

# Housing Property Rights, Collateral, and Entrepreneurship: Evidence from China

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## Abstract

This paper provides new evidence on the impact of the housing collateral lending channel on entrepreneurial activities by allowing homeowners to access property equity and invest in new businesses. We exploit dual housing property rights forms in China as an instrument, where complete access to collateral values is only legally granted to homeowners with full property rights (FPR), with no access for those without FPR. Using data from a large survey, we find that expected rising house prices significantly increase the probability of starting a new business for FPR homeowners relative to the control group. The effects are robust when we rely on the exogenous shock induced by the house purchase restriction and primarily driven by homeowners without household debt. Macro analysis supports a positive correlation between the concentration of FPR homeowners and employment and economic growth, where homeowners are better able to obtain external financing via the collateral channel.

**Keywords:** Property rights, entrepreneurship, collateral channel, home equity, housing price

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## **I. Introduction**

There is a long-standing debate on how various factors affect entrepreneurial activity, one of the most challenging obstacles being access to required capital (Hurst and Lusardi, 2004). A number of influential papers have suggested that the credit constraints of potential entrepreneurs can be alleviated by extracting additional home equity from their properties and investing in new businesses, especially during a housing boom, namely, the collateral lending channel (e.g., Chaney et al., 2012; Gan, 2007; Mian and Sufi, 2011; Schmalz et al., 2017). Two recent papers focus on the collateral lending channel for business investment outcomes. Adelino et al. (2015) show that the equity-based collateral lending channel is more important for more credit-constrained small businesses than for large firms and more so in industries that require little startup capital. Corradin and Popov (2015) document that an increase in home equity significantly raises the share of individuals who transition into self-employment. These studies are based on US data to explore the effect of the recent housing boom in the run-up to the financial crisis, however. Very few studies have examined the equity-based lending channel for new business formation in China, which has seen enormous housing price appreciation in the years subsequent to the US housing boom. From 2008 to 2013, China's national home price appreciated by more than 150%, similar to or greater than in the US housing boom from 2001 to 2006 (Fang et al., 2016). This period was also when China experienced rapid economic and business growth. We investigate the link between the housing boom and new business formation using novel micro-level survey data.

Empirically, it is challenging to identify the causal effect of home equity on the transition into entrepreneurship. Individuals who ultimately become business owners may inherently differ from others. For example, they may own more valuable homes in more developed markets that are pro-business. Hurst and Lusardi (2004) suggest that household wealth only matters in the business formation decision for extremely rich individuals. We take advantage of the dual housing property rights system in China as an instrument. Since the housing reform has been introduced gradually since 1994, two major property rights coexist throughout the country. Due to the historical central planning system, some homeowners own houses

with only limited or incomplete property rights (LPR), because the land use rights (LUR) of these houses are still owned by the state-owned enterprises (SOEs) or public institutions, as opposed to homeowners with full property rights (FPR), where the land use rights are obtained by them. Only FPR owners have the legal right to collateralize their houses to borrow from banks according to China's Urban Real Estate Administration Law, while LPR owners cannot. Our analysis explores whether access to collateral enabled by different property rights helps ease credit constraints for entrepreneurship and therefore promotes business startup activities.<sup>5</sup>

Our baseline identification strategy is a difference-in-difference approach where we compare the entrepreneurial outcomes of homeowners who live in the same market in the same years and share similar characteristics to begin with, but one has FPR while the other has only LPR. The rise in house prices boosts the collateral value available for FPR homeowners to start their business, while LPR homeowners remain unaffected due to their inability to collateralize their homes. Funding opportunities other than collateral lending are still very limited for private firms or individuals in China because, regardless of the reforms in the financial industry, four state-owned banks still hold the vast majority of deposits and other SOEs are their preferred borrowers.

Our data are drawn from the 2011, 2013 and 2015 China Household Finance Survey (CHFS), the very first national representative survey on Chinese households' financial and wealth-holding conditions. Each survey year, the respondents were asked whether they had run/created a business and we utilize the change in this response to identify entry into entrepreneurship as our main outcome variable. In addition to direct engagement in entrepreneurial activity, the CHFS data also allows us to define a broader measure of entrepreneurship, ownership of business equity, which may not be a household's own business (e.g.,

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<sup>1</sup> A full-fledged legal and institutional environment associated with property rights is believed to facilitate the protection of entrepreneurs from expropriation by powerful political groups and therefore promote entrepreneurs' financial and investing activities (Acemoglu and Johnson, 2005). A number of influential papers have addressed the importance of property rights institutions in firms' investing or financial activities (Berkowitz et al., 2015; Demirgüç-Kunt and Maksimovic, 1998; Johnson et al., 2002; La Porta et al., 1998; McLean et al., 2012), as well as in household decision making such as investment (Besley, 1995; Galiani and Schargrodsky, 2010; Goldstein and Udry, 2008), labor market, and residential choices (Field, 2007; Frye and Shleifer, 1997; Wang, 2012).

Corradin and Popov, 2015). The respondents were also asked questions related to their residential property, including the property rights type (full or limited) and the value of the house. The FPR indicator is our main explanatory variable. In addition, information was obtained on housing and non-housing wealth, as well as mortgage and non-mortgage debt, raised through informal financing.

Our baseline results indicate that the probability of starting a new business is significantly higher for homeowners with FPR than for those without, even in a region that experienced significant home price appreciation. The magnitude of the effect is also economically significant: a 4.1% appreciation in house price in two years raises the probability of entrepreneurship by 21%. The effect is robust across different specifications after controlling for a full array of homeowners' demographic and financial information, as well as regional social-economic characteristics. We find similar effects when we adopt an alternative definition of entrepreneurship based on indirect ownership of someone else's business. To address potential endogeneity concerns that some differences between FPR and LPR homeowners may be driving the different entrepreneurial outcomes, we also construct matched samples of homeowners with and without FPR who are observationally similar. The estimated effect is still statistically significant and similar in magnitude.

There may be reasons other than the collateral channel why increasing housing wealth induces more entrepreneurial activity, such as the wealth effect documented by Hurst and Lusardi (2004). As individuals become wealthier, they are likely to take more risks and thus decide to start their own business. We use a number of measures to disentangle the wealth effect from the collateral channel. First, CHFS surveys information on individual risk attitude, so we can control for different levels of risk preference. The result is very similar to the baseline. Second, it is also possible that entrepreneurship is a "luxury good," from which wealthier individuals are able to purchase non-pecuniary benefits, including prestige or flexible working hours. We address this concern by splitting the sample into homeowners with and without debt. While both types of homeowners become wealthier as the house price increases, the collateral channel should only work through homeowners who have no outstanding debt. The results suggest that the estimated effects of FPR are primarily driven by homeowners without debt. Third, a necessary condition for the

collateral channel to work is that there should be a reasonable level of financial development and access to financing in the local market. We thus classify regions in our sample based on bank branch penetration as a proxy for the level of financial development and run the baseline regression by subsamples. The results indicate that the impact of FPR on entrepreneurship is more prominent in areas with higher levels of financial development. Last, we find a significant and positive relation between new business activities and change in household debt. These results support the collateral channel hypothesis, whereby new entrepreneurs use their house collateral to finance their new business.

We also examine the effect on the intensive margin of entrepreneurship and study whether the variation in collateral value induced by house price dynamics can have an impact on other entrepreneurial outcomes, such as firm size, employment, and profitability. We find little difference in firm assets, the number of employees and profitability between businesses started by homeowners with and without FPR.

Finally, we conduct a macro-level analysis of the effect of the collateral channel. The results largely confirm our baseline finding, that rising house price induces entrepreneurship. The concentration of FPR homeowners at the county level is also positively correlated with employment and economic growth, making it easier for homeowners to obtain external financing via the collateral channel.

This paper contributes to the growing literature on entrepreneurial activity. A number of papers explore the effects of many factors on entrepreneurial decisions, such as liquidity constraints (Evans and Jovanovic, 1989), credit or borrowing constraints (Boháček, 2006; Wang, 2012), household wealth levels (Fairlie and Krashinsky, 2012; Hurst and Lusardi, 2004), homeownership (Bracke et al., 2012), risk aversion (Herranz et al., 2015), non-diversifiable risk (Chen et al., 2010; Wang et al., 2012), and the regulatory environment (Klapper et al., 2006). Two recent papers are closely related to what we address. Adelino et al. (2015) document the collateral lending channel by regressing the increase in housing prices on self-employment growth. Corradin and Popov (2015) provide evidence that housing equity has a significant and positive effect on entrepreneurial decisions. Our research, based on a unique dataset in China, provides empirical evidence on the effect of the collateral channel on entrepreneurial activity due to different property rights that may limit peoples' access to house equity.

Our paper also contributes to the property rights literature by offering an empirical test of the effect of full housing property rights on entrepreneurs. De Soto (2000) points out that the real estate occupied by urban squatters contains vast amounts of potential wealth that could be transformed into capital for entrepreneurial ventures through the formalization of property rights. Wang (2012) documents the importance of change in the ownership of employer-provided housing for entrepreneurship in China. There is a much broader property rights institution literature that studies the link between property rights and economic development and investment activities in former colonial as well as transitional countries (Acemoglu and Johnson, 2005; Beck et al., 2003; Beck and Laeven, 2006; Frye and Shleifer, 1997; Johnson et al., 2002; McMillan and Woodruff, 2002). The focus of this paper is the home equity-based collateral lending channel for entrepreneurial ventures in the presence of credit constraints resulting from imperfect property rights.

Finally, our paper increases our broad understanding of the Chinese housing market. A few papers examine the home prices in major cities in China and look for signs of a potential asset bubble (Wu et al., 2012; Ren et al., 2012). Fang et al. (2016) document rapid housing price appreciation as well as growth in household income in Chinese cities in 2003–2013 and find little evidence of imminent financial crisis. Other papers also explore the impact of rising housing prices on social and economic activities. Wei and Zhang (2011) document a positive effect of housing wealth on marriage. Li and Wu (2014) explore the relation between housing prices in China and individual occupational choices and find home purchase crowds out entrepreneurial activities. Our paper finds that access to housing equity during the housing boom helped new business formation.

The remainder of the article is organized as follows: Section II introduces China's legal system regarding housing property rights and the overall housing market. Section III presents details about the data and outlines the empirical research design. Sections IV and V report our main empirical results and Section VI presents the region-level analysis. Section VII concludes the paper.

## **II. Housing Property Rights in China**

Land and residential housing units have been nationalized and owned by the Chinese government since the founding of the country in 1949. House transactions were strictly prohibited and the central government was the monopolistic power in house production, distribution, and maintenance. All residential housing units were allocated to individual households through states or SOEs. The situation started to change during the 1990s, when China implemented a series of reforms to promote housing market development. Residents were offered the opportunity to purchase state-owned housing units from their state employers at below-market prices and private developers were allowed to develop residential housing projects and sell the developed housing units to various buyers in urban China. The housing reform greatly increased home ownership in this country and played an important role in transforming the country into a country with one of the highest rates of homeownership (Wang, 2012).

According to the Urban Real Estate Administration Law of the People's Republic of China, housing property rights in China include structure ownership and LUR, where all urban land is owned by the state while rural land is collectively owned by the village. Individual LUR can only be granted when the land used in construction is converted from collectively owned rural land to urban land and the owners are then entitled to 70 years of use rights following the land purchase. This gives rise to dual house property rights in China. The law grants FPR to homeowners when they possess proof of both ownership of the structure/property and LUR. The FPR entitle homeowners to use, possess, and dispose of the property, as well as use the house as collateral to borrow from banks. On the other hand, LPR arise when homeowners have only ownership of houses with no proof of LUR. According to the Land Management Law of China, LPR houses cannot be legally sold in the urban housing market. Moreover, LPR owners cannot use their houses as borrowing collateral because the Chinese Guarantee Law mandates that proof of both types of ownership be recorded in mortgage lending. It is also possible for homeowners to have no ownership due to property rights disputes or illegal construction, that is, they have no property rights (NPR). These NPR houses are legally forbidden from entering the market. We include such cases in the LPR category.

The causes of LPR house are twofold. First, the owners have no LUR when they obtain home ownership via their original employer, which is the government, a public institution or an SOE. This usually happens when the owner purchases at below-market prices or the housing unit provision is included as part of the employment benefits. Since LUR still belong to the original employers, individual owners do not hold the LUR certificate of their houses.

The second cause is the double-track system of land ownership and use management that the Chinese government has long implemented uniformly throughout the country. The system draws a strict line between urban land and collective rural land. According to the revised 1998 Land Administration Law, all urban land belongs to the state and can only be acquired after paying LUR fees. On the other hand, land in rural districts and villages belongs to collectives, including farmers' cooperative societies or village committees. Collective land can be inherited and used for cultivation or for farmers to build their own houses on but cannot be converted to urban use without undergoing legal procedures. Individual owners of houses built on collective land do not hold the LUR certificate of their properties. The past two decades have witnessed accelerating urbanization and city expansion in China in multiple forms and through many approaches, such as mergers, the direct and cooperative development of villages and towns, the reconstruction of old cities, and new rural construction. Many villages that used to be located on the city periphery have now become incorporated into the inner city and have become an increasingly scarce resource with increases in land value. To facilitate urban development and simultaneously reduce compensation costs, many Chinese local governments have chosen to convert part of the collective land, which is mostly for farming, into urban land but to leave its status of residential land unchanged. This has led to the emergence of LPR houses on collective land in inner cities. Many real estate developers are also major participants in the construction of LPR houses to avoid paying large amounts of LUR fees to the local government.



According to the statistical bulletin of the State Statistics Bureau, by 2012 the number of LRP houses reached 6.6 billion square meters, accounting for 20% of country's total housing stock.<sup>6</sup> Although the contracts signed in the sales of LRP house will not stand in any Chinese court as legal documents, LRP houses are still sold well in many cities due to the rapid increase in the price of commercial residential building in urban areas.

### **III. Data and Methodology**

#### **A. Data**

To analyze how housing property rights affect collateral value and the decision to enter into entrepreneurship, we use the household-level data from the CHFS. The CHFS is the first and only nationally representative survey on household finance in China and has more complete geographic coverage than other surveys, such as the China Health and Nutrition Survey (CHNS) and the China Family Panel Studies (CFPS). The CHFS employs a stratified three-stage probability proportional to size random sample design.<sup>7</sup> Specifically, the primary sample units include 2,585 counties (including county-level cities and districts) from all provinces in China except Tibet, Xinjiang, Inner Mongolia, Hong Kong, Macau, and Taiwan in the first stage and the second and third stages involve selecting residual committees and households. Every stage is performed with the probability proportional to size method and weighted by its population size. Our sample includes three waves of data collected so far, the 2011, 2013 and 2015 survey. Our analysis is based on repeat families who were surveyed in at least two consecutive years, which allows us to study changes in households' assets, liabilities, business ventures, and employment. The final sample contains a total of 26,392 household-year observations.

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<sup>6</sup> See [http://www.chinadaily.com.cn/opinion/2013-12/10/content\\_17163175.htm](http://www.chinadaily.com.cn/opinion/2013-12/10/content_17163175.htm). This rapid growth is more even prevalent in southern cities. For example, Shenzhen, in Guangdong province, alone was estimated to comprise more than 379,400 such houses, about 49.3% of the total stock (Shen and Li, 2014).

<sup>7</sup> For details of the survey design, see Gan et al. (2012).

Our definition of entrepreneurship is based on the survey question asked in each wave: “Have you run/created a business in the past year?” We utilize changes in responses to identify entry into entrepreneurship as our main outcome variable. Specifically, we define entrepreneurs as individuals who were non-business owners in the 2011/2013 wave but reported running/operating a business in the 2013/2015 wave. The measure is in similar spirit to that of Corradin and Popov (2015) and richer than in previous studies, which cannot distinguish between direct and indirect ownership. In addition to direct engagement in entrepreneurial activity, we adopt a broader measure of entrepreneurship in the robustness check: ownership of a business equity that may not be the household’s own business. The respondents were also asked about the property rights type of their residential property (FPR or LPR). The responses to these questions allow us to construct the dummy variable *FPR* that equals one if the household has FPR over its house and to include it as our main independent variable.

We also notice that expected housing price growth plays an important role in the pricing of residential mortgages based on the application of option-pricing theory in the field of real estate. The evaluation of residential mortgages has been extensively examined using options-based models (Kau et al., 1995; Deng et al., 2000), where the constant expected growth of housing price is usually specified. As a result, expectation of housing price growth is taken into our consideration in the examination of collateral lending channel. Past housing price usually has important implication for the formation of housing price expectation and mortgage credit (Goetzmann et al., 2012), in that the expectations can be formed based on the past housing prices due to people’s backward looking tendency (Case and Shiller, 1988; Zhang et al., 2017). During the past ten years, Chinese urban areas have experienced rapid housing price appreciation, suggesting the importance of considering the history of housing price in the analysis. We make use of the predicted housing price growth generated from the deterministic time trend model with autoregressive processes to represent the expected growth of housing prices, in order to better capture the effects of rising house prices on entrepreneurial activity. Housing prices usually can also display feature of autocorrelation due partially to backward looking tendency (Capozza et al., 2004; Mayer and Sinai, 2009).

The rise in house prices may also influence decisions to become self-employed due to the wealth effect rather than the collateral channel. To isolate the confounding role of such a wealth effect, it is necessary to control for contemporaneous income and wealth. We take advantage of the great amount of detail in the survey data related to households' financial conditions, including housing and non-housing wealth, mortgage borrowed from the bank, and debt raised from informal financing.

Individuals who choose to become self-employed can differ in many ways that impact entrepreneurship. The CHFS dataset contains a rich set of demographic variables and allows us to control for potential differences in an observable household's characteristics. Specifically, we observe the household head's age, gender, education, legal residence (so-called *hukou*), and marital status. We measure individuals' risk preferences based on responses to a series of questions on whether the respondent tends to invest in a high-risk, high-return project. We need to control for individuals' risk preferences to mitigate potential endogeneity due to correlation between household wealth and risk preferences. The household level characteristics for the whole family in the CHFS data include the household size, the number of healthy family members, and whether any of the members works as a civil servant or for an SOE. The latter variable indicates a more stable income source for the family, which is likely to lower their entrepreneurial tendency. We also create a security indicator of whether any member of the family receives social security. To account for the fact that a more booming local economy raises the propensity to start a new business, we complement our sample with the gross state product at the county level from the China National Bureau of Statistics. Finally, we merge our dataset with information on local house prices and calculate their growth between the two survey waves.

## **B. Summary Statistics**

Table 1 reports descriptive statistics of the variables used. Panel A shows the detailed individual-level characteristics for household heads. They are, on average, aged 52.4 and have nine years of education (equivalent to junior high school), 69% are male, 88% are married, and 10% are categorized as risk takers.

The key variable of interest is the share of households that were previously non-entrepreneurs and chose to become self-employed. The responses to the question on entrepreneurial activity indicate that about 7% of non-entrepreneurs started their own business during 2013 or 2015. The estimate is largely comparable with the results of other Chinese studies. For example, Li and Wu (2014) use the 2005 Inter Census Population Survey to show the fraction of entrepreneurs ranges from 11.0% to 13.5%, while Wang (2014) suggests the self-employment rate is around 6%, based on the China Health and Nutrition Survey. In Table A1 in the Appendix, we stratify new business owners according to region and industry and calculate the share in each category. Most of the new entrepreneurial activities are in retail and wholesales, followed by accommodation, food service, transportation and warehousing, manufacturing and construction. The sectoral breakdown reveals that the entrepreneurs in our sample are primarily small business owners who are unlikely to be big job creators. Local economic conditions are vital factors that impact entrepreneurial decisions and there is large variation in the number of household businesses starting across regions. As we move from the more developed east coast to western regions with a less developed economy, the share of new businesses decreases dramatically, confirming the economic gap between the eastern and western parts of China.

Panel B of Table 1 reports the statistics of the household-level variables. On average, each household includes 3.5 people, reflecting the fact that households with more than one generation of adults are common in urban China. With the successive economic reform and opening-up policies, the private sector has become a vibrant employment-generating force, with only 12% of households having a family member working for the state or an SOE.<sup>8</sup> A total of 76% of families will have access to a senior family member's retirement pension. In terms of the household balance sheet, housing wealth, averaged at 535,973 RMB, represents 74% of total wealth, while non-housing wealth accounts for only 26%. A total of 10% of households carry mortgage debt.

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<sup>8</sup> According to the China Statistical Yearbook, the share of employment by SOE declined from 60.5% to 19.8% between 1998 and 2011.

Finally, Panel C of Table 1 presents summary statistics for region-level variables, namely, predicted house price growth (as a proxy for the increase in collateral value) and dummy for rural area (to control for the local economic environment for entrepreneurship). House prices in China have experienced rapid and prolonged growth in the recent decade, rising nearly twice as fast as people's disposable income has. This is confirmed by the results for our sample: The mean of predicted two-year regional house price growth is as high as 5.1%, while that of unpredicted two-year growth drops 6.6%. There is also a large degree of heterogeneity in predicted house price growth across different regions, which is critical for our design to identify the role of property rights in the impact of collateral value on entrepreneurship decisions. The standard deviation of predicted two-year growth is 2.7% and predicted two-year growth is 1% at the 10th percentile and 8.9 % at the 90th percentile.

To more precisely quantify the effect of the collateral channel, we need to account for differences in other characteristics that are determinants of the entrepreneurship decision. We further split the sample based on whether the household transitioned into entrepreneurship in 2013/2015 and contrast the individual- and household-specific characteristics between the two groups in Table 2. Variable means are presented in the first and second columns for non-business and business owners, respectively, and the t-statistics for the difference are shown in the third column. The differences between the two groups are both statistically significant and economically large in most dimensions. For example, business owners are younger and more likely to be male and married. Consistent with the argument that risk-tolerant individuals are prone to becoming entrepreneurs (Hvide and Panos, 2014), the business owners in our sample, on average, have more appetite for risk. Individuals have less incentive to start their own business if they live in a smaller household that enjoys a stable income source or receives a retirement pension. Importantly, Table 2 implies that those who transition into entrepreneurship have a similar level of initial housing wealth compared to non-entrepreneurs.

[Insert Tables 1 and 2 here]

### C. Empirical Strategy

To evaluate the casual impact of property rights on labor market outcome, we adopt a difference-in-difference identification strategy. The “treatment” is the predicted two-year cumulative house price growth in the local market. The treatment group is the set of individuals who own their house with full property rights (FPR), whereas the control group is comprised of owners with limited or incomplete property rights (LPR). A rise in house price leads to greater collateral value available to the FPR homeowners for consumption and investment, while the LPR homeowners’ consumption and investment outcomes should remain unaffected due to their inability to collateralize their homes. Compared to the previous literature, our empirical strategy has the advantage of comparing homeowners instead of contrasting homeowners with renters, because renters are negatively affected by variations in local house prices and may not be a valid control group (Schmalz et al., forthcoming).

Our baseline econometric model is a difference-in-difference regression fit at the household level. Specifically, consider a non-business homeowner  $i$  residing in region  $j$  at year  $t$ . We estimate regressions of the form

$$\begin{aligned} Prob(Entrepreneurship)_{i,j,t+1} \\ = \alpha + \beta \times (FPR_{i,t} \times PredictedHousePriceGrowth_{j,t+1}) + \theta \times FPR_{i,t} + \gamma \times M_{i,t} \\ + \tau \times M_{i,t} \times PredictedHousePriceGrowth_{j,t+1} + \delta_j + \varepsilon_{i,j,t} \quad (1) \end{aligned}$$

where  $Entrepreneurship_{i,j,t+1}$  is an outcome variable that equals one if household  $i$  in region  $j$  was a non-business owner in year  $t$  but became a business owner in the next period,  $t + 1$ . The dummy variable  $FPR_{i,t}$  is a treatment indicator that takes the value of one for the homeowner with FPR, while  $PredictedHousePriceGrowth_{j,t+1}$  is the predicted cumulative house price growth in region  $j$  between 2011 and 2013 (or 2013 and 2015). In all specifications, the main effect of  $PredictedHousePriceGrowth_{j,t+1}$  is absorbed by region fixed effects  $\delta_j$ , which aim to capture factors that are common to all households living in the same region. Because our focus is to identify the impact of

house property rights, we limit our sample to only homeowners in the main analysis. The term  $M_{i,t}$  represents the list of demographic and financial variables as described in Table 1 that matter for entrepreneurial choice: age, education, gender marital status, and risk preference for household  $i$  living in region  $j$  at time  $t$ . Schmalz et al. (2017) suggest that omitting household wealth as a control can introduce an upward bias, because wealthier individuals may be simultaneously more likely to purchase a house and start a business. A number of studies also show that the inability to raise sufficient capital is the main barrier to entrepreneurship. Therefore, we include variables related to household financial assets and liability in  $M_{i,t}$ , such as non-housing wealth and a home mortgage dummy. To moderate heterogeneity across homeowners with and without FPR, we also include the interaction of house price growth,  $HousePriceGrowth_{j,t+1}$ , and household characteristics  $M_{i,t}$ . The term  $\varepsilon_{i,j,t}$  is the error term assumed to be conditionally uncorrelated with unobserved determinants of  $Entrepreneurship_{i,j,t+1}$ . To account for serial correlation and local specific random shocks, we cluster standard errors at the county level in all specifications.

The coefficient of interest is  $\beta$ , which measures how the differential in entrepreneurial activity between FPR and LPR homeowners living in the same region varies with house price growth, holding constant individual-level, household-level, and aggregate differences. We expect  $\beta$  to be positive, which indicates that FPR homeowners are more likely to start a business (via the collateral borrowing channel) than the other types of homeowners are and this gap is significantly larger in areas with rapid house price growth, relative to those with low house price growth.

There are a number of nontrivial concerns about our estimate potentially being biased. The first is related to the omitted variable bias. FPR and LPR homeowners can differ in ways that can influence how the entrepreneurship decision responds to local house price growth. For example, FPR homeowners may be more likely to start a business in sectors with greater exposure to local economies. To address this concern, we include the interaction of the vector of control variables and house price growth to account for the elasticity of entrepreneurship to house price growth. In addition, we construct a matched sample of FPR and

LPR homeowners who are observationally similar and repeat our analysis based on the matched sample. One limitation of our study is that we do not have the instrument for household homeownership as suggested by Saiz (2010) and Chaney et al. (2012).

Another potential concern is that a demand channel may exist whereby the housing boom will feed back into local demand and raise the return to entrepreneurship. Therefore, the difference in entrepreneurial choices between FPR and LPR owners may be driven by channels other than the collateral channel we want to identify. While the demand channel cannot explain the difference between the two types of homeowners, we conduct a robustness check by excluding new business in industries that are directly linked to the housing boom, such as construction and real estate finance.

Third, increasing housing wealth can affect entrepreneurship for reasons other than the collateral channel, since Hurst and Lusardi (2004), using survey data, show that personal wealth is important for entrepreneurship among the richest households. One possibility is that individuals take more risks as they become wealthier. We include the risk preference variable to account for this. Another reason may be that entrepreneurship is a luxury good; that is, wealthier individuals are more likely to purchase non-pecuniary benefits pertained to owning their business, such as prestige or flexible working hours. We address this concern by exploiting the cross-sectional heterogeneity in initial household leverage and splitting our sample into two groups: homeowners with and without debt. If our estimates are driven by the wealth effect, we should expect the effect to persist for both groups of homeowners. However, we find a significant impact only for homeowners without debt, which is consistent with the collateral channel.

Finally, we compare the change in household debt between new business owners and non-business households and observe a significant increase in total debt for the new business owners. This result provides direct evidence of the collateral channel, whereby business owners can indeed tap into housing wealth.



## IV. Main Results

This section presents the main estimate of how access to collateral induced by house property rights affects the owner's probability of transitioning into entrepreneurship. We first present formal difference-in-difference estimates for the entrepreneurial outcome and then perform a series of alternative tests to evaluate robustness. To provide additional evidence on the role that collateral plays in the response of entrepreneurship choice to rising house value, we examine heterogeneous series across various dimensions.

### A. Entrepreneurship Choice

We begin by considering the homeowners' extensive margin choice of whether to become self-employed. To do so, we estimate the pooled difference-in-difference regression given by Equation (1) using as the outcome an indicator for whether the homeowner chooses to transition into entrepreneurship. Table 3 presents the results from these regressions. The first column reports the estimate from a baseline specification that includes only the FPR main effect, the interaction of the effect with house price growth and region fixed effects at the county level. This specification removes the influence of average differences across regions and identifies the effect of access to collateral by comparing the entrepreneurship choice between FPR and LPR house owners in response to the rise in house values within the same region. To account for the effect from that of other observables, we complement our specification in the remaining columns with a series of control variables progressively categorized in Section III. To allow the observable characteristics to vary freely with house property rights, we also interact the control variables with house price growth. In the second column, we add a set of individual characteristics for the household head, including age, gender, marital status, and education. The third column further accounts for differences in household-level demographic characteristics and financial conditions. Finally, to address concerns related to the impact of the differential macroeconomic environment on the entrepreneurship choice, Column (4) includes the region-level GDP.

Take the specification in Column (4) of Table III with the full set of control variables and county fixed effects, for example. The coefficient estimate of the main effect of *FPR* is both statistically and economically insignificant, implying that, for constant housing wealth (no experiment), there is no meaningful heterogeneity in entrepreneur choice between FPR and LPR house owners. The gap increases significantly after the house value rises, as evidenced by the positive and statistically significant coefficient of the interaction term *FPR\*House Price Growth*. The estimated effects are all significant and relatively stable across specifications,<sup>9</sup> suggesting that higher property values significantly increase the propensity to start a new business for FPR house owners who have full access to their home's collateral value, as opposed to the observationally identical LPR house owners who live within the same region and face stringent collateral constraints.

The effect also has a sizable economic magnitude. Take the specifications with full controls and the interaction terms in Column (4) of Table III. Moving from the 25th to the 75th percentile of house price growth (corresponding to a 4.1% increase) raises the difference in the propensity of transitioning into entrepreneurship between FPR and LPR homeowners by 1.5 percentage points ( $0.3582 \times 0.041$ ). Given that the mean unconditional probability of transitioning into entrepreneurship for the full sample is 7.1%, the estimate is equivalent to a 21% increase in the probability of becoming an entrepreneur in the next period.

[Insert Table 3 here]

## **B. Robustness Checks**

This section presents a series of robustness checks of our main findings. The results are summarized in Table 4 to 6.

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<sup>9</sup> The stability of the estimates across specifications suggest that the observable characteristics are relatively representative of unobservable variables and thus the omitted variable bias is of less concern for our estimate of  $\beta$ .

*Survey Weight.* We start by addressing concerns related to the survey design. The survey data may not be very representative of the whole population, since the CHFS may intentionally overweight groups with certain characteristics to ensure complete coverage. To address this concern, we replicate the analysis of Equation (1) using the reported survey weights to reweight our observations and the estimate is shown in Column (1) of Table 4. The results from this exercise are both qualitatively and quantitatively similar to the estimates reported above, suggesting that the main findings are unlikely to be generated by unrepresentative samples.

*Alternative Entrepreneurship Definition.* As a further robustness check, we explore alternative ways to identify entrepreneurial activities to ensure our main difference-in-difference estimates are not limited by our proxy for entrepreneurship. As explained in Section III, the measure we use in Section IV.B focuses solely on the direct ownership of a business and includes individuals who own and run a business—a direct investment—in the sample of entrepreneurs. However, this proxy does not take into account ownership in the business of another—indirect business ownership—which has been used in the literature. We replicate the pooled difference-in-difference estimate employing an alternative definition of entrepreneurship used by Hurst and Lusardi (2004) that considers cases in which individuals either become self-employed or invest in another agent’s business. The dummy variable for entrepreneurship equals one if non-business owners at time  $t$  either run their own business or own business equity in the very next period. The results based on the new definition are shown in Column (2) of Table 4. We still find a positive and statistically significant estimate of  $\beta$  ( $p < 0.05$ ) using the broader definition and therefore our results are not likely to be driven by the choice of entrepreneurship proxy.

*Matching Estimates.* We address another potential concern with our main difference-in-difference estimates provided in the previous section. They rely on standard ordinary least squares (OLS) estimation, which can be sensitive to the difference in the distribution of observable or unobservable characteristics across the treatment (FRP homeowners) and control (LPR homeowners) groups. In other words, our estimate can be biased if the differences between the two types of homeowners are related to the sensitivity

of the entrepreneurial decision to house price growth. To deal with this issue, we take an alternative approach to estimate the effect of the house property rights type using a propensity score matching estimator. Specifically, we construct a matched sample of FPR and LPR homeowners who are observationally similar by performing nearest-neighbor matching using a rich set of household wealth and demographic information. The approach enables us to alleviate concerns about covariate imbalance by restriction to the sample with overlapping characteristics and the construction of valid counterfactual outcomes for each FPR homeowner (Heckman et al., 1997; Heckman et al., 1998; Imbens, 2004). The estimate from the matched sample is reported in Column (3) of Table 4. We find that  $\beta$  continues to be positive and significant at a point estimate of 0.3611 and the effect is comparable with the estimate using the full sample.

*Demand Boom and Feedback Effect.* Our estimates can be biased upward if the rise in hourly price drives entrepreneurial activity through a demand channel instead of the collateral borrowing channel: Changes in home price can feed back into local demand booms and therefore increase new business formation. To address this concern, we employ a similar strategy as for Schmalz et al. (2017) and Adelino et al. (2015) and exclude new business in industries that are directly linked to the housing boom, such as construction and real estate. We report the estimate in Column (4) of Table 4 for the sample without entrepreneurs who were driven by the housing boom to start a business. The main effect is still significant at the 5% level, suggesting that our results are not likely to be driven by the demand boom effect.

*Home-purchase Restriction as the Shock.* The expansion of Chinese housing market is associated with soaring housing prices and falling housing affordability. To curb the soaring housing price, local government adopted a series of policies, among which home-purchase restriction is considered as the most stringent one. Prior literature also provides evidence that purchase restriction reduce the both the annual growth rate and level of housing prices, which indicates the effectiveness of such policy tool (e.g., Du and Zhang, 2015; Sun et al, 2017). Since the purchase restriction policy introduces a shock to the house price variation, we replace *Predicted House Price Growth* by a dummy indicating the restriction period in a city and re-estimate Equation(1). As can be observed in Table 5, the estimates are all negative and statistically significant,

suggesting that house value depreciation reduce the probability of becoming an entrepreneur in the next period for FPR house owners, who have full access to their home's collateral value, as opposed to the observationally identical LPR house owners.

*Placebo Test for Renters.* Finally, we conduct a falsification test utilizing the sample of renters. As explained in Section III, as house prices rise, the collateral channel works only for FPR homeowners, since they can extract more housing wealth to raise sufficient capital for a new business. We re-estimate Equation (1) based on the sample of LPR homeowners and renters who do not enjoy the benefit of credit constraint alleviation due to rising house prices.<sup>10</sup> We expect insignificant estimates for this test. Again, we progressively add the controls and their interaction with house price growth, as in Table 3. The estimates are presented in Table 6 and the coefficients of the interaction term are indistinguishable from zero across all specifications.

[Insert Tables 4-6 here]

### **C. Heterogeneity Test**

In this section, we provide further evidence that the collateral channel is the dominant force leading owners of FPR houses to start their own business following an increase in house price. To do so, we exploit various dimensions of cross-sectional heterogeneity in the magnitude of the estimates using subsamples categorized by different demographic, financial, and state-specific variables. If access to collateral value is driving the response of entrepreneurship choice to the rise in the house wealth, we might expect those FPR house owners with less limited borrowing capacity to respond more aggressively. While a borrower's initial leverage is not exogenous and could be correlated with other observable and unobservable factors, it is also a direct measure of additional collateralized borrowing capacity. Therefore, the evidence that FPR house owners with lower initial leverage should respond more strongly to a rise in property value lends further

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<sup>10</sup> A rise in local house price could negatively affect the propensity to start a new business among renters. This is because the house price increase leads to a rise in rent, so that renters have fewer resources available to start a new business.

support for the role of collateral channel in driving the difference-in-difference estimate and is hard to reconcile with alternative interpretations.

To test whether the effect is more pronounced among house owners with low initial leverage, we follow Schmalz et al. (2017) and group our sample of house owners into two categories based on the presence of initial outstanding household debt observed in 2011/2013: full owners (owners without debt) and partial owners (owners with outstanding debt). Columns (1) and (2) of Table 6 report the results from estimating Equation (1) to obtain estimates of  $\beta$  for the two subsamples separately. The results are consistent with our hypothesis and unambiguously show that the gap in the sensitivity of entrepreneurial activity to local house prices is mostly concentrated among full owners rather than among partial owners with outstanding debt. We find the estimate for full owners is highly significant at a point estimate of 0.6489. Moving from the 25th to the 75th percentile of house price growth (corresponding to a 4.1% increase) raises the difference in the propensity of transitioning into entrepreneurship between FPR and LPR homeowners by 2.7 percentage points ( $0.6489 \times 0.041$ ), which is equivalent to a 38% increase in the probability of becoming an entrepreneur in the next period.

Our results suggest that potential entrepreneurs are discouraged from starting a new business due to insufficient capital and access to the increase in collateral value can help them overcome this barrier. This raises additional questions related to the collateral channel hypothesis. If the collateral channel drives our main result, we expect that, for a given increase in local house price, constrained owners will react more strongly in terms of business creation relative to owners with fewer constraints. To address this issue, we use age as the proxy for constraint, because prior literature argues that young consumers are more likely to be liquidity constrained. We classify household heads in our sample into young and old groups: A household head belongs to the old group if his/her age is above the median of the distribution (50 years old). Column (3) of Table 7 estimates Equation (1) for the younger household sample while Column (4) estimates Equation (1) for the older sample. The coefficient of the interaction of property rights and house price growth is positive and statistically significant in Column (4), implying our main finding that an increase in

house price leads to a significant rise in self-employment for FPR house owners relative to LPR owners is mainly driven by younger individuals, who tend to be more constrained.

Do the characteristics of local business environment impact the association between house wealth and new business creation? In particular, it is well established that financial development or access to financing plays an important role in economic activity, including the labor market choice (Beck et al., 2003; Karlan and Morduch, 2009; Bruhn and Love, 2014). Following the previous literature (i.e., Bruhn and Love, 2014; Burgess and Pande, 2005), we collect region-level data on the number of bank branches and use the level of bank branch penetration as the measure of local financial development. Then we classify regions in our sample as being more financially developed if the number of bank branches is above the median of the empirical distribution and less financially developed otherwise. The estimates for the two groups of areas are shown in Columns (5) and (6) of Table 7. The point estimate for the most saturated specification is weakly significant at 0.4398 for individuals living in areas with lower levels of financial development and 0.2437 (insignificant) for house owners domiciled in more financially developed regions. The results suggest that the impact of FPR on the entrepreneurship decision as house prices rise is not different among areas with different levels of financial development.

[Insert Table 7 here]

## **V. Further Results**

### **A. Entrepreneurship Outcomes**

While the results in the previous section provide evidence of the likelihood of new business creation responding significantly to the rise in house price for FPR house owners, they say nothing about how efficiently the additional source of funding is used. In this section, we present the estimate of intensive margin analysis and investigate how access to more valuable collateral affects the entrepreneurship outcomes. Specifically, we take advantage of the questions in the survey data related to information about

the newly established business, including firm assets, the number of employees, and profitability. It is possible that the effect of increased collateral value on firm productivity and output is reflected only in the medium run. For example, the firm may have to make an irreversible technology choice upon creation and expect to make profits later, in future operations. However, we do not observe medium and long-run outcomes in the data. As with the extensive margin regressions presented in Equation (1), we adopt a difference-in-difference approach and estimate the following estimation based on the sample of new business owners, for entrepreneur  $i$  and region  $j$ :

$$Y_{i,j,t+1} = \alpha + \beta \times FPR_{i,t} \times PredictedHousePriceGrowth_{j,t} + \theta \times FPR_{i,t} + \gamma \times M_{i,t} + \tau \times M_{i,t} \times PredictedHousePriceGrowth_{j,t} + \delta_j + \varepsilon_{i,j,t} \quad (2)$$

The outcome variables we consider include the logarithm of firm assets, the logarithm of the number of employees, and an indicator variable for profitability. Table 8 presents the results from estimating the pooled difference-in-difference regression using the above outcome variables. The coefficient estimates of  $FPR \times PredictedHousePriceGrowth$  from the OLS specification in Columns (1) to (4) imply a smaller scale of operations, reflected by the firm's assets and number of employees, following housing capital gains and the effect is statistically insignificant. This result reconfirms the insight obtained from the sectoral breakdown of new businesses reported in Table A1: The entrepreneurs in our sample are, on average, small business owners rather than important job creators. Columns (5) and (6) of Table 8 present estimates of how access to more valuable collateral affects profitability. The profitability of a business created by FPR homeowners using new collateralized value is not significantly lower following greater house price appreciation, compared to LPR homeowners. The implication drawn from the results is that the positive impact of housing property right on new business creation induced by the house price appreciation does not lower the quality in the pool.

[Insert Table 8 here]



## B. Changes in Mortgage

Section IV provides evidence that the probability of new business creation responds strongly to the increase in collateralized borrowing capacity among FPR homeowners. However, whether housing wealth indeed drives entrepreneurial activities through the collateral channel depends on how the additional capital for creating new business is obtained. While the survey does not directly ask questions related to the source of funding, the data allow us to observe the behavior of new business owners in terms of changes in total household debt. Thus, we are able to evaluate two potential mechanisms as to how the increase in property value enables FPR home owners to raise sufficient capital to invest in their business. First, a home equity borrowing channel exists whereby homeowners extract equity from their property to finance their business. Second, FPR homeowners may simply collateralize their property to obtain external financing through either the bank or more prevalently, informal financing. Informal financial institutions have been shown to play an important role in China (i.e., Ayyagari et al., 2010) and one recent statistic shows that over two-thirds of property collateral loans are originated by informal financial institutions.<sup>11</sup> We explicitly test for the two potential channels by comparing changes in household debt composition between entrepreneurs and non-entrepreneurs in our sample and we estimate the following equation at the household level:

$$\Delta \ln (1 + Debt_{i,j,t+1}) = \alpha + \beta \times Entrepreneurship_{i,j,t+1} + \theta \times \ln (1 + Debt_{i,j,t}) + \gamma \times M_{i,j,t} + \delta_j + \varepsilon_{i,j,t} \quad (3)$$

where the dependent variable  $Debt_{i,j,t+1}$  is the logarithm change in total household debt from period  $t$  to period  $t + 1$  for household  $i$  living in region  $j$ . We also examine separately different components of total household debt: mortgage, credit card debt and debt raised from informal financing. To account for natural convergence, we also include the last period's stock of debt to control for time series correlation.

Table 9 reports the estimate of Equation (3) through OLS and all specifications include the same demographic and regional characteristics and fixed effects as in Table 3. Column (1) report the results for

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<sup>11</sup> <http://finance.sina.com.cn/meeting/2016-11-10/doc-iffxxsmic5902111.shtml>

total household debt, while Columns (2)-(4) show the results for mortgage, credit card debt and informal debt, respectively. The coefficient of the lagged variable indicates a smaller increase in household debt for homeowners with higher levels of initial leverage. In all cases, the estimated effect on the *Entrepreneurship* indicator is positive and highly significant, which implies that new business owners do accumulate more debt than otherwise similar individuals who do not become self-employed. Overall, the evidence is consistent with the collateral borrowing channel, whereby new entrepreneurs use their house as a source of wealth to finance their new business.

[Insert Table 9 here]

## VI. Macro Implication

In this section, we further explore whether the main findings we document at the micro level can be reflected at the aggregate level. This test enables us to obtain the regional estimate of the impact of property rights on entrepreneurship activities and to provide economic implications for our main finding. We first collect region-level information on two important economic outcomes, such as GDP and employment. Since the data related to FPR and LPR homeowners are not readily available at the aggregate level, we compute the fraction of FPR homeowners of all homeowners for each region and create a variable for the FPR ratio to exploit regional heterogeneity in the share of FPR house owners. We estimate a similar specification with a difference-in-difference design at the level of region  $j$ :

$$\Delta Y_{j,t+1} = \alpha + \beta \times FPR\ Ratio_{j,t} \times HousePriceGrowth_{j,t} + \theta \times FPR\ Ratio_{j,t} + \gamma \times HousePriceGrowth_{j,t} + \varepsilon_{j,t} \quad (4)$$

The dependent variables are the logarithm of the changes of the three variables: employment in Column (1) of Table 10, the GDP in Column (2), and the GDP per capita in Column (3) from period  $t$  to period  $t + 1$  for region  $j$ . Equation (4) is an aggregate version of Equation (1). In regions with more FPR houses, the increase in local house price leads to a larger increase in collateral value and thus boosts local

entrepreneurial activities. Table 10 presents the estimated results for Equation (4). While the smaller sample size leads to a modest loss of precision, all of the estimated effects are positive, which confirms that small businesses are an engine of job creation and a major contributor to the strength of local economies. The point estimate in Column (1) implies that the rise in local house prices leads to an increase in employment for regions with a larger fraction of FPR house owners and the estimate is statistically insignificant. We further investigate the impact on local economic development—with the GDP and GDP per capita—in Columns (2) and (3). Both columns yield positive and statistically significant coefficients. Local economic conditions respond significantly more to past increases in house prices in regions with a larger fraction of FPR homeowners. Overall, the region-level evidence is largely consistent with our main finding, that rising house prices induce entrepreneurship and promote economic growth primarily in areas where the homeowners are more likely to collateralize their property to obtain external financing.

[Insert Table 10 here]

## VII. Conclusions

This paper studies the impact of the housing collateral lending channel for entrepreneurial activities by allowing homeowners to access property equity and invest in new businesses. We exploit dual housing property rights forms in China as an instrument. Our treatment group consists of homeowners with FPR who have complete access to the collateral value, while the control group comprises LPR house owners who have no access to collateral lending. Using one survey’s country-wide and representative household-level data, we compare the sensitivity of entrepreneurial activities to house price dynamics between two types of homeowners: FPR homeowners, who have complete access to their house collateral value, and LPR homeowners, who have no such access.

Our estimation results show that the ownership of FPR housing can significantly increase the probability of family involvement in entrepreneurial activity in response to an increase in collateral value.

Going from the 25th to the 75th percentile of the empirical house price distribution raises the propensity of transitioning into entrepreneurship by 2.1 percentage points for FPR homeowners. The estimate is equivalent to a 19% increase in the probability of becoming an entrepreneur, relative to comparable LPR homeowners. The effect remains robust to controlling for a wide range of demographic, financial, and regional characteristics. We also document a positive relation between small business creation and change in household debt, especially debt raised from informal financial institutions, suggesting housing wealth is indeed a sufficient source of capital for entrepreneurs to start their business with and the benefit is limited to FPR owners in China.

Finally, we draw the implication of our main findings for the regional labor market and economic development. Our estimates offer new evidence on the importance of property rights in household entrepreneurship choices and shed new light onto the puzzle of the relation between property rights protection and external financial activity in China. The finding in this paper is supportive of potentially relevant policy related to property rights reform, especially in developing countries.

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## Appendix: Variable Definitions

**Table A.1: Variable Definitions**

<b>Panel A: Household- and Individual-Level Variables</b>	
Entrepreneurship	Dummy variable equal to one if the non-business owner in the 2011/2013 wave ran or operated a business in the 2013/2015 wave
Housing Wealth	Total housing wealth
Non-Housing Wealth	Total wealth of the household net of the house
Home Mortgage Dummy	Dummy variable equal to one if the household has outstanding mortgage debt
Household Size	Number of people in the household
Healthy_Number	Number of healthy members in the household
D(Civil Servant)	Dummy variable equal to one if at least one member of the household works as a formal employee in a public institution
D(State-Owned Firms)	Dummy variable equal to one if at least one member of the household works in an SOE
D(Social Security)	Dummy variable equal to one if at least one member of the household has social security, in other words, a retirement or pension after retirement
Age	Household head's age
Education (years)	Number of years of education of the household head
Male	Dummy variable equal to one if the household head is male
Married	Dummy variable equal to one if the household head is married
Risk Taker Dummy	Dummy variable equal to one if the household head is categorized as a risk taker
<b>Panel B: Region-Level Variables</b>	
Predicted House Price Growth	Predicted cumulative house price growth in the household's region between the three waves (2011 and 2013) using deterministic time trend model with autoregressive processes
GDP	GDP in the household's region

**Table 1: Summary Statistics**

This table presents summary statistics for our data. Panels A and B report household and individual characteristics, respectively, while Panel C reports region-level characteristics. All variable definitions are detailed in the Appendix.

Variable	Mean	SD	P10	P 25	P50	P75	P90
<b>Panel A: Individual Characteristics—Household Head</b>							
Entrepreneurship	0.071	0.256	0.000	0.000	0.000	0.000	0.000
Age	52.382	14.029	34	42	52	62	71
Urban Hukou	0.423	0.494	0	0	0	1	1
Education (years)	9.117	4.275	6	6	9	12	15
Male	0.694	0.461	0	0	1	1	1
Married	0.873	0.333	0	1	1	1	1
Risk Taker Dummy	0.102	0.303	0	0	0	0	1
<b>Panel B: Household Characteristics</b>							
Housing Wealth (RMB)	535973.2	1030065.0	10001	55000.5	200001	550000.9	1375002
Non-Housing Wealth (RMB)	184049.7	6194512.0	4000	11751	44150.5	140901	330001
Home Mortgage Dummy	0.104	0.306	0	0	0	0	1
Household Size	3.506	1.613	2	2	3	4	6
Healthy_Number	0.762	0.812	0	0	1	1	2
D(Civil Servant)	0.116	0.321	0	0	0	0	1
D(State-Owned Firms)	0.098	0.297	0	0	0	0	0
D(Social Security)	0.755	0.430	0	1	1	1	1
<b>Panel C: Regional Characteristics</b>							
Predicted House Price Growth (%)	0.051	0.027	0.010	0.032	0.049	0.073	0.089
Unpredicted House Price Growth (%)	-0.066	0.110	-0.182	-0.131	-0.088	0.003	0.069
Rural Area	0.360	0.480	0	0	0	1	1
Number of Observations = 26392							



**Table 2: Descriptive Statistics for New Business Owners and Non-Business Owners**

This table compares households that transitioned into entrepreneurship in the next period versus the subsample that remained non-business owners. All statistics are means and the t-statistics for the difference in means are shown in the last column. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

Variable	Non-Business Owner	Business Owner	Difference
Age	52.737	47.703	-14.99***
Urban Hukou	0.431	0.327	-8.73***
Education(years)	9.130	8.953	-1.72*
Male	0.693	0.704	1.01***
Married	0.870	0.906	4.48***
Risk Taker Dummy	0.098	0.148	6.79***
Housing Wealth (RMB)	540000	500000	-1.51
Non-Housing Wealth (RMB)	140000	780000	4.29***
Home Mortgage Dummy	0.102	0.130	3.71***
Household Size	3.467	4.027	14.5***
Healthy_Number	0.750	0.909	8.11***
D(Civil Servant)	0.119	0.089	-3.81***
D(State-Owned Firms)	0.100	0.067	-4.73***
D(Social Security)	0.761	0.672	-8.65***
Rural area	0.361	0.344	-1.47
Predicted House Price Growth (%)	0.051	0.055	6.64***
Unpredicted House Price Growth (%)	-0.065	-0.072	-2.68***

**Table 3: Housing Property Rights, House Price Growth, and Entrepreneurship**

This table present estimates of a linear probability model at the household level, as follows:

$$\begin{aligned}
 Prob(Entrepreneurship)_{i,j,t+1} \\
 = \alpha + \beta \times FPR_{i,t} \times PredictedHousePriceGrowth_{j,t} + \theta \times FPR_{i,t} + \gamma \times M_{i,t} \\
 + \tau \times M_{i,t} \times HousePriceGrowth_{j,t} + \delta_j + \varepsilon_{i,j,t}
 \end{aligned}$$

The dependent variable is a dummy variable equal to one if the non-business owner ran or operated a business in the next period. All regressions include region fixed effects. Column (2) adds individual characteristics for the household head, as well as their interaction with local house price growth; Column (3) adds household-level demographic and financial variables as well as their interactions with local house price growth; Column (4) adds region-level GDP as well as the interaction with local house price growth. See the Appendix for the variable definitions. Standard errors clustered by region are reported in parentheses. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent Variable = Entrepreneurship Dummy				
	(1)	(2)	(3)	(4)
FPR*Predicted House Price Growth	0.4508*** (0.1436)	0.4445*** (0.1577)	0.4398*** (0.1592)	0.3582** (0.1670)
FPR	-0.0257*** (0.0075)	-0.0112 (0.0079)	-0.0102 (0.0081)	-0.0148* (0.0083)
Individual Characteristics and Individual Characteristics* Predicted House Price Growth	No	Yes	Yes	Yes
Household Characteristics and Household Characteristics* Predicted House Price Growth	No	No	Yes	Yes
Rural area and Rural area * Predicted House Price Growth	No	No	No	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes
Observations	26392	26392	26392	26392
R <sup>2</sup>	0.0216	0.0314	0.0415	0.0443

**Table 4: Housing Property Rights, House Price Growth, and Entrepreneurship:  
Robustness Checks**

This table displays the results for the robustness checks. The dependent variable is a dummy variable equal to one if the non-business owner ran or operated a business in the next period. Alternative definition of entrepreneurship1 means at least one member operated a business in a family. Alternative definition of entrepreneurship2 is the union of entrepreneurship and entrepreneurship1. All regressions control for individual- and household-level demographic and financial variables, the region-level GDP, as well as their interactions with local house price growth and include region fixed effects. See the Appendix for the variable definitions. Standard errors clustered by region are reported in parentheses. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable = Entrepreneurship Dummy			
	(1)	(2)	(3)	(4)
	Survey Weight	Alternative Definition	Matched Sample	Excluding Housing Boom-driven sectors
FPR*Predicted House Price Growth	0.6546** (0.2732)	0.4325** (0.1882)	0.3611** (0.1690)	0.3408** (0.1683)
FPR	-0.0300** (0.0121)	-0.0182* (0.0096)	-0.0143* (0.0085)	-0.0143* (0.0084)
Individual Characteristics and Individual Characteristics* Predicted House Price Growth	No	Yes	Yes	Yes
Household Characteristics and Household Characteristics* Predicted House Price Growth	No	No	Yes	Yes
Rural area and Rural area * Predicted House Price Growth	No	No	No	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes
Observations	26389	26392	27505	26384
R <sup>2</sup>	0.0432	0.0314	0.0613	0.0441

**Table 5: Evidence from the Implementation of China's Housing Purchase Restriction**

This table displays the results for the impact of housing property right on entrepreneurship decision in response to variation in house value, using the implementation of China's Housing Purchase Restriction during our sample period. The dependent variable is a dummy variable equal to one if the non-business owner ran or operated a business in the next period. The predicted house price growth is replaced by a dummy, D(Purchase Restriction), which equals one if the city-year falls into periods of housing purchase restriction. All regressions control for individual- and household-level demographic and financial variables, the region-level GDP, as well as their interactions with D(Purchase Restriction) and include region fixed effects. See the Appendix for the variable definitions. Standard errors clustered by region are reported in parentheses. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable = Entrepreneurship Dummy			
	(1)	(2)	(3)	(4)
FPR*D(Purchase Restriction)	-0.0292*** (0.0074)	-0.0309*** (0.0091)	-0.0326*** (0.0092)	-0.0247*** (0.0095)
FPR	0.0073 (0.0054)	0.0207*** (0.0067)	0.0218*** (0.0067)	0.0114 (0.0070)
Individual Characteristics and Individual Characteristics* D(Purchase Restriction)	No	Yes	Yes	Yes
Household Characteristics and Household Characteristics* D(Purchase Restriction)	No	No	Yes	Yes
Rural area and Rural area * D(Purchase Restriction)	No	No	No	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes
Observations	26389	26392	27505	26384
R <sup>2</sup>	0.0432	0.0314	0.0613	0.0441

**Table 6: Placebo Tests for Renters and Homeowners without FPR**

This table presents estimates of placebo tests based on the sample of renters and homeowners without FPR. The dependent variable is a dummy variable equal to one if the non-business owner ran or operated a business in the next period. All regressions include region fixed effects. Column (2) adds individual characteristics for the household head, as well as their interactions with local house price growth; Column (3) adds household-level demographic and financial variables as well as their interactions with local house price growth; Column (4) adds the region-level GDP as well as the interaction with local house price growth. See the Appendix for the variable definitions. Standard errors clustered by region are reported in parentheses. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable = Entrepreneurship Dummy			
	(1)	(2)	(3)	(4)
FPR Renter* Predicted House Price Growth	0.0962	0.2395	0.3441	0.3230
	(0.1847)	(0.1975)	(0.3253)	(0.3253)
FPR Renter	-0.0248***	-0.0239**	0.0018	-0.0089
	(0.0090)	(0.0098)	(0.0195)	(0.0195)
Individual Characteristics and Individual Characteristics* Predicted House Price Growth	No	Yes	Yes	Yes
Household Characteristics and Household Characteristics* Predicted House Price Growth	No	No	Yes	Yes
Rural area and Rural area * Predicted House Price Growth	No	No	No	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes
Observations	18419	18419	18419	18419
R <sup>2</sup>	0.0246	0.0337	0.0453	0.0487

**Table 7: Heterogeneity Test**

This table explores the heterogeneity of our main findings. The dependent variable is a dummy variable equal to one if the non-business owner ran or operated a business in the next period. All regressions controls for individual- and household-level demographic and financial variables, the region-level GDP, as well as their interactions with local house price growth and include region fixed effects. Columns (1) and (2) divide the sample based on whether the household has outstanding debt. Columns (3) and (4) are run on the sample of individuals aged either above or below the distribution median. In Columns (5) and (6), we classify regions in our sample as being more financially developed if the number of bank branches is above the median of the empirical distribution. See the Appendix A for the variable definitions. Standard errors clustered by region are reported in parentheses. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

	(1) Without debt	(2) With debt	(3) Young	(4) Old	(5) Financial development: High	(6) Financial development: Low
FPR* Predicted	0.6489**	0.2829	0.5853*	0.1716	0.2437	0.4398*
House Price Growth	(0.3148)	(0.1969)	(0.3008)	(0.1887)	(0.2350)	(0.2509)
FPR	-0.0436**	-0.0037	-0.0182	-0.0106	-0.0114	-0.0148
	(0.0174)	(0.0098)	(0.0167)	(0.0093)	(0.0112)	(0.0129)
Individual Controls and Individual Controls *	Yes	Yes	Yes	Yes	Yes	Yes
Predicted House Price Growth						
Individual Controls *						
Predicted House Price Growth						
Household Controls and Household Controls *	Yes	Yes	Yes	Yes	Yes	Yes
Predicted House Price Growth						
Rural area and Rural area * Predicted	Yes	Yes	Yes	Yes	Yes	Yes
House Price Growth						
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9209	17183	8807	17585	10444	15861
R <sup>2</sup>	0.0597	0.0460	0.0549	0.0443	0.0600	0.0470

**Table 8: Intensive Margin Analysis—Entrepreneurial Outcomes**

This table reports the coefficient of regression of entrepreneurial outcome on the full rights ownership dummy and the interaction of the full rights ownership dummy and regional price appreciation in Equation (2). The dependent variables include the logarithm of firm assets in Columns (1) and (2), the logarithm of the number of employees in Columns (3) and (4), and the indicator variable for profitability that equals one for profits in Columns (5) and (6). Columns (1), (3), and (5) are without controls. Columns (2), (4), and (6) control for individual- and household-level demographic and financial variables, region-level GDP, as well as their interactions with local house price growth and include region fixed effects. See the Appendix for the variable definitions. Standard errors clustered by region are reported in parentheses. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Log(Firm Assets)		Log(# Employee)		Profit Dummy	
FPR*Predicted House Price Growth	-3.0751	-8.7289	-1.0342	-1.1572	-1.1725	-1.1345
	(5.9791)	(7.1665)	(2.1545)	(2.9142)	(0.9568)	(1.3160)
FPR	0.7280*	0.7371*	0.1515	0.1389	0.0560	0.0072
	(0.3754)	(0.4326)	(0.1244)	(0.1566)	(0.0553)	(0.0709)
Individual Controls and Individual Controls *						
Predicted House Price Growth	No	Yes	No	Yes	No	Yes
Household Controls and Household Controls *						
Predicted House Price Growth	No	Yes	No	Yes	No	Yes
Rural area and Rural area * Predicted House Price Growth	No	Yes	No	Yes	No	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1608	1608	1593	1593	1742	1742
R <sup>2</sup>	0.1411	0.2076	0.1413	0.1841	0.4243	0.4443

**Table 9: Change in Household Debt**

This table reports the OLS estimates of household debt change after transitioning into being a new business owner. The dependent variables include the logarithm of changes in total household debt in Column (1), mortgage debt in Column (2), Credit card debt in Column (3) and informal debt in Column (4) between the two survey waves, 2011 and 2013. In addition to the last period's stock of debt, all specifications control for individual- and household-level demographic and financial variables, region-level GDP, as well as their interactions with local house price growth and include region fixed effects. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

	$\Delta \log (\text{Total Debt})$	$\Delta \log (\text{Mortgage})$	$\Delta \log (\text{Credit Card Debt})$	$\Delta \log (\text{Informal Debt})$
	(1)	(2)	(3)	(4)
Entrepreneur Dummy	1.6710*** (0.1294)	0.9544*** (0.0995)	0.2379*** (0.0416)	1.3078*** (0.1232)
Total Debt_2011	-0.7795*** (0.0075)			
Mortgage_2011		-0.8089*** (0.0165)		
Credit Card Debt_2011			-0.7333*** (0.0193)	
Non-Bank Debt_2011				-0.8169*** (0.0074)
Individual Characteristics	Yes	Yes	Yes	Yes
Household Characteristics	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes
Observations	26392	26392	26392	26392
R <sup>2</sup>	0.4245	0.4085	0.4695	0.4706



**Table 10: Aggregate Impact**

This table presents the estimates of the regression of region-level entrepreneurial activity on the fraction of full rights owners, local house price growth, and the interaction of the two terms. The dependent variables include the logarithm of the changes for the variables for employment in Column (1), GDP in Column (2), and GDP per capita in Column (3) between the two survey waves, 2011 and 2013. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
	$\Delta \log(\text{Employment})$	$\Delta \log (\text{GDP})$	$\Delta \log (\text{GDP per capita})$
FPR Ratio*House Price Growth	17.6286 (20.3432)	3.3347* (1.9766)	11.0123*** (4.1070)
FPR Ratio	-0.9568 (1.1701)	-0.1707 (0.1377)	-0.7279** (0.2881)
House Price Growth	-17.8380 (19.9041)	-3.0499* (1.8366)	-9.9241*** (3.7582)
Constant	1.0109 (1.1381)	0.3670*** (0.1281)	0.8579*** (0.2624)
Observations	142	150	150
R <sup>2</sup>	0.0816	0.0175	0.0940