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Real estate prices and firm borrowings: Micro evidence from China

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ABSTRACT

Real estate price appreciation can lessen firm's financial constraint by increasing its collateral value. This paper studies this channel by utilizing a large firm-level dataset during the 2000–2007 period on Chinese firms. In contrast to Wu, Gyourko, and Deng (2015) that collateral channel effect in China does not exist either for firms overall or for private firms, we provide empirical evidence on the presence of collateral channel effect and show the effect is significant for private firms but not significant for state owned enterprises, whose behavior is more of political based. Further analysis shows that firms significantly change their debt structures in response to real estate price shocks.

1. Introduction

Firms are issued bank loans typically on the basis of two measures: (1) collateral, such as real estate and other fixed assets that a firm holds, and (2) the firm's future profitability, that is, a firm working on important projects stands a better chance of obtaining loans. In China, because of the dominance of the state-owned banking system, state-owned enterprises (SOEs) also receive bank loans on the strength of their political connections. However, given China's underdeveloped institutions and financial markets, state-owned banks rarely allocate resources to private firms in China by evaluating the future profitability of firm projects. Most loans are issued by evaluating firms' collateral holdings, of which the real estate holdings are considered the most important. Moreover, many banks in China claim that they only accept land or buildings as collateral (Gregory & Tenev, 2001; Cousin, 2011).

China's real estate market has been booming, with real estate prices in major Chinese cities increasing by more than eight times (Wu, Gyourko, & Deng, 2012). Previous theoretical literature suggests that a real estate bubble can hurt firm or economic growth by crowding out efficient investments In contrast, some studies also argue that firms can borrow and invest more on the upswing of a real estate price cycle when their collateral values are on the rise. Barro, (1976), Stiglitz and Weiss, (1981) and Hart and Moore, (1994) suggest that contract incompleteness causes collateral-driven increase in firms borrowing capacity. This so-called collateral effect amplifies the business cycle as discussed in some classic literature (Bernanke & Gertler, 1989; Kiyotaki & Moore, 1997). Recent theoretical literature on bubbles shows that bubbles can also raise the collateral value or net worth and lead to excessive investment in capital (Martin & Ventura, 2011; Miao & Wang, 2011). The growing empirical interest in asset prices and firm's borrowing

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constraints yields interesting insights. Chaney, Sraer, and Thesmar, 2012 test the collateral effect using US-listed firm data for the 1993–2007 period, and find that a $1 increase in collateral value can bring the representative US public corporation to raise its investment by $0.06, suggesting that asset price appreciation can lessen a firm's financial constraints by increasing the firm's collateral value. Gan (2007a,b), who studies the impact of collateral on corporate investment in Japan, also confirms the presence of this effect. Cvijanovi (2014) analyzes the impact of real estate prices on firm capital structure decisions and shows that a collateral value shock causes firms to change their debt structure.

Capital markets in China are imperfect. Allen, Qian, and Qian (2005) and Ayyagari, Demirg-Kunt, and Maksimovic (2010) find that SOEs receive a large share of bank financing, while private firms depend more heavily on alternative financing channels. Poncet, Steingress, and Vandenbussche (2010) empirically analyze the determinants of credit allocation to Chinese firms by ownership and find that private Chinese firms are credit constrained while SOEs are not. A recent seminal work by Song, Storesletten and Zilibotti (2011) presents a growth model with financial imperfection to explain China's economic growth transition, in which high productivity firms are financially constrained and have to rely on internal saving. Overall, SOEs do not depend on collateral values to finance their investment, while private firms are more likely to be constrained. How do real estate booms and bust affect the firm-level credit allocation? Given the empirical and theoretical findings, we expect the collateral effect to exist in China, especially when the real estate market is booming. We use firm-level data from the Annual Census of Enterprises conducted by the National Bureau of Statistics (NBS) for the period of 1999–2007 to investigate the effect of real estate prices on firms' borrowing. We find that real estate price appreciation has a significant positive impact on a firm's borrowing in term of loans and debts. The effect is stronger for private firms but insignificant for SOEs.

Since real estate price is the key explanatory variable in our regression, our estimation results are affected by the endogeneity issue as price is endogenously determined. We leave this endogeneity concern in Section 6.

Our paper contributes to the body of literature that studies the relationship between asset prices and firms' borrowing. The works of Chaney et al. (2012) and Wu, Gyourko, and Deng (2015) are closely linked with ours. Chaney et al. (2012) find that more investments are financed if the value of real estate is high and confirm the presence of financing friction, using financial data on U.S. public firms. Wu et al. (2015) conduct a similar study using data on 444 listed Chinese firms from 2003 to 2011 to test the collateral effect. They find that, on average, the collateral effect does not exist in China, even for private firms. However, our study differs from theirs and has the following advantages. First, unlike Chaney et al. (2012) who used US data, we study the Chinese capital markets, which are primarily bank-oriented. This unique characteristic provides a better experimental field to study the collateral effect. Second, our sample size is much larger than that of Wu et al. (2015), who have listed their sample size as a study limitation. Our sample includes 411,430 firms and a total of 1,934,072 firm–year observations over the period 1999–2007. Third, our firm-level data are mainly composed of non-listed firms without an equity financing channel. Controlling for this channel helps us better understand the borrowing constraints in China. Our paper, therefore, includes firms smaller than those analyzed by Wu et al. (2015), as the listed firms are the largest in China. Most of the large firms are known to exploit their connections with either the local or central government to obtain financing (Wang 2015). Given that the firms had access to state funding, it is not surprising that Wu et al. (2015) do not find a positive correlation between collateral appreciation and firm borrowing and investment.

The rest of this paper proceeds as follows. Section 2 describes the data. Section 3 discusses the research methodology. Section 4 discusses our estimation methodology and reports key results. Section 5 confirms the robustness of our main results. Section 6 discusses the endogeneity concern. Section 7 presents the conclusions.

2. Data

We use the Chinese firm-level data merged with city-level data on land price and housing price.

2.1. The Chinese NBS firm-level data

Firm-level data from 1999 to 2007 was obtained from the Annual Census of Enterprises conducted by the Chinese National Bureau of Statistics. The NBS firm-level data covers industrial firms that are state-owned (SOEs), and all non-SOEs with a sales revenue above 5 million Chinese yuan (denoted as above-scale firms). We follow the procedure used in Brandt, Van Biesebroeck, and Zhang (2012) to link firms over time. We modify the algorithm by Brandt et al. (2012) to construct the panel data needed in the paper.[1] The matching algorithm not only uses unique numerical IDs to link firms in each year, but also tracks additional information such as a firm's name, address, and the industry to which it belongs. Even when a firm's ID changed because of restructuring or privatization, the algorithm links the subsequent observations of the same firm in most cases. This provides us with a sample of 411,430 firms and a total of 1,934,072 firm–year observations. However, firms with missing key variables are dropped. Only firms that appear at least two consecutive years in the sample are retained.[2] The final sample consists of 409,986 firms and 1,931,146 firm–year observations.

Variables used in our analysis are normalized by firm size. Since we are mainly interested in how real estate price appreciation affects firms' borrowing, we use the following methods to measure borrowing. Loan rate is computed as the ratio of annual interest expenses to firm's asset value, where the numerator is expenditure on interest payment over the year and the denominator is total asset at the beginning of the year. Another way to measure a firm's borrowing is to use leverage ratio, which is measured as the ratio of total debts to total assets. We also use the ratio of cash flows to firm asset value, which reflects the net income plus depreciation over the

[1] The program by Brandt et al. (2012) to match firms over time is available online at http://www.econ.kuleuven.be/public/n07057/China/.
[2] In Section 5 we find that our main results still hold when we keep only firms that appear at least three or four consecutive years in the sample.