maccini (1991), 87% of the drop in Gross National Product (GNP) during the average US post-war recession could be explained by the decline in inventory investment. Also see footnote 1 for more details on the huge contribution of inventories to macroeconomic fluctuations.

(Boyreau-Debray, 2003; Allen *et al.*, 2005; World Bank, 2006; Guariglia and Poncet, 2008). Despite a poorly developed financial system, it has in fact one of the fastest growing economies in the world (Allen *et al.*, 2005).

The financial system in China is mainly bank-based.[9] The majority of Chinese banks, including the "Big Five"[10], are controlled by the government. The influence and intervention of the government play a significant role in banks' decisions. For instance, the central bank explicitly sets primary deposit and lending interest rates and target levels for loan volumes. Furthermore, due to political reasons, in many circumstances, the government controls lending by directing a large number of loans to particular firms, sectors, and regions (Elliott and Yan, 2013). The dominance of state-owned banks also causes a massive misallocation of financial resources, as these banks have a preferential policy of lending to the low-performing state-owned enterprises (SOEs), which crowds out the access to credit for the more dynamic private sector in general and small- and medium-sized enterprises (SMEs) in particular (Allen *et al.*, 2005; Guariglia and Yang, 2016). As a result, China's underdeveloped and inefficient banking system hinders to some extent the fast progress of economic growth (Guariglia and Poncet, 2008).

Yet, there is no consensus on the role of financial development in China's economic success. Cull and Xu (2005) show that access to bank loans is positively connected with China's profit reinvestment. Based on the positive relationship observed between bank financing and firms' growth rates and reinvestment rates, Ayyagari *et al.* (2010) argue that there is evidence that private firms benefit from utilizing bank loans. Liang (2006) shows that financial development positively affects economic growth in coastal areas, and World Bank (2006) argues that capital market depth is also positively associated with growth. Using city-level data, Zhang *et al.* (2012) show that economic growth is positively correlated with financial development.

Despite these conflicting views, it cannot be denied that Chinese firms do not always have easy access to bank loans. Considering that raising external equity capital is also difficult, and that bonds still do not represent a primary form of external financing in China (Jiang *et al.*, 2020), trade credit, which can provide funds through inter-firm transactions, has been found to play an important role in financing China's

[9] This is confirmed by our data, according to which the average bank loans to assets ratio of Chinese firms is as high as 37.4%.

[10] China's banking sector is dominated by the "Big Five" stated-owned commercial banks, which are the Bank of China (BOC), the People's Construction Bank of China (PCBC), the Agriculture Bank of China (ABC) the Industrial and Commercial Bank of China (ICBC), and Bank of Communications (BoCom).

rapid growth. Using survey data, Ge and Qiu (2007) investigate the extent to which the high growth of the non-state sector can be sustained by trade credit financing. They argue that high usage of trade credit helps non-SOEs bypass the limited access to formal finance and meet their financing needs. Furthermore, according to Cull *et al.* (2009), poorly performing SOEs tend to redistribute bank loans via trade credit to prop up their faltering customers. On the contrary, profitable private firms are more likely to extend trade credit than their unprofitable counterparts. Degryse *et al.* (2016) find that the use of informal finance, including trade credit, promotes the high sales growth of small Chinese firms. Guariglia and Mateut (2016) show that Chinese firms with strong political affiliations find it easier to obtain short-term external sources of finance, which they use to extend more trade credit than their non-affiliated counterparts. Allen *et al.* (2019) consider trade credit as "constructive informal finance". They argue that because this type of financing is characterized by an information advantage and monitoring mechanisms, it supports firm growth. In summary, the evidence above suggests that trade credit is an important extension to the availability of funds for Chinese firms.

3. Hypotheses

According to Petersen and Rajan (1997), firms use trade credit as a source of finance mostly because they are unable to raise funds from the traditional bank finance channel. Trade credit is in fact typically more expensive than bank credit due to price discrimination (Petersen and Rajan, 1997; Nilsen, 2002). As a result, the growth of those firms that rely on this type of informal financing may be constrained. In line with this argument, Rajan and Zingales (1998) suggest that the development of financial markets can reduce the costs of formal external finance, and consequently enhance growth. Fisman and Love (2003) emphasize the importance of financial development in explaining the substitution between bank credit and trade credit. They argue that firms in countries with more developed financial markets rely more on cheaper bank loans to finance their growth. By contrast, in countries with less developed financial systems, firms do not have easy access to bank loans, and, consequently, are forced to make more use of expensive trade credit.

We relate to this literature by focusing on Chinese firms' inventory investment, which can be financed either by bank loans or by trade credit (Restrepo *et al.,* 2019). Considering that China contains very heterogeneous cities in terms of financial

development[11], in line with Fisman and Loves's (2003) argument, we hypothesize that in cities characterized by relatively high (low) financial development, firms will rely more on bank loans (trade credit) to finance their inventory investment. In other words:

H1: *Financial development has a moderating effect on the association between bank loans/trade credit and inventory investment: it strengthens (weakens) the association between bank loans (trade credit) and inventory investment.*

In principle, firms can choose to finance their activities using either formal bank credit or informal trade credit. Yet, when they are financially constrained, they might not be able to obtain credit from formal financial institutions due to the cost premium associated with the use of external finance. This problem will be exacerbated in cities characterized by poor financial development. Petersen and Rajan (1997) argue that suppliers are usually willing to extend trade credit to firms with limited access to credit markets, as this enhances credit-financed sales and boosts demand. In addition, suppliers are more willing to offer trade credit to firms more likely to face financial constraints than financial institutions because they are in a better position than banks to gather information on their customers, have an advantage in salvaging value from constrained firms' assets, and implicitly hold a stake in these firms. In line with this argument, and focusing on China, Guariglia and Mateut (2016) document that more financially constrained firms indeed have a higher reliance on trade credit financing. We therefore expect that in cities characterized by low financial development, financially constrained firms will show a higher incentive to substitute bank loans with trade credit to finance their inventory investment.

Similarly, Beck *et al.* (2008) argue that financial development is particularly important for lowering informational barriers and transaction costs that hinder small

[11] It is noteworthy that geographical segmentation is an important characteristic of the Chinese banking system. Huang *et al.* (2020) document that city and rural financial institutions rarely operate outside their own city or province. They justify this considering that until 2006, these banks were not allowed to do business outside their province of origin. Subsequently, although reforms between 2006 and 2009 technically allowed them to operate across provincial boundaries, only very few inter-province licenses were actually approved. Huang *et al.* (2020) further argue that even the large commercial banks and policy banks (which together account for 50% of total bank assets) generally operate on a local basis. In our empirical analysis, we look at financial development at the city-level, and divide the Chinese territory into 287 prefecture-level cities or municipalities.

firms' growth[12]. This suggests that the difficulties faced by small firms in obtaining bank loans will be lower the higher the financial development. In line with this argument, we expect those Chinese firms more likely to face financing constraints to make heavier use of bank loans to finance their inventories in cities characterized by higher financial development. This leads to our second hypothesis:

H2: *The moderating effect of financial development on the association between bank loans/trade credit and inventory investment is stronger for firms more likely to face financing constraints.*

Following Poncet et al. (2010) and Guariglia *et al.* (2011), we consider private firms and firms located in coastal regions (which face a higher competition for a limited pool of funds) more likely to face financing constraints. Other firms in this group are small firms, as well as companies without political connections. These criteria are defined and discussed in Section 6.2.

4. Data and summary statistics

4.1. Data

We utilize firm-level data drawn from the annual accounting reports of industrial firms conducted by the National Bureau of Statistics (NBS) of China from 2004 to 2009. The NBS data contains accounting variables and firm-specific information for enterprises in the manufacturing and mining sectors with annual sales above 5 million RMB ("above-scale" industrial firms). These firms come from 31 provincial-level administrative units, which can be further decomposed into 287 prefecture-level cities or municipalities (or main districts). The original sample contains 1,957,370 observations. We firstly drop observations with negative values for the stock of inventories, sales, total assets, total fixed assets, bank loans, accounts payable, current assets, current liabilities, total equity, total assets net of total fixed assets, and total assets net of liquid assets, which constitute 6.5% of the sample. Furthermore, to

[12] Small firms are assumed more likely to face financial constraints than large firms (Beck *et al.*, 2005; Clementi and Hopenhayn, 2006; Guariglia, 2008; Yang and Guariglia, 2016). See Section 6.2.2 for a further discussion of this point.

minimize the potential influence of outliers, we exclude the top and bottom one percent of the distribution of each of our continuous regression variables. We also drop firms that do not have complete records on the key variables used. This leads to a final unbalanced panel made up of 224,604 mostly unlisted firms, which corresponds to 579,250 firm-year observations.[13] Table A1 in Appendix A shows that our panel ranges from a minimum of 45,289 observations in 2004 to a maximum of 126,230 observations in 2007. All variables are deflated using the gross domestic product (GDP) deflator, which is provided by the Federal Reserve Bank of Atlanta.[14] We next merge the data with the city- and district-level financial development data, which are collected from the *China City Statistical Yearbook*.[15]

A vast literature shows that ownership has a significant impact on how Chinese firms make use of different sources of funds (Allen *et al.,* 2005; Ge and Qiu, 2007; Ayyagari *et al.,* 2010; Guariglia *et al.,* 2011; Guariglia and Yang 2016).[16] In our study, we classify firms into four ownership categories (state-owned, foreign, collective, and private firms), based on the majority share of capital paid-in by each type of investors in each year.[17] For instance, a firm is categorized as state-owned in a given year if the proportion of its paid-in-capital owned by the state in that year is greater than 50%.

4.2. Measures of financial development

To investigate the extent to which financial development affects the use of different financial sources, we construct a set of financial indicators to proxy the level of

[13] We cannot separate public listed firms from the unlisted ones as the NBS dataset does not have an identifier for public listed companies. There are around 1000 listed firms in the manufacturing and mining industries covered by the NBS dataset, which accounts for about 0.4% of the total observations.
[14] We use this GDP deflator instead of that provided by Chinese statistical and government agencies because it adjusts for seasonality more appropriately and is comparable to the deflators commonly used in the studies on OECD (Organisation for Economic Co-operation and Development) countries. For details about how to construct this GDP deflator, see Chang *et al.* (2016) and Higgins *et al.* (2016).
[15] The yearbook contains aggregate data on loans, deposits, savings and other financial variables at the city level.
[16] Specifically, there is a large imbalance in the allocation of financial resources in China. Although private firms have been expanding very rapidly and make a significant contribution to China's growth, the majority of domestic bank credit goes to the less efficient state-owned sector, hence depriving private firms of access to bank credit (Allen *et al.,* 2005; Cull *et al.,* 2009; Ayyagari *et al.,* 2010; Guariglia *et al.,* 2011; Guariglia and Yang, 2016).
[17] The NBS dataset classifies investors into the following six categories: state investors: foreign investors (excluding those from Hong Kong, Macao, and Taiwan); Hong Kong, Macao, and Taiwan investors; legal entities; individuals; and collective investors. Following Guariglia *et al.* (2011), we group foreign investors and Hong Kong, Macao, and Taiwan investors into a single category named foreign firms. Similarly, legal entities-owned and individual-owned firms are grouped into the private firm category. Our results were robust to only considering firms owned by individuals as the private category.

financial development in the city where the firm resides. Typically, financial development should proxy for the overall depth and availability of financial intermediaries and markets across areas. In other words, it should measure how easily borrowers and savers can be brought together.

As in Zhang *et al.* (2012), we measure financial development at the city-level[18], and construct the following three indicators. *City_FinDev* is the ratio of total loans in the city's financial system to the city's gross regional product (GRP). *City_FinDev2* is the ratio of total deposits in the city's financial system to the city's GRP. These two indicators serve as proxies for the overall depth of financial intermediation. *City_FinDev3* is the ratio of total household savings in the city's financial system to the city's GRP. It measures the city's financial development in terms of mobilizing household savings. Next, we measure financial development at the district level[19]. To this end, we construct the indicator *City_FinDev4* , which denotes the ratio of total loans in the city's main district to GRP. Finally, we design a composite index of financial development, *City_FinDev5*, at the city level, by aggregating *City_FinDev*, *City_FinDev2* and *City_FinDev*3 following the procedure outlined in Amidžic *et al.* (2014).[20]

Figures 1 and 2 show maps of the level of financial development measured as the ratio of total loans to GRP (*City_FinDev)* across different Chinese cities in 2004 and 2009. There are 287 municipality- or prefecture-level cities in our maps. The figures suggest that there is a substantial imbalance in the level of financial development across different cities of China. This can have a significant impact on how difficult firms located in different cities find it to raise funds, as well as on their choice of financing. Not surprisingly, coastal provinces, major municipalities, and capitals of provinces enjoy the highest financial development. As a consequence of the recent financial crisis, the level of financial development in 2009 is slightly lower than in 2004. Specifically,

[18] There are three levels of cities in China: municipalities (Beijing, Shanghai, Tianjin and Chongqing), which are directly governed by the central government and are administratively equivalent to provinces; prefecture-level cities, which are directly governed by the provincial government and are ranked below provinces and above counties in China's administrative structure; and county-level cities, which are governed by prefecture-level governments. In this paper, we use 287 municipality- or prefecture-level cities, including both urban and rural areas, to measure financial development. Similar results, not reported for brevity, were found excluding the municipalities.

[19] A district refers to a subdivision of a prefecture-level city or a municipality. A district of a municipality is generally a prefecture-level area; and a district of a prefecture-level city is a county-level area. The main districts of a city are typically densely populated areas.

[20] See Appendix B for more details on how this indicator is constructed.

5 out of 12 coastal provinces show a drop in their ratio of total loans to GRP between 2004 and 2009. The corresponding numbers for central and western regions are, respectively, 7 out of 8 and 7 out of 10. The imbalanced nature of financial development across different cities of China provides us with a unique opportunity to analyze how financial development affects the way firms finance their accumulation of inventories.

[Insert Figure 1 here]

4.3. Summary statistics

Table 1 reports the means and medians for a number of key variables used in this study. Column 1 refers to the full sample, whilst columns 2 to 5 correspond to state-owned, collective, private and foreign firms. Focusing on the full sample, we observe that firms experience positive inventory and sales growth. However, private firms (which represent 76.6% of the observations in the sample) are the major contributor to this growth. By contrast, the other three types of firms experience low or even negative inventory and sales growth over the sample period.

We observe that state-owned and foreign firms are generally larger than collective and private firms. Furthermore, state-owned and collective firms have a significantly longer history than private and foreign firms, as the latter were only allowed to start their business after China's reform and opening up.

With regards to different uses of funds, SOEs exhibit the largest bank loans to assets ratios (0.421) and the lowest trade credit to assets ratio (0.127), compared to the rest of the sample. This is consistent with Ding *et al.* (2013) and Guariglia *et al.* (2011). Due to the soft budget constraints from which they benefit, SOEs are able to obtain more bank credit than other firms, despite experiencing negative sales growth. Consequently, SOEs do not need to rely too much on informal finance, such as trade credit.

[Insert Table 1 here]

In terms of financial development[21], Table 2 shows that the average ratios of total loans, total deposits and total household savings to GRP are 72.3%, 114.3%, and 68.0%, respectively, suggesting that the financial system in China remains mainly bank-based[22].

[21] The total number of observations in Table 2 is 1692, corresponding to 281 to 285 prefecture-level cities or municipalities in each year.

[22] This is consistent with the World Bank, World Development Indicators (2020), according to which, over the period 2004-2009, domestic credit provided to the private sector by Chinese banks (deposit taking corporations except central banks, % of GDP) was 112%. This is a much larger figure than the corresponding ratio observed in the US over the same period (57%).

Our descriptive statistics also show that coastal regions generally have a higher level of financial development compared to their interior counterparts[23].

[Insert Table 2 here]

5. Model specifications

5.1. Baseline specification

Our baseline specification is an extension of Lovell's stock adjustment model (1961), which has been widely used in the literature to explain the dynamic adjustment of inventory investment (Kashyap *et al.*, 1994; Guariglia, 1999; Benito, 2005; Guariglia and Mateut, 2006)[24]. Specifically, denoting with *I*, the logarithm of firms' inventories; with *S*, the logarithm of sales; with *Loans*, the ratio of the sum of long-term and short-term debt (net of accounts payable) to total assets (used as a proxy for a firm's bank financing); and with *TC* (trade credit), the ratio of accounts payable to total assets[25], we initially estimate the following equation:

$$\Delta I_{j,t} = \beta_0 + \beta_1 \Delta I_{j,t-1} + \beta_2 \Delta S_{j,t} + \beta_3 \Delta S_{j,t-1} + \beta_4 \left(I_{j,t-1} - S_{j,t-1}\right) + \beta_5 Loans_{j,t} + \beta_6 TC_{j,t} + V_j + V_t + V_k + V_p + V_o + e_{jt} \quad (1)$$

where the subscript *j* indexes firms; *k,* industries; *p*, provinces; *o,* ownership; and *t*, time (where *t* = 2004-2009). The lagged inventory growth and sales growth are included in the regression to capture short-run dynamics. Following Guariglia (1999), the coefficient β_1, which represents the adjustment speed of inventories, is expected to be positive. β_2 is also expected to be positive, as firms need to avoid remaining out of stock when they face high demand for their goods.[26] The error-correction term $(I_{j,t-1} - S_{j,t-1})$ captures the cost of inventories being far from a target level expressed in terms of sales. Consistent with error-correction behavior, we expect β_4 to be negative.

[23] See Appendix B for details about the provinces belonging to the coastal and interior regions. The latter include both central and western regions. It is noteworthy that the majority of the firms (76.9%) in our sample are located in coastal regions.

[24] The rationale behind the stock adjustment model is that when a firm's actual level of inventories is different from the desired target level, which is proportional to sales, the firm will only try to adjust inventories partially towards the target level in any one period due to adjustment costs.

[25] Similar results were found when defining *Loans* and *TC* in logarithms. These results are not reported for brevity, but available upon request.

[26] Although β_3 could be negative, we expect (β_2+β_3) to be positive as firms need to avoid remaining out of stock when they face high demand for their goods.

In other words, future inventory investment will increase (drop) if inventories are lower (higher) than the target. Furthermore, we expect both β_5 and β_6 to be positive, as both bank loans and trade credit are likely to facilitate inventory investment.[27]

The error term in Equation (1) consists of several components. V_j is a firm-specific component, embracing all time-invariant firm characteristics likely to influence inventory investment, as well as any additive measurement errors. We control for this component by using a fixed-effects estimator. V_t is a time-specific component, accounting for possible business cycle effects, which we account for by including time dummies in all our models. V_k and V_P represent industry- and province-specific effects, respectively, which we control for by including both industry and province dummies[28]. We also include ownership dummies to control for the heterogeneity in ownership structure in the Chinese context (V_o). Lastly, e_{jt} is an idiosyncratic component of the error term.

5.2. Financial development and the choice of financing

To shed light on the extent to which the level of financial development of the city where firms reside can influence their choice of financing, we augment Equation (1) with the interactions of bank credit and trade credit with *City_FinDev*, which denotes the level of financial development of the city where the firm is located. We also include the variable *City_FinDev* non-interacted in the equation. This leads to the following augmented model:

$$\Delta I_{j,t} = \beta_0 + \beta_1 \Delta I_{j,t-1} + \beta_2 \Delta S_{j,t} + \beta_3 \Delta S_{j,t-1} + \beta_4 \left(I_{j,t-1} - S_{j,t-1}\right) + \beta_5 Loans_{j,t} + \beta_6 TC_{j,t} + \beta_7 City\_FinDev_{c,t} + \beta_8 Loans_{j,t} * City\_FinDev_{c,t} + \beta_9 TC_{j,t} * City\_FinDev_{j,t} + V_j + V_t + V_k + V_p + V_o + e_{jt} \quad (2)$$

where the subscript *c* indexes cities. The coefficient associated with *City_FinDev* is expected to be positive, as firms located in more financially developed cities will find it easier to fund their inventory investment. Furthermore, based on Hypothesis 1, we expect the coefficient associated with *Loans*City_FinDev* to be positive, while the

[27] As inventories are characterized by a very low adjustment cost, a large literature has investigated the impact of financial variables (such as bank loans, trade credit, cash flow, and liquidity) on inventory investment. See footnote 2 for details.

[28] We obtained similar results using city dummies instead of province dummies. These are not reported for brevity, but are available upon request.

coefficient associated with *TC*City_FinDev* should be negative. The rationale is that financial development tends to reduce the costs of external finance to firms (Rajan and Zingales 1998). Hence higher financial development promotes the use of bank credit. By contrast, firms located in cities with a low level of financial development may find it difficult to obtain bank loans, and may use trade credit as an alternative source of funds (Fisman and Love, 2003).

To test our second hypothesis, we estimate Equation (2) separately for firms more and less likely to face financial constraints. We expect the coefficients associated with both interaction terms to be larger (in absolute value) for more financially constrained firms.

6. Empirical results

6.1. Main results

We estimate Equations (1) and (2) for the whole sample using the fixed-effects estimator, which enables us to take into account the v_j component of the error term (i.e. unobserved firm-specific heterogeneity). The results are shown in Table 3. Column 1 reports the estimation results of the baseline model (Equation (1)). The coefficients associated with bank loans and trade credit in column 1 are both positive and statistically significant at the 1% level, which indicates that both sources of finance are used to fund inventory investment. The elasticities of inventory growth with respect to a change in bank loans and trade credit, evaluated at sample means, suggest that a one percent increase in bank loans and trade credit are respectively associated with a 6.26 and 2.90 percent higher inventory investment[29]. These are sizeable effects.

Focusing on the other regressors, the significant and positive coefficient associated with the lagged dependent variable suggests that there is persistence in firms' inventory investment. Also, current sales growth is positively and significantly related to inventory accumulation, whilst lagged sales growth is significantly negatively related to it. The sum of the coefficients on the change in sales is positive, suggesting that the stock of inventories moves together with sales growth, as there is a high cost of being

[29] The elasticity is defined as the ratio of the change in inventory growth for a relative change in bank loans or trade credit. Bearing in mind that the mean of inventory growth is 0.031 and the means of bank loans and trade credit are respectively 0.374 and 0.153, the elasticities (evaluated at sample means) of inventory growth with respect to bank loans and trade credit are respectively given by 6.26=0.519*(0.374/0.031) and 2.90=0.587*(0.153/0.031).

out-of-stock when firms face high demand for their goods. As predicted by theory, the coefficient associated with the error-correction term is significant and negative, suggesting that inventories move towards their long-run target and tend to close the gap with their desired level. These findings are generally consistent with the literature (Kashyap *et al.,* 1994; Guariglia, 1999; Benito, 2005; Guariglia and Mateut, 2006).

[Insert Table 3 here]

Columns 2-4 of Table 3 focus on the role of financial development on the extent to which firms use bank loans and trade credit to finance inventory investment. We initially use the ratio of total loans to GRP (*City_FinDev*) as an indicator of financial development. In column 2, we include the level of financial development and the interaction between bank loans and financial development in the model. The marginal effect associated with *City_FinDev* evaluated at sample means (0.275) is positive and significant at the 1% level[30]. Bearing in mind that the standard deviations of financial development and inventory investment are respectively given by 0.52 and 1.01, a one standard deviation increase in financial development is associated with an increase in inventory investment by 14.2 (0.275*0.52/1.01) standard deviations, which is economically significant.

Furthermore, in line with Hypothesis 1, the coefficient associated with the interaction between bank loans and financial development is positive and significant (0.119), implying that a higher level of financial development is associated with a stronger association between bank lending and inventory investment. Specifically, the positive impact of bank loans on inventory growth is 8.7% [0.119*(1.31-0.58)] higher in a city with financial development at the 75th percentile (1.31) relative to a city with financial development at the 25th percentile (0.58)[31]. One reason for this finding could be that financial development reduces firms' costs of accessing formal external finance (Rajan and Zingales 1998).

In column 3, we include the interaction between trade credit and financial development. The coefficient associated with this interaction term is negative and significant (-0.20), suggesting that financial development mitigates the association

[30] As *City_FinDev* appears in the Equation both individually and interacted with bank loans, its average marginal effect evaluated at sample means, accounts both for its direct effect on inventory investment and its indirect effect through bank loans. This marginal effect is obtained using the *margins, dydx (.)* command in Stata.

[31] The values of 0.58 and 1.31 represent the 25th and 75th percentiles of *City_FinDev* within the sample used in estimation.

between trade credit and the accumulation of inventories. Specifically, the positive link between trade credit and inventory growth is 14.6% [0.200*(1.31-0.58)] lower in a city with financial development at the 75th percentile (1.31) relative to a city with financial development at the 25th percentile (0.58). This provides additional evidence in favor of Hypothesis 1. The marginal effect associated with *City_FinDev* is also significantly positive (0.273) at the 1% level in this specification.

Finally, in column 4, we include financial development, bank loans, trade credit, and both the interactions of bank loans and trade credit with the financial development indicator at the same time. The coefficients associated with bank loans, trade credit and *City_FinDev* are all positive and statistically significant. Moreover, the coefficient associated with the interaction between financial development and bank loans (0.0697) is once again positive and significant, while the coefficient associated with the interaction between trade credit and financial development (-0.159) is still negative and significant. In line with our first hypothesis, these findings suggest that a high level of financial development promotes the use of cheaper bank credit, whilst a low level of financial development forces firms to use more expensive trade credit to finance their inventories. These findings are consistent with Allen *et al.* (2019), who show that constructive informal financing such as trade credit supports economic growth when bank credit supply lags behind economic demand.

6.2. Robustness tests

We conduct a series of robustness tests to check the validity of our results. In Section 6.2.1, we check whether our main findings are robust to using different indicators of financial development. In Section 6.2.2, we verify whether our results hold when we control for the possible endogeneity of our right-hand side variables. Further tests are described in Section 6.2.3.

6.2.1. Using different measures of financial development

We first verify whether our results are robust to using different city-level proxies for financial development (Zhang *et al.,* 2012). These are the ratio of total deposits to the city's GRP (*City_FinDev2*) and the ratio of total household savings to the city's GRP (*City_FinDev3*). We also use *City_FinDev4,* which is defined as the ratio of total loans to the GRP of the city's main district. Finally, we construct a composite index of financial development, *City_FinDev5*, by aggregating *City_FinDev, City_FinDev2* and

*City_FinDev*3 following the procedure outlined in Amidžic *et al.* (2014). These indicators are thoroughly described in Section 4.2 and descriptive statistics are presented in Table 2.

Table 4 present the estimates of Equation (2) based on each of these alternative financial development indicators in turn. Regardless of how we measure financial development, the estimates suggest that the coefficients associated with the interactions between financial development and both bank loans and trade credit are statistically significant at the 1% level. The positive coefficient on the former interaction and the negative coefficient on the latter are consistent with our prior findings and with the first hypothesis, according to which city-level financial development has a significant impact on firms' choice between formal bank credit and informal trade credit. In particular, in highly financially developed cities, firms tend to use more bank loans to finance their inventory investment, whilst in poorly financially developed cities, they tend to use more trade credit. Also, all financial development indicators non-interacted have a positive and significant direct impact on inventory growth. As for the other explanatory variables, the estimates are qualitatively similar to those reported in Table 3. In summary, these results suggest that our main findings are robust to using different city-level financial development indicators.

[Insert Table 4 here]

6.2.2. Accounting for endogeneity

6.2.2.1 Using a fixed-effects Instrumental Variable (IV) estimator

Financial development has been often considered as endogenous in the finance-growth literature (Rajan and Zingales, 1998; Becker, 2007; Butler and Cornaggia, 2011). Economic outcomes may in fact have an impact on the demand for financial resources and instruments, which may, in turn affect financial development indicators based on loans, deposits, or savings. Although it seems unlikely, in our case, that inventory investment is causal to our proxies for financial development, we take a cautious approach and verify whether our results are robust to instrumenting financial development to reduce these potential endogeneity concerns. To this end, following Becker (2007) and Butler & Cornaggia (2011), we use the proportion of seniors in a

given province and year as an instrument for financial development[32]. The intuition is that, compared to other age groups, seniors are less likely to participate in the labor force, and typically consume less, while they hold more bank deposits. Thus, a large proportion of seniors in a region will be positively associated with the local capital supply rather than the demand for business finance.[33] As in Butler and Cornaggia (2011), this instrument is used to instrument both *City_FinDev* and its interactions with bank loans and trade credit.

Column 1 of Table 5 presents the fixed-effects IV estimates of Equation (2). In line with Hypothesis 1 and with the results reported in Table 3, we observe that the interactions between financial development and both bank loans and trade credit still respectively show positive and negative coefficients. In short, our main results are robust to accounting for the potential endogeneity of financial development.

A rule of thumb for instrument validity is that the F-statistics associated with the first stage regressions relating each endogenous regressor to the entire set of instruments be greater than 10. These statistics are respectively equal to 10174.67, 10013.27, and 3269.23, for our three endogenous variables, suggesting that the relationship between the included endogenous regressors and the instruments is sufficiently strong to justify inference from the results. Other tests, such as the Cragg-Donald F-statistic and the Anderson statistic, which are reported in Table 5, also suggest that the instruments are adequate to identify the equation [34].

[Insert Table 5 here]

6.2.2.1 Using the system Generalized Method of Moments (GMM) estimator

Next, we go one step further and treat all regressors including the interaction terms as potentially endogenous. We re-estimate Equation (2) using the system GMM estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998). We use levels

[32] Seniors are defined as people aged 64 or above. Data for the fraction of seniors is drawn from the National Bureau of Statistics (NBS).

[33] We found similar results when using the lagged number of bank branches per 1000 km squares in each city and year as an additional instrument for financial development. The rationale for using this instrument is that the number of bank branches is likely to be correlated with the level of financial development, but unlikely to be correlated with inventory investment. These results are not presented for brevity, but available upon request.

[34] The former, which is a test for weak identification, is much higher than the critical values proposed by Stock and Yogo (2005). The latter is distributed as chi-square under the null that the equation is unidentified. It should be noted that the Sargan test for overidentifying restrictions is not reported as the number of excluded instruments is identical to the number of endogenous variables.

of our regressors lagged three times and further as instruments in the first-differenced equations, and first-differences of these same variables lagged twice as additional instruments in the level equations. To ensure the validity of our instruments and the specification of the models, we present the *Hansen (J)* test and the test for third-order serial correlation of the differenced residuals (*m(3)* test)[35].

Column 2 of Table 5 presents the results. The coefficients associated with the interaction terms between both bank loans and trade credit and financial development are still significant and exhibit the expected signs, suggesting that our main findings are robust to controlling for the possible endogeneity of the regressors. Although the *Hansen (J)* test indicates some issues with the instruments and/or the specification[36], the *m(3)* test suggests that the instruments used are valid, and our model is correctly specified.

6.2.3. Additional robustness tests

It has been documented that there has been a high rate of entry and exit of firms during the sample period (Brandt *et al.,* 2012). This may have a significant impact on how inventory investment is financed. In order to check if our results are driven by the massive entry of new firms, our first additional test consists in re-estimating our models based on a balanced sample, which enables us to focus on firms which have been present throughout the sample period[37]. The results, which are not reported for brevity but are available upon request, are very similar to those in Tables 3.

Second, in unreported results, following Caglayan *et al.* (2012) and Chen and Guariglia (2013), we include *liquidity* (the ratio of the difference between current assets and current liabilities to total assets) and *cash flow* (the ratio of the sum of net income and depreciation to total assets) in our baseline model to control for the role of internal finance. Once again, we find similar results to those of our baseline regressions.

Third, our results remain qualitatively unchanged when the sample is stopped in 2006. This suggests that our main findings reported in Table 3 were not driven by the

[35] We initially used two lags of the regressors as instruments. Yet, because we found evidence of serial correlation of order two in the differenced residuals, we restricted the instrument set to lags three and deeper (Roodman, 2009).

[36] The *J*-test rejects the null that the over-identifying restrictions are valid. This could be due to the fact that the presence of intra-cluster correlation or heteroskedasticity cause standard statistics to over-reject the null (Arellano and Bond 1991; Hall and Horowitz 1996). In line with this argument, using Monte Carlo experiments, Blundell *et al.* (2001) demonstrate that the Sargan test tends to over-reject the null hypothesis of valid instruments for the system GMM, especially for large samples.

[37] 68.3% of firms in our sample are present throughout the available period.

2007-2009 financial crisis.

6.3. Taking financing constraints into consideration

This section is aimed at testing Hypothesis 2, according to which the moderating effect of financial development on the association between bank loans/trade credit and inventory investment is stronger for firms more likely to face financing constraints. In Section 6.3.1, we differentiate firms according to ownership and, in line with Poncet *et al.* (2010) and Guariglia *et al.* (2011), consider private firms as most likely to face financing constraints. Then, in Section 6.3.2, we classify firms on the basis of alternative criteria which have been used in the literature to assess financial constraints, namely size and political affiliation. Finally, in Section 6.3.3, we differentiate firms according to whether they operate in coastal or inland regions. As they compete for a limited pool of funds, the former are more likely to face liquidity constraints (Guariglia *et al.*, 2011).

6.3.1. Differentiating firms according to ownership

6.3.1.1 Main results

In Table 6, we present estimates of Equation (2) differentiating firms by ownership types. Specifically, we partition our firms into state-owned (column 1), collective (column 2), private (column 3), and foreign (column 4), according to the shares of paid-in-capital contributed by the four types of investors in each year.

Our results suggest that the coefficients associated with the interaction terms between financial development and bank loans, on the one hand, and trade credit, on the other, are both statistically significant only for private firms (column 3). Specifically, the positive association between bank loans (trade credit) and inventory growth for private firms is 0.0846*0.73=6.2% higher (0.167*0.73=12.2% lower) in a city with financial development at the 75th percentile (1.30) relative to a city with financial development at the 25th percentile (0.57). In other words, in line with Hypothesis 2, when they operate in cities characterized by a relatively high level of financial development, private firms, which are most likely to face financing constraints (Poncet *et al*., 2010; Guariglia *et al*., 2011), tend to make more use of cheaper bank loans to finance the accumulation of inventories. By contrast, in cities with a relatively low level

of financial development, discrimination in bank lending becomes severe, and private firms are forced to rely more on expensive trade credit to invest in inventories. These results are in line with Ge and Qiu (2007), who, using survey data, show that high usage of trade credit helps non-SOEs bypass the limited access to formal bank loans and meet their financing needs.

[Insert Table 6 here]

For state-owned firms, none of the interaction terms are statistically significant, suggesting that the level of financial development has no impact on the choice of trade credit or bank loans to finance inventory investment. This finding is consistent with the view that due to strong connections with local governments and their role in maintaining social stability and keeping low unemployment rates, SOEs have the privilege to access funds from state banks, regardless of the level of financial development of the city in which they operate (Poncet *et al.,* 2010; Guariglia *et al.*, 2011).

Similar results are found for collective firms, with the exception of the negative and significant coefficient associated with the interaction between loans and the financial development indicator. This can be explained considering the low and negative average inventory investment characterizing collective firms (-1.0%, Table 1), which suggests that, in cities characterized by higher financial development, these firms may prefer to use bank loans for purposes other than inventory investment.

For foreign firms, only the interaction between financial development and trade credit shows a significant and negative coefficient, whilst the interaction with bank loans is not significant. This suggests that the higher the level of financial development of the city where they operate, the less do foreign firms rely on expensive trade credit to finance their inventory investment[38]. However, if they are located in more financially developed cities, they do not show more reliance on bank loans. This is consistent with the view that regardless of the financial development of the city in which they operate, foreign firms keep a relatively low level of bank loans. In line with this argument, the descriptive statistics reported in Table 1 show that, compared to firms owned by other agents, foreign firms have the lowest bank loans to assets ratio. A possible explanation

[38] The fact that the coefficient associated with the interaction between trade credit and financial development is actually larger in absolute value for foreign firms than for private does not contradict Hypothesis 2 as, according to Guariglia *et al*. (2011), both private and foreign firms show a strong sensitivity of asset growth to cash flow, which suggests both groups of firms are likely to face financing constraints.

is that these firms are able to obtain funds from their parent companies. Additionally, the demand for bank finance may be lower for foreign firms due to their high profitability (Cull *et al.*, 2009).

Finally, we find that the coefficients associated with both bank loans and trade credit non-interacted are positive and significant for all types of firms. However, the coefficient associated with financial development is only significantly positive for private and foreign firms, which suggests these firms' inventory investment can directly benefit from financial development. By contrast, financial development is irrelevant to the inventory investment decisions of state-owned and collective firms, which enjoy privileged access to bank loans and show negative inventory investment.

6.3.1.2. Robustness checks

A potential criticism of our ownership-based results is that a firm's true ownership may change during the sample period and this change could be endogenous. Firms could in fact change ownership to take advantage of or to avoid certain policies that affect particular ownership classes[39]. To tackle this issue, we first re-define a firm's ownership based on the average shares of capital paid-in by our four types of investors during the sample period, which are time-invariant. Next, to minimize the endogenous nature of the ownership structure, we also use the ownership classification made on the basis of ownership shares immediately before the start of the sample period. In both cases, we find similar results to those reported in Table 6[40].

6.3.2. Differentiating firms according to size and political affiliation

We next re-estimate Equation (2) differentiating firms according to their likelihood of facing financial constraints. We make use of a conventional criterion (firms' size) and a Chinese-specific criterion (political affiliation) to proxy for the level of financing constraints faced by firms.

Small firms and firms without political affiliation are assumed more likely to face more serious financial constraints than large firms with political affiliation (Beck *et al.*, 2005; Clementi and Hopenhayn, 2006; Guariglia, 2008; Guariglia *et al.*, 2011; Xu *et*

[39] In our sample, 1.26% of firm-years change their ownership across the period.

[40] These results are not reported for brevity but are available upon request. It should be noted that the NBS dataset does not provide information about firms' ownership in the years 2008 and 2009. To overcome this problem, we assume the ownership of firms does not change after 2007.

al., 2013; Guariglia and Mateut, 2016; Guariglia and Yang, 2016). This can be explained as follows. First, in China, legal protection for creditors is still weak, and small and medium-sized borrowers sometimes fail to pay back their loans (World Bank, 2006). Furthermore, it is more difficult for small firms to provide banks with collateral or evidence of a good track record. As there are no specific rules for SMEs' financial reporting, these firms are more likely to be subject to asymmetric information in financial markets, leading to higher financial premiums (Guariglia, 2008; Guariglia and Yang, 2016). In some cases, banks may even be reluctant to lend to small firms.

Second, compared to their unaffiliated counterparts, firms with political affiliation (*Lishu*) are more likely to have connections and private communication with the (central, provincial, or local) governments, which mitigates asymmetric information[41]. Politically affiliated firms are also more likely to have government support and subsidies, which gives them better access to key resources, such as bank loans at better conditions, tax benefits, and business operation licenses (Li *et al.*, 2008). As a result, politically unaffiliated firms are more likely to face financing constraints than their politically affiliated counterparts.

The estimates of Equation (2) for firms characterized by relatively low and high financial constraints are reported in Table 7. In column 1 (2), we consider a firm facing low (high) financial constraints in a given year if its real total assets lie in the top (bottom) half of the distribution of the corresponding variable of all firms belonging to the same ownership group and operating in the same industry in that year[42]. In columns 3 and 4, we present results for firms with and without political affiliation, respectively.

[Insert Table 7 here]

We observe that the coefficients associated with the interaction terms (*Loan* City_FinDev* and *TC*City_FinDev*) are all significant for financially constrained firms regardless of how financial constraints are measured. Additionally, the magnitude of these coefficients is higher (in absolute value) for financially constrained firms compared to their financially healthier counterparts. For example, for small firms (column 2), the coefficients associated with *Loan* City_FinDev* and *TC*City_FinDev*

[41] See Appendix B for a detailed definition of political affiliation.

[42] As a robustness check, we also defined a firm as facing a relatively high (low) level of financing constraints in a given year if its total real assets fell in the bottom 30% (top 70%) of the distribution of the corresponding variable of all firms belonging to the same ownership group and operating in the same industry in that year. The results, which are not reported for brevity but available upon request, were very similar to those reported in Table 7.

are respectively 0.103 and -0.126, whereas the corresponding coefficients are only 0.0997 and -0.08 for larger firms (column 1). Furthermore, the coefficients associated with the two interactions are respectively 0.120 and -0.183 for firms without political affiliation (column 4) and -0.0214 and -0.0001 (insignificant) for firms with political affiliation (column 3). Based on the *t*-test proposed by Acquaah (2012), the differences in the means of the interactions between the two groups are statistically significant three out of four cases. These findings are in line with Hypothesis 2.

Furthermore, the coefficients associated with bank loans, trade credit, and financial development are positive and significant across all types of firms. Interestingly, the marginal effects associated with financial development are higher for firms more likely to face financing constraints (0.306 , in column 2, and 0.327, in column 4) compared to their financially healthier counterparts (0.226, in column 1, and 0.083, in column 3), suggesting that financial development has a higher impact on inventory investment for financially constrained firms. This is consistent with the view that financially constrained firms are in higher need of external financing, and, as a result, can accumulate more inventories in cities with more financial development where it is easier to obtain bank loans (Beck *et al.*, 2008).

6.3.3. Differentiating firms according to regions

We next group the 31 Chinese provincial-level units into coastal and interior regions[43]. The rationale for this classification is that China not only has a very large territory, but its regional economy is far beyond full integration. During the transition period from a planned to an open market economy, the coastal region enjoyed the fastest growth rate in China. It also benefited from the open-door policy and the coastal development strategy (Chen, 2010), which can explain the high financial development figures reported in Table 2. Yet, firms operating in the fast-growing coastal region face high competition for a limited amount of funds (Guariglia *et al.*, 2011). They are therefore likely to suffer from severe financial constraints. In line with this argument, a World Bank's survey (2006) documents that firms in coastal regions, and especially SMEs, often find it difficult to obtain bank loans and, as a result, tend to meet their financial needs from informal sources of finance such as trade credit. Thus, residing in a city

[43] Interior regions encompass central and western regions. See Appendix B for details on the distribution of provincial-level units within regions.

characterized by higher financial development could help these firms to gain easier access to formal funds, and, consequently, to rely less on expensive trade credit to accumulate inventories.

By contrast, interior regions are typically less developed and less financially sound than their coastal counterparts. As a result, the Chinese government established policies aiming at developing these regions, lowering the costs, and increasing the availability of finance (Goodman, 2004; Guariglia *et al.*, 2011)[44]. Firms operating in these regions are therefore less likely to face financing constraints as they benefit from financial incentives and heavily depend on policy-driven bank loans regardless of the financial development of the city where they are located (Ru, 2018).

Considering that regional variation is likely to affect firms' use of funds, we re-estimate Equation (2) separately for firms located in coastal and interior regions. Colum 1 of Table 8 reports estimates for the former, and column 2, for the latter.

[Insert Table 8 here]

We observe that in all specifications, the coefficients associated with bank loans and trade credit are always positive and significant, suggesting that both types of financing promote inventory investment. The marginal effects associated with *City_FinDev* are also significant and positive in both coastal and interior regions. The magnitude of the former (0.29) is much higher than that of the latter (0.10). This suggests that firms operating in coastal regions, where there is high competition for a limited amount of funds, benefit the most from city-level financial development.

Next, focusing on the interaction terms (*Loan* City_FinDev* and *TC*City_FinDev)*, column 1 shows that, in line with Hypothesis 1, for coastal firms, the use of bank loans is enhanced, and the use of trade credit discouraged in cities characterized by a higher financial development.

By contrast, column 2 shows that the coefficient associated with the interaction between bank loans and financial development is not significant. This is consistent with

[44] After the late 1990s, regional development policies such as "the western development strategy", "the northeast revival strategy", and "the rise of central China strategy" have been implemented by the Chinese government in order to speed up the development of central and western regions and reduce regional imbalance. These policies involved the investment of a substantial amount of state funds in interior regions, especially in infrastructure, energy, and natural resources projects (Goodman, 2004). In line with these arguments, Liang *et al.* (2017) document that local governments in central and western regions have borrowed substantially to finance government-led infrastructure construction and other fixed asset investments through local government debt and urban construction and investment bonds (also known as Chengtou bonds).

the view that firms operating in interior regions benefit from financial incentives and policy-driven bank loans regardless of where they are located (Ru, 2018). As a result, financial development is relatively unimportant to their use of bank loans. As firms operating in interior regions are less likely to face financial constraints than their coastal counterparts, this finding, coupled with the significant coefficient associated with the same interaction in column 1, is in line with Hypothesis 2.

Coming to the coefficient associated with the interaction between trade credit and financial development, it is significant in both coastal and inland regions, but larger in absolute value for the latter[45]. As firms located in coastal regions are more likely to face financial constraints than those in inland regions, this contradicts Hypothesis 2. A possible explanation is that in inland regions, local governments in more financially developed cities find it easier to borrow money, which they then use to support firms (Liang *et al.*, 2017). As a result, firms in more financially developed cities may have access to a pool of cheap loans, and as a result, may be able to reduce their use of expensive trade credit more.

7. Conclusion

Using a panel of 224,604 Chinese firms operating in 287 cities over the period 2004-2009, together with a set of unique city-level financial development data, this paper presents evidence on how financial development affects the use of different sources of financing, namely bank loans and trade credit, to finance corporate inventory investment.

Our results suggest that both bank lending and trade credit play a significant role in financing inventory investment. We also find that financial development promotes firms' inventory investment. Considering that changes in inventories in China are an indicator of the overall performance of the economy (Trading Economics, 2020), our results are in line with Zhang *et al.* (2012), who argue that the level of financial development is positively related to cities' economic growth. Furthermore, we observe that in cities with relatively high (low) financial development, firms rely more on bank loans (trade credit) to finance their inventory investment. Finally, we show that the moderating effect played by financial development on the association between bank

[45] Based on the *t*-test proposed by Acquaah (2012), the differences in the means of both the interactions between the two groups are statistically significant.

loans/trade credit and inventory investment is more pronounced for firms more likely to face financing constraints, i.e. private, small, politically unaffiliated firms, as well as firms based in coastal regions. Our results are robust to using a variety of specifications; different measures of financial development, financial constraints, and ownership; as well as different estimation methods. Our work adds city-firm-level evidence within one single country to Fisman and Love (2003)'s findings about the relation between financial development and trade credit in a country-industry-level setting.

Our findings provide a portrait of the choice of financing used by different types of Chinese firms. They offer new insights into the finance-growth relationship in an emerging market by providing microeconomic evidence on the relationship between financial development and economic growth in China. The importance of informal and more expensive finance such as trade credit for private coastal financially constrained firms operating in cites characterized by low financial development suggests that poorly developed and inefficient financial markets might be an obstacle restricting the fast growth of these firms. If these firms were to develop difficulties in obtaining trade credit, then China's fast growth could be jeopardized. Given that private firms and SMEs operating in coastal regions constitute the engine of growth of the Chinese economy, policymakers should think about creating a more supportive legal and regulatory system to promote the use of formal sources of funds for these firms. A more effective financial system and better allocation of resources would therefore benefit the economy. Positive steps in this direction have already been taken. Recent reforms to the financial system have led to a significant increase in the flow of loans to the private sector in recent years (Lardy, 2014; Borst and Lardy, 2015).

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Appendix A: Structure of the panel

Table A1 presents the structure of our panel.

Table A1: Structure of the unbalanced panel

Year	*Number of observations*	*Percentage*	*Cumulative*
2004	45,289	7.82	7.82
2005	56,580	9.77	17.59
2006	115,317	19.91	37.49
2007	126,230	21.79	59.29
2008	109,647	18.93	78.22
2009	126,187	21.78	100
Total	579,250	100	

Note: The table shows the number and percentages (and cumulative percentages) of the observations across years.

Appendix B: Variable definitions

Firm-level variables

I: inventories, measured as the sum of the firm's work-in-progress inventories, raw materials, and finished goods.

ΔI: inventory investment, measured as the log-difference of the firm's inventories.

S: total sales (including both domestic and overseas sales).

ΔS: sales growth, measured as the log-difference of the firm's total sales.

TC: trade credit, measured as the ratio of accounts payable to total assets.

Loans: ratio of the sum of long-term and short-term debt (net of trade credit) to total assets.

Age: number of years the firm has been incorporated.

Total Assets: natural logarithm of the sum of the firm's fixed and current assets.

Deflator: All variables (except *Age*) are deflated using the GDP deflator, which is obtained from the Federal Reserve Bank of Atlanta.

Political affiliation (Lishu): (categorical variable)

Lishu=10: affiliated at the central level; *Lishu*=20: affiliated at the provincial level; *Lishu*=40: affiliated at the city or district level; *Lishu*=50: affiliated at the county level; *Lishu*=61: affiliated at the street level; *Lishu*=62: affiliated at the town level; *Lishu*=63: affiliated at the township level; *Lishu*=71: affiliated at the community level; *Lishu*=72:

affiliated at the village level; *Lishu*=90: no political affiliation.

We define firms with political affiliation if they have any type of political affiliation (i.e. Lishu≠90), and firms without political affiliation, otherwise *(Lishu*=90).

Chinese Regional/Provincial Units

Regions:

Coastal; interior (central and western).

Provincial Units:

There are 31 provincial-level administrative units in mainland China: Coastal provinces (Beijing, Fujian, Guangdong, Hainan, Hebei, Jiangsu, Liaoning, Shandong, Shanghai, Tianjin, and Zhejiang); central provinces (Chongqing, Anhui, Heilongjiang, Henan, Hubei, Hunan, Jiangxi, Jilin, and Shanxi); and western provinces (Gansu, Guangxi, Guizhou, Neimenggu, Ningxia, Qinghai, Shaanxi, Sichuan, Xinjiang, and Yunnan).

City-level financial development indicators

City_FinDev: ratio of total loans (from both banking and non-banking institutions) in the city's financial system to the city's gross regional product (GRP).

City_FinDev2: ratio of total deposits in the city's financial system to the city's GRP.

City_FinDev3: ratio of total savings in the city's financial system to the city's GRP.

City_FinDev4: ratio of total loans in the city's main district to the GRP of the city's main district.

City_FinDev5: Composite index of financial development calculated by aggregating *City_FinDev*, *City_FinDev2* and *City_FinDev*3 following the procedure outlined in Amidžic *et al*. (2014). In a nutshell, we first standardized *City_FinDev*, *City_FinDev2* and *City_FinDev*3. Second, we used factor analysis to derive a weighting scheme. Third, we computed the composite index based on a weighted geometric mean of each component for each city in each year.

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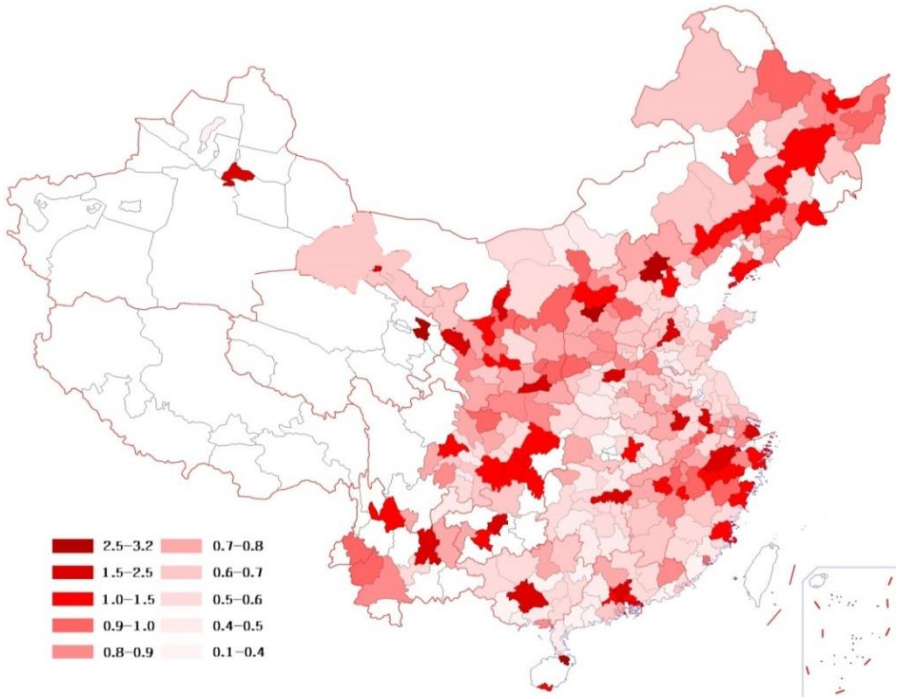
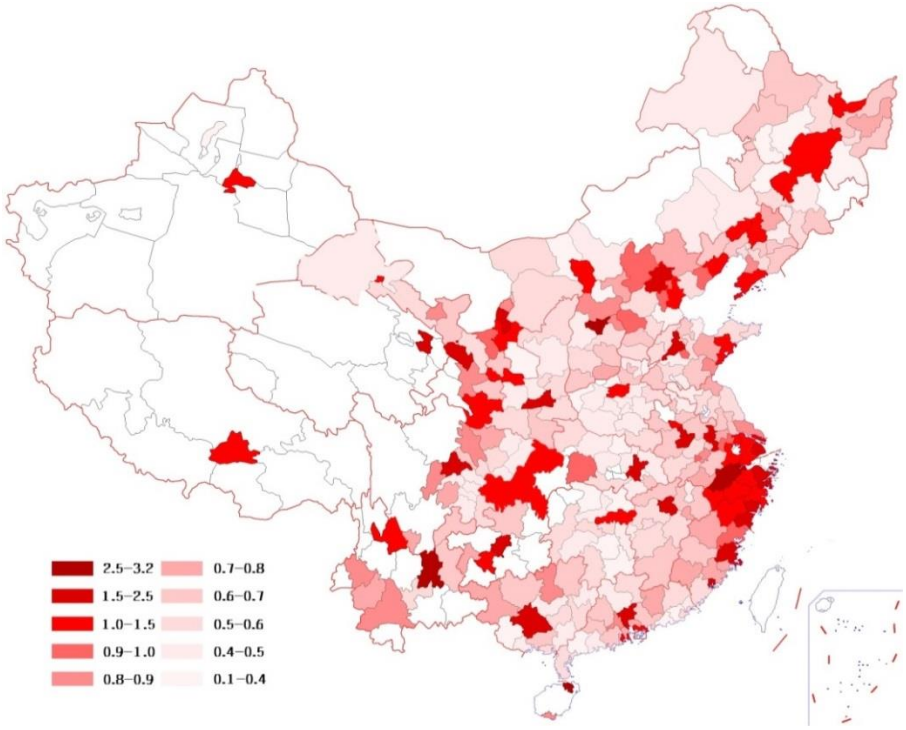
Figure 1: City-level financial development in China



2004



2009

Note: This figure presents the city-level financial development in China in 2004 and 2009. The level of financial development of a city is measured by the ratio of total loans (from both banking and non-banking institutions) in the city's financial system to the city's gross regional product (GRP).
Source: *China City Statistical Yearbook.*

Table 1
Sample means and medians (in parentheses) of key variables

	(1) All	(2) State-owned	(3) Collective	(4) Private	(5) Foreign
ΔI	0.031	-0.049	-0.010	0.044	-0.005
	(0.025)	(-0.023)	(-0.009)	(0.033)	(0.009)
ΔS	0.060	-0.005	0.031	0.077	-0.008
	(0.062)	(0.011)	(0.038)	(0.078)	(0.008)
I-S	-2.614	-1.797	-2.564	-2.735	-2.165
	(-2.434)	(-1.638)	(-2.372)	(-2.568)	(-1.977)
TC	0.153	0.127	0.157	0.147	0.185
	(0.099)	(0.079)	(0.102)	(0.093)	(0.130)
Loans	0.374	0.421	0.380	0.395	0.259
	(0.363)	(0.412)	(0.366)	(0.392)	(0.210)
Total Assets	9.432	9.785	9.445	9.354	9.756
	(9.412)	(9.850)	(9.428)	(9.319)	(9.784)
Age	9.516	22.767	15.697	8.863	8.523
	(7.000)	(16.000)	(13.000)	(7.000)	(8.000)
Observations	579,250	13,576	31,728	443,669	89,474

Notes: This table reports sample means and medians (in parentheses) of key variables used in this paper. All the variables except *Age* are deflated using the GDP deflator provided by Federal Reserve Bank of Atlanta. Definitions of all variables are shown in Appendix B.

Table 2
Sample means and medians (in parentheses) of the indicators of financial development

	(1) All	(2) Coastal	(3) Interior
City_FinDev	0.723	0.781	0.6911
	(0.600)	(0.647)	(0.5812)
City_FinDev2	1.143	1.189	1.118
	(1.015)	(1.068)	(0.9893)
City_FinDev3	0.680	0.661	0.690
	(0.654)	(0.64)	(0.666)
City_FinDev4	1.036	1.094	1.005
	(0.908)	(0.990)	(0.864)
City_FinDev5	0.273	0.283	0.268
	(0.258)	(0.266)	(0.2537)
Observations	1692	597	1095

Notes: This table reports sample means and medians (in parentheses) of the indicators of financial development used in this paper. Definitions of all variables are shown in Appendix B.

Table 3
Inventory investment models: Baseline specifications

Dependent Variable:$\Delta I_{j,t}$	(1)	(2)	(3)	(4)
$\Delta I_{j,t-1}$	0.0122***	0.0139***	0.0139***	0.0140***
	(0.0017)	(0.0018)	(0.0018)	(0.0018)
$\Delta S_{j,t}$	0.456***	0.458***	0.458***	0.458***
	(0.0031)	(0.0032)	(0.0032)	(0.0032)
$\Delta S_{j,t-1}$	-0.272***	-0.275***	-0.275***	-0.275***
	(0.0033)	(0.0034)	(0.0034)	(0.0034)
$I_{j,t-1}-S_{j,t-1}$	-0.967***	-0.973***	-0.973***	-0.973***
	(0.0023)	(0.0024)	(0.0024)	(0.0024)
$Loans_{j,t}$	0.519***	0.401***	0.511***	0.446***
	(0.0101)	(0.0191)	(0.0105)	(0.0205)
$TC_{j,t}$	0.587***	0.585***	0.777***	0.739***
	(0.0139)	(0.0143)	(0.0270)	(0.0289)
$Loans_{j,t}$* $City\_FinDev_{c,t}$		0.119***		0.0697***
		(0.0169)		(0.0187)
TC*$City\_FinDev_{c,t}$			-0.200***	-0.159***
			(0.0235)	(0.0260)
$City\_FinDev_{c,t}$		0.230***	0.304***	0.272***
		(0.0118)	(0.0106)	(0.0136)
Observations	579,250	549,602	549,602	549,602
Margin *City_FinDev*		0.275***	0.273***	0.274***
R^2	0.47	0.47	0.47	0.47
ρ	0.73	0.73	0.73	0.73

Note: All specifications were estimated using a fixed-effects estimator. Test statistics and standard errors (in parentheses) of all variables in the regressions are asymptotically robust to heteroscedasticity. The subscript *j* indexes firms, the subscript *c*, cities, and the subscript *t*, time, where *t* = 2004-2009. The dependent variable is inventory growth, $\Delta I_{j,t}$. Time, industry, provincial, and ownership dummies were included in all models, but their coefficients are not reported for brevity. See Appendix B for definitions of all variables. ρ denotes the proportion of the total error variance accounted for by unobserved heterogeneity. *Margin* denotes the marginal effects of relevant variables. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table 4
Inventory investment models: Alternative measures of financial development

Dependent Variable:$\Delta I_{j,t}$	*(1)* *City_FinDev2*	*(2)* *City_FinDev3*	*(3)* *City_FinDev4*	*(4)* *City_FinDev5*
$\Delta I_{j,t-1}$	0.0128***	0.0123***	0.0132***	0.0136***
	(0.00175)	(0.00175)	(0.00176)	(0.00175)
$\Delta S_{j,t}$	0.457***	0.456***	0.457***	0.457***
	(0.00321)	(0.00321)	(0.00321)	(0.00321)
$\Delta S_{j,t-1}$	-0.274***	-0.274***	-0.275***	-0.274***
	(0.00341)	(0.00341)	(0.00341)	(0.00340)
$I_{j,t-1}-S_{j,t-1}$	-0.970***	-0.969***	-0.972***	-0.972***
	(0.00242)	(0.00242)	(0.00243)	(0.00242)
$Loans_{j,t}$	0.451***	0.454***	0.428***	0.465***
	(0.0221)	(0.0276)	(0.0213)	(0.0211)
$TC_{j,t}$	0.688***	0.666***	0.741***	0.728***
	(0.0303)	(0.0388)	(0.0300)	(0.0293)
$Loans_{j,t}$* $City\_FinDev_{c,t}$	0.0477***	0.0942**	0.0690***	0.144***
	(0.0141)	(0.0379)	(0.0149)	(0.0538)
TC*$City\_FinDev_{c,t}$	-0.0722***	-0.121**	-0.127***	-0.418***
	(0.0188)	(0.0534)	(0.0212)	(0.0738)
$City\_FinDev_{c,t}$	0.106***	0.0737***	0.111***	0.721***
	(0.00965)	(0.0214)	(0.00940)	(0.0405)
Observations	549,602	549,602	548,918	549,602
Margin *City_FinDev*	0.106***	0.074***	0.111***	0.721***
R^2	0.470	0.469	0.470	0.470
ρ	0.728	0.728	0.728	0.728

Note: All specifications were estimated using a fixed-effects estimator. In columns 1-4, *City_FinDev2*-*City_FinDev5* are respectively used as indicators of financial development. Test statistics and standard errors (in parentheses) of all variables in the regressions are asymptotically robust to heteroscedasticity. The subscript *j* indexes firms, the subscript *c*, cities, and the subscript *t*, time, where *t* = 2004-2009. The dependent variable is inventory growth, $\Delta I_{j,t}$. Time, industry, ownership, and provincial dummies were included in all models, but their coefficients are not reported for brevity. See Appendix B for definitions of all variables including the indicators of financial development. ρ denotes the proportion of the total error variance accounted for by unobserved heterogeneity. *Margin* denotes the marginal effects of relevant variables. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table 5
Inventory investment models: IV and system-GMM estimates

Dependent Variable:$\Delta I_{j,t}$	(1) IV	(2) GMM
$\Delta I_{j,t-1}$	0.0122***	0.005
	(0.00180)	(0.015)
$\Delta S_{j,t}$	0.457***	0.616***
	(0.00324)	(0.048)
$\Delta S_{j,t-1}$	-0.274***	0.246***
	(0.00342)	(0.040)
$I_{j,t-1}-S_{j,t-1}$	-0.969***	-0.196***
	(0.00254)	(0.015)
$Loans_{j,t}$	0.411***	-0.207
	(0.0573)	(0.187)
$TC_{j,t}$	0.857***	0.616***
	(0.0850)	(0.239)
$Loans_{j,t}$* $City\_FinDev_{c,t}$	0.111*	0.301**
	(0.0600)	(0.144)
$TC_{j,t}$*$City\_FinDev_{c,t}$	-0.274***	-0.456**
	(0.0868)	(0.223)
$City\_FinDev_{c,t}$	-0.0117	-0.010
	(0.0686)	(0.075)
Observations	549,602	549,602
Margin *City_FinDev*	-0.0160	-0.0104
R^2	0.469	
ρ	0.728	
Anderson p-value	0.00***	
Cragg-Donald F-stat	3218.85	
m3 test (p-value)		0.70
Hansen J test(p-value)		0.00***

Note: The specification in column 1 was estimated using a fixed-effects instrumental variable (IV) estimator. The specification in column 2 was estimated using the system GMM estimator. Test statistics and standard errors (in parentheses) of all variables in the regressions are asymptotically robust to heteroscedasticity. The subscript *j* indexes firms, the subscript *c*, cities, and the subscript *t*, time, where *t* = 2004-2009. The dependent variable is inventory growth, $\Delta I_{j,t}$. Time, industry, provincial, and ownership dummies were included in all models, but their coefficients are not reported for brevity. See Appendix B for definitions of all variables. In column 1, *City_FinDev* is instrumented using the proportion of seniors (people aged 64 and older) in a given province and year. The Cragg-Donald F-statistic is aimed at testing whether the model is weakly identified. The Anderson canonical correlation statistic is distributed as chi-square under the null that the equation is unidentified. In column 2, we treat all regressors as potentially endogenous. Levels of these variables dated *t*-3 and further are used as instruments in the first-differenced equations and first-differences of these same variables lagged twice are used as additional instruments in the level equations. *m3* is a test for third-order serial correlation in the first-differenced residuals, asymptotically distributed as $N(0,1)$ under the null of no serial correlation. The Hansen *J* test of over-identifying restrictions is distributed as Chi-square under the null of instrument validity. ρ denotes the proportion of the total error variance accounted for by unobserved heterogeneity. *Margin* denotes the marginal effects of relevant variables ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table 6
Inventory investment models: Distinguishing firm-years on the basis of ownership

Dependent Variable:$\Delta I_{j,t}$	(1) State-owned	(2) Collective	(3) Private	(4) Foreign
$\Delta I_{j,t-1}$	-0.00448	0.0136	0.0161***	0.0234***
	(0.0139)	(0.0083)	(0.0020)	(0.0045)
$\Delta S_{j,t}$	0.421***	0.418***	0.458***	0.477***
	(0.0208)	(0.0145)	(0.0038)	(0.0077)
$\Delta S_{j,t-1}$	-0.285***	-0.312***	-0.275***	-0.279***
	(0.0233)	(0.0163)	(0.0040)	(0.0084)
$I_{j,t-1}-S_{j,t-1}$	-0.902***	-0.967***	-0.984***	-0.990***
	(0.0187)	(0.0113)	(0.0028)	(0.0062)
$Loans_{j,t}$	0.612***	0.697***	0.414***	0.522***
	(0.1230)	(0.0934)	(0.0236)	(0.0582)
$TC_{j,t}$	0.951***	0.712***	0.668***	1.122***
	(0.2000)	(0.1280)	(0.0339)	(0.0706)
$Loans_{j,t}$* $City\_FinDev_{c,t}$	0.0056	-0.182**	0.0846***	0.0626
	(0.1070)	(0.0848)	(0.0220)	(0.0497)
TC*$City\_FinDev_{c,t}$	-0.0475	-0.130	-0.167***	-0.242***
	(0.1700)	(0.1120)	(0.0310)	(0.0609)
$City\_FinDev_{c,t}$	0.0307	0.0848	0.317***	0.231***
	(0.0704)	(0.0597)	(0.0164)	(0.0327)
Observations	11,720	30,384	420,215	86,559
Margin *City_FinDev*	0.027	-0.004	0.326***	0.202***
R^2	0.44	0.46	0.48	0.47
ρ	0.80	0.77	0.73	0.73

Note: All specifications were estimated using a fixed-effects estimator. Test statistics and standard errors (in parentheses) of all variables in the regressions are asymptotically robust to heteroscedasticity. The subscript *j* indexes firms, the subscript *c*, cities, and the subscript *t*, time, where *t* = 2004-2009. The dependent variable is inventory growth, $\Delta I_{j,t}$. Time, industry, and provincial dummies were included in all models, but their coefficients are not reported for brevity. See Appendix B for definitions of all variables. ρ denotes the proportion of the total error variance accounted for by unobserved heterogeneity. *Margin* denotes the marginal effects of relevant variables. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table 7
Inventory investment models: Distinguishing firm-years on the basis of financial constraints

Dependent Variable:$\Delta I_{j,t}$	(1) Low_FC (Large)	(2) High_FC (Small)	(3) Low_FC (With PA)	(4) High_FC (Without PA)
$\Delta I_{j,t-1}$	0.00386	0.00898***	-0.00254	0.0235***
	(0.00254)	(0.00253)	(0.00473)	(0.00216)
$\Delta S_{j,t}$	0.421***	0.378***	0.393***	0.471***
	(0.00478)	(0.00500)	(0.00840)	(0.00402)
$\Delta S_{j,t-1}$	-0.262***	-0.328***	-0.282***	-0.280***
	(0.00466)	(0.00522)	(0.00882)	(0.00427)
$I_{j,t-1}-S_{j,t-1}$	-0.955***	-0.990***	-0.982***	-0.999***
	(0.00354)	(0.00355)	(0.00658)	(0.00299)
$Loans_{j,t}$	0.391***	0.390***	0.514***	0.376***
	(0.0302)	(0.0313)	(0.0482)	(0.0258)
$TC_{j,t}$	0.712***	0.702***	0.700***	0.710***
	(0.0458)	(0.0412)	(0.0697)	(0.0362)
$Loans_{j,t}$* $City\_FinDev_{c,t}$	0.0997***	0.103***	-0.0214	0.120***
	(0.0265)	(0.0291)	(0.0457)	(0.0234)
Diff-test (t-value)	-1.08		-35.01***	
*TC**	-0.0841**	-0.126***	-0.000147	-0.183***
$City\_FinDev_{c,t}$	(0.0404)	(0.0372)	(0.0641)	(0.0324)
Diff-test (t-value)	7.55***		19.46***	
$City\_FinDev_{c,t}$	0.199***	0.291***	0.0912***	0.311***
	(0.0193)	(0.0215)	(0.0322)	(0.0173)
Observations	269,415	280,187	98,856	398,009
R^2	0.48	0.49	0.48	0.48
ρ	0.76	0.73	0.78	0.73
Margin *City_FinDev*	0.226***	0.306***	0.083***	0.327***

Note: All specifications were estimated using a fixed-effects estimator. Test statistics and standard errors (in parentheses) of all variables in the regressions are asymptotically robust to heteroscedasticity. The subscript *j* indexes firms, the subscript *c*, cities, and the subscript *t*, time, where *t* = 2004-2009. The dependent variable is inventory growth, $\Delta I_{j,t}$. *Low_FC*, and *High_FC* are dummy variables equal to 1 in a given year, respectively, if a firm is likely to face low and high financial constraints relatively to all firms in the same ownership group operating in the same industry it belongs to in that year, and 0 otherwise. Specifically, in columns 1 (2), we consider a firm facing low (high) financial constraints in a given year if its real total assets lie in the top (bottom) half of the distribution of the corresponding variable for all firms belonging to the same ownership group and operating in the same industry in that year. In columns 3 and 4, we consider a firm facing relatively low financial constraints in a given year if it has political affiliation (*Lishu*<90) and facing relatively high financial constraints if it has no political affiliation (*Lishu*=90), respectively. Time, industry, ownership, and provincial dummies were included in all models, but their coefficients are not reported for brevity. See Appendix B for definitions of all variables. *Diff-test* is the t-statistics associated with the t-test test for differences in means of corresponding variables between *Low_FC*, and *High_FC* firms (Acquaah, 2012). ρ denotes the proportion of the total error variance accounted for by unobserved heterogeneity. *Margin* denotes the marginal effects of relevant variables. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table 8
Inventory investment models: Distinguishing firm-years on the basis of location

Dependent Variable: $\Delta I_{j,t}$	(1) Coastal	(2) Interior
$\Delta I_{j,t-1}$	0.0105***	0.0224***
	(0.00194)	(0.00407)
$\Delta S_{j,t}$	0.442***	0.471***
	(0.00372)	(0.00712)
$\Delta S_{j,t-1}$	-0.286***	-0.252***
	(0.00387)	(0.00717)
$I_{j,t-1}$-$S_{j,t-1}$	-0.965***	-1.029***
	(0.00269)	(0.00576)
$Loans_{j,t}$	0.398***	0.531***
	(0.0246)	(0.0412)
$TC_{j,t}$	0.648***	0.892***
	(0.0341)	(0.0601)
$Loans_{j,t}$*$City\_FinDev_{c,t}$	0.0879***	0.00227
	(0.0214)	(0.0462)
Diff-test (t-value)	13.67***	
$TC_{j,t}$*$City\_FinDev_{c,t}$	-0.0959***	-0.219***
	(0.0294)	(0.0649)
Diff-test (t-value)	17.82***	
$City\_FinDev_{c,t}$	0.268***	0.126***
	(0.0161)	(0.0334)
Observations	432,320	117,282
Margin *City_FinDev*	0.286***	0.097***
R^2	0.49	0.49
ρ	0.73	0.77

Note: All specifications were estimated using a fixed-effects estimator. Test statistics and standard errors (in parentheses) of all variables in the regressions are asymptotically robust to heteroscedasticity. The subscript *j* indexes firms, the subscript *c*, cities, and the subscript *t*, time, where *t* = 2004-2009. The dependent variable is inventory growth, $\Delta I_{j,t}$. Time, industry, ownership, and provincial dummies were included in all models, but their coefficients are not reported for brevity. See Appendix B for definitions of all variables. *Diff-test* is the t-statistics associated with the t-test test for differences in means of corresponding variables between firms in the *Coastal* and *Interior* regions (Acquaah, 2012). ρ denotes the proportion of the total error variance accounted for by unobserved heterogeneity. *Margin* denotes the marginal effects of relevant variables. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.