

Using City Mayoral Replacements to Estimate the Effect of Property Rights Protection on Investment

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ABSTRACT

This paper utilizes a novel instrument variable to solve the endogeneity problem that exists in identifying a causal effect between property rights protection and investment. In China, the replacement of a city mayor, the key figure lobbying for a higher local land supply, has a substantial negative impact on the total land quotas for local government. However, the impact of the replacement of city mayors on other investment-related policies, such as tax and fiscal expenditure, is quite weak. This exogenous decrease in land supply is used to verify the impact of obtaining land with property rights protection on investment. The result of instrumental variable regression shows that for each US Dollar that is invested in entitled land purchasing, the induced investment is 1.05 US Dollars. This indicates that the investment promoted by property rights protection accounts for 43% of economic growth in China for the period between 2008 and 2011. This impact is exerted through both a security channel and a collateral channel.

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The effect of property rights protection on investment is not a theoretical problem but an empirical one. On the theoretical level, economists have already reached the consensus that property rights protection plays a fundamental role in promoting investment. Ever since Adam Smith (1776), generations of institutional economists (North and Thomas (1973), North (1981), Knack and Keefer (1995), Acemoglu, Johnson and Robinson (2001), Engerman and Sokoloff 2003)) have been advocating the ultimate fundamental role played by strengthened property rights protection in promoting investment and fostering long-term economic growth. Various channels through which the impact of property rights protection on investment is exerted are also carefully analysed. Most notably, there are two channels: the security channel (Demsetz (1967) and Alchian and Demsetz (1973)) and the collateral channel (De Soto, 2010). The security channel is that the property rights protection will decrease the possibility of the land being expropriated from the land user, either by government or other politically connected parties, so that the investment incentives of more worry-free land users are promoted. The collateral channel entails that land with strengthened property rights protection will be more likely to be pledged as collateral so that the financial constraints faced by the land users, given its existence, will be lifted, leading to more investment.

However, on an empirical level, the evidence in support of the benign role of property rights protection in regard to investment is quite scarce. This scarceness reflects a two-pronged difficulty. Firstly, there is a multiple-constraint problem that may dampen the title-investment correlation (Deininger and Feder, 2009). Although property rights protection is the most fundamental institution in promoting investment and economic growth, it is by no means the only one. The depressing force of the absence of other institutions necessary for economic growth, such as the rule of law, infrastructure investment and market preserving measures¹, could bring down the incentives for investment even when property rights protection is well preserved. That is the most plausible reason why the expected positive title-investment correlation is not found in many developing countries, especially southern African countries (Besley, 1985). Failing to account for the restriction of other institutions over investment would result in a downward biased correlation when estimating the impact of property rights on investment². Secondly, there is an endogeneity issue. Even if a positive correlation between property rights protection and investment were detected, one can hardly claim that the observed correlation indicates causation. Notably, an omitted third variable, usually technological advancement (See Demsetz (1967)), may bring about both property rights protection

and investment simultaneously. In that case, the total amount of property rights protection is not *exogenously* determined by factors unrelated to investment but is induced by the *endogenous* factors that may also bring about investment. Failure to recognize the endogeneity issue and not to exclude the effect of the third omitted variable is likely to cause an upward bias in the estimate.

In this paper we are going to investigate the impact of property rights protection on investment within a Chinese context, which will help solve the two aforementioned problems. Firstly, China is less likely to be subject to a multiple-constraint problem as other institutions have been demonstrated to be sufficient to promote a consistent above-8% growth rate for 30 years, ranking first worldwide. In sharp contrast to that impressive economic growth, China's property rights protection over land notoriously lags behind its economic growth. This is mainly reflected in the limited area of entitled land in China, lands with relatively stronger property rights protection. By the end of 2011, the total sum of entitled land amounted to 2.57 million square kilometers, or merely 1.3% of the total area of inhabitable land. The majority of the land exists in the form of either communal land or allocated land, both have weak property rights protection and are incapable of being collateralized. The lack of land with property rights protection has an inevitable vicious consequence for business. Estimates from the Chinese Economic Survey (2008) suggest that only 2% of Chinese firms purchased land during a period between 2006 and 2012. In the "investment climate" survey implemented by the World Bank in 2003 (Ayyagari, Demirguc-Kunt and Maksimovic, 2010), 66% of respondents replied that they could not obtain bank loans due to the lack of acceptable collateral, which includes mainly land and the buildings above it. Consistent with that, the OECD (2005) also reports data highlighting that more than 50% of the firms surveyed reported that their lack of collateral was a major barrier to bank borrowing. This severe shortage of entitled land, combined with the impressive economic growth rate in China, suggests that property rights protection is highly likely to be the binding constraint on Chinese firms' investment.

Secondly, to address the issue of endogeneity, the Chinese land supply system made possible an instrumental variable, i.e. the replacement of city mayors, to identify causation between property rights protection and investment. In China, the government is the sole supplier of entitled land in the primary market and a quota set by its higher provincial government annually determines the supply of city government. However, city mayors, with their political connections and local knowledge, have certain influences over provincial government and can campaign for a greater land

supply quota or to maintain the current level against the competitive lobbyist behaviour of other cities. This lobbying effort is dramatically interrupted by the replacement of city mayors, either because of the decreased incentive for lobbying the about-to-be-replaced mayor or because of the time taken for the new mayor to get familiarized with lobbying tasks. Therefore, the replacement of city mayors is related to a temporal decrease of the local land supply and the possibility of a local firm obtaining land that year. This prediction is confirmed by the data, as a city with a replaced mayor is associated with a 20% decrease in the total land supply compared to those without. This leads to a similar-scaled decline in the probability of a firm obtaining the entitled land.

Apart from demonstrating that the replacement of city mayors is correlated with land supply, one has to show the exclusive restriction in order to establish the validity of the instrumental variable. The exclusive restriction requires that the replacement of city mayors is not linked with the land supply, directly or indirectly, via channels other than land supply. Although this is hard as one can hardly exhaust all possibilities that the city mayoral replacement may be linked to the firms' investment, we limit ourselves to the most obvious channels. First, the decision on the timing of mayoral replacement is mainly a political decision and is not based on the economic performance of existing or new mayors³. Secondly, there is no sign that the new mayors are systematically less pro-business compared to previous mayors, nor the political uncertainty resulted from the mayoral replacement can explain the decrease the investment. Thirdly, other government actions, such as taxation levying and fiscal expenditure, are not so much affected by the replacement of city mayors as the entitled supply.

In order to explore the relationship between the investment and entitled land supply that was instrumented using the replacement of city mayors, we constructed a dataset that contains 26,000 firm-year observations from 5,000 firms that have bought at least one piece of industrial land in China between 2006 and 2012. All those firms are unlisted companies and the majority of them are privately owned. Those firms are sampled from more than 300 cities all over China. For each observation, three main pieces of information - the firm-level investment, the land purchase record, and its corresponding city mayor - are obtained from various sources and they are merged according to the names and addresses of the firms. In the merged database we have records of 5,978 land purchase transactions that account for about 30% of the total entitled land supply in China for the period between 2006 and 2012.

The empirical result revealed a substantial increment in investment after the purchase of entitled land. The coefficient obtained from the instrumental variable regression suggests that for each 1 RMB that was spent by the firm in purchasing the entitled land, there is 1.05 RMB worth of investment made in the same year and 4 RMB worth of investment in the first three years. This is of both statistical and economic significance. It suggests that by the end of 2013, the aggregate nationwide annual title-induced fixed asset investment amounted to 8.458 trillion RMB (or 1.364 trillion USD), almost 17% of total fixed asset formation in China, or 14.8% of China's total Gross Domestic Product (GDP hereafter)⁴. The average annual growth in value of the entitled land sales for the post-financial crisis period of 2008 to 2011 was 728 billion RMB, corresponding to a total value of 1.494 trillion fixed asset investments⁵. This means that land-related investment accounts for 47% of the average aggregate value of GDP growth during that four-year period⁶.

Alternative interpretations of the title-investment correlation observed from the data are also addressed. The most suspicious factor is the investment opportunities that could lead to both entitled land purchasing and the investment, causing the observed correlation between the two. This concern is addressed by controlling for the investment opportunities of individual firms, proxied by the regional and industrial investment growth rate. This is exercised under the assumption that the degree of homogeneity of investment opportunities for Chinese firms is extremely high. This assumption is justifiable as Chinese companies are mostly export-oriented and severely regulated by government, subject to similar global macroeconomic and local regulation risks⁷. The result remains unchanged after controlling for investment opportunity. Secondly, we address the possibility that our results are driven by the political connections of those land purchasers. Those politically connected firms are more likely to receive subsidies from government, in the form of either tax reductions or profitable project contracts that could bring about land purchase and investment at the same time, causing an upwards bias in the estimation. Our first attempt is to exclude from our database all firms that have no land purchasing history in order to control for the unobserved heterogeneity between land purchasers and non-land purchasers, notably the degrees of political connection⁸. Secondly, a series of firm and land characteristics, including firms' ownership, tax rate, the ratio of long-term loans, and the size and construction ratio of land, are used to control for the political connections and the result remains unchanged.

The richness of the dataset also enables us to explore the firm-level cross-sectional heterogeneity

for evidence of the security channel and the collateral channel. The security channel indicates that those firms that enjoy a higher level of property rights protection should demonstrate a lower level of title-investment sensitivity. We investigate the role of security channels by exploiting the difference of alternative forms of property rights protection, namely rented communal land. If the lease contract between the land user and the land owner is better protected, then firms are in less urgent need of entitled land. In those terms, Guangdong province stands out as an exception as it is the only province that recognizes the legitimacy of the private land lease contract⁹. As firms in Guangdong province have more alternative communal land to rent, they should display a lower level of title- investment sensitivity. This is confirmed by the data: the title-investment sensitivities in Guangdong province are much lower compared to other provinces, even Zhenjiang and Jiangsu, provinces that have similar productivity and geographic location.

As the entitled land could be pledged as collateral that contributes to relaxing the firms' financial constraints, the collateral channel predicts that those firms with a higher level of financial constraints should be associated with a higher degree of title-investment sensitivities. We use two sets of variables to decompose the financial constraint from either the *demand* or the *supply* side. From the *demand* perspective, those firms in the business more dependent on external finance are more likely to be vulnerable to financial constraints. We use the measure proposed by Rajan and Zingales (1998) and Braum (2003) to describe the industry-level variation of firms' dependent on external finance. From the *supply* perspective, those firms that have more external finance resources, such as larger firms, older firms and firms with holding companies, are less likely to be subject to financial constraints. We use the reduced-form Scale-Age (SA) measure proposed by Hadlock and Pierce (2010) and an independent index provided by the Oriana database to describe to what extent the firms are capable of mobilizing external finance resources¹⁰. These predictions are confirmed by the data. Those firms with a higher level of demand for external finance and those with less ability to raise external capital are associated with higher reactions to the event of obtaining the entitled land.

Our paper contributes to the existing literature in three ways. Firstly, this paper is closely related with the literature about the role of property rights protection in promoting investment. Natural experiments in developing countries (Field, 2005,2007;Field and Torero, 2006;Galiani and Schargrodsky, 2010;Feder, Chalamwong, Onchan and Hongladarom, 1988; Carter and Orlinton, 2003;Dower and Potamintes, 2005;Deininger and Jin,2009; Deininger, Ali and Alemu; 2011) and

instrumental variables (Acemoglu, Johnson and Robinson, 2001; Hornback, 2010; Jacoby, Li and Rozelle, 2002; Acemoglu and Johnson, 2005) are two methods that are widely applied in order to establish a causal relationship between property rights protection and investment. One similarity shared by the aforementioned papers is that they focus on the behaviour of households in underdeveloped rural areas where formal institutions and infrastructure are in short supply. This paper extends the existing literature as it investigates the behavior of industrial firms rather than household residences. This is worth the effort as there is no reason to believe that the investment decisions of those large-scale, profit-driven enterprises should display a similar pattern to those of household residences and, given its scale, the former should have much larger economic and welfare implications. Moreover, those firms are mostly located in urban areas with modern infrastructure, formal economic institutions and fast economic growth. This would help to overcome the potential downward bias caused by other institutional obstacles that hinder the investment when property rights protection is strengthened. In that sense, our paper is close to Johnson, McMillan and Woodruff (2002) (JMW hereafter), who utilize the survey data of industrial firms from five post-Soviet Union countries to explore the effect of property rights security on firms' investment behaviour. The difference between JMW and this paper is that JMW's firms are not subject to financial constraints due to the abundance of accumulated revenue as internal finance, while firms in China are universally subject to several constraints on raising capital externally, as found by Cull and Xu (2005).

Secondly, our paper also contributes to the dispute about the law-finance-growth nexus in the Chinese context. Allan, Qian and Qian (2005) demonstrate that Chinese firms are outliers as they are growing fast despite the hardship caused by the undesirable institutional environment, indicating that informal institutions, such as reputation, work well in China as substitutes for formal institutions. This "China receptionist" argument is disproved by Ayyagari et al (2010), who illustrate that the formal institute is more efficient, as Chinese bank loans are associated with a higher growth rate in firms. This debate is critical for institutional economics as it sheds light on the relative efficiency of formal institutions compared to informal institutions. (Williamson 1999). The result in this paper is more in line with Ayyagari et al (2010). We emphasize the important role played by the formal institution in promoting investment and economic growth. We also extend the idea of Ayyagari et al (2010) in terms that as Ayyagari et al (2010) treat whether the firms can provide sufficient collateral as an exogenous variable that determines corporate growth, we

endogenize this variable and show that the availability of collateral is determined by the local entitled land supply, which ultimately will decide firms' growth rate.

Thirdly, this paper also unveils some important channel through which the local Chinese government intervenes in economic growth. The Chinese government, especially local government, is famous for being the “helping hand” that encourages economic growth (Li, 1998; Qian and Weingast, 1992 and Jin, Qian Weingast, 2005), most likely out of consideration of the political careers of heads of government (Li and Zhou, 2005). They employ measures such as recommending local companies to be listed in the national stock market (Chen, Lee, and Li, 2008; Wang 2005), promoting Foreign Direct Investment (FDI hereafter)(Luo, Xue and Han, 2010) and advancing technology infrastructure (Luo, 2001; Ramamurti, 2001; Zhang, 2003), all to induce development. In our paper, a new channel is proposed. This new channel works so that the local government can intervene in economic growth by adjusting the total amount of land as the shortage of land with sufficient property rights protection is the binding constraint on investment(Tain and Ma,2008). Considering that almost half of Chinese growth from the period 2008-2011 was induced by the increment of land supply, the land supply channel plays a predominant role in the ways the city government intervenes in local economic growth.

The rest of this paper is organized as follows. Section 2 is a brief literature review. Section 3 is the institutional background that describes the Chinese land market and the political influence over the local land supply, providing evidence for the legitimacy of the use of instrumental variables. Section 4 describes the data and the method we used to merge them. Section 5 is the empirical section that provides the regression analysis. Section 6 concludes.

I. Institutional Background: Land Quota System and Political Influence

In this section we will provide a general introduction to entitled land in China. The main purpose of this is to establish two points that are critical to the following empirical analysis. We begin with the argument that property rights protection is the binding constraint on firms' investment due to the restricted supply of entitled land. This is a necessary condition if one would expect to observe a positive impact of entitled land supply over investment. Then we demonstrate that the replacement

of city mayors, given their impact over the quota system, has a great impact on the total amount of entitled land supply to the market, although it is not directly linked with the local investment, especially the investment made by small and medium-sized firms. This would justify the use of the political arrangement as the instrument for our identification strategy.

A. Entitled Land as a Binding Constraint

In this sub-section, we are going to introduce the situation of entitled land in China. In order to argue that entitled land is the binding constraint for investment and economic development in China, we would like to make two points. Firstly, entitled land provides the property rights protection that is critical for inducing investment and economic growth. Secondly, despite its economic importance, the total amount of entitled land is quite restricted in China. Namely, the primary market of entitled land is controlled and deliberately under-supplied by the government and the secondary market and black market are quite inactive due to various institutional constraints.

A.1. Beneficial for Investment

Entitled land, also called conveyance land (*huabo* land), is created by a lease contract signed between the government and private individuals. In the Chinese constitution, the land in China can be owned either by the state or by collectives - no individuals are allowed to own the land. This lease contract serves the purpose of carving out the usage right of the state-owned land and transferring the right to individuals, who can then use the land legally. Government is the sole supplier of this entitled land. It provides the entitled land by auctioning the land-associated lease contract on the primary market. The highest bidder will receive the usage of the land after paying the bid-price in a lump-sum style and the contract is signed.

Compared to entitled land in the developed world, this contract-based entitled land in China is naturally limited by the terms of contracts, which feature two major types of restrictions over land users: a purpose term and a tenure term. The purpose term specifies the purpose of the usage of the land, such as residential, industrial or commercial. It is similar to the zoning laws of the UK or the US, but with more detailed requirements. On top of the general categories of usage, the purpose term usually only allows firms to operate in one particular industry, such as the IT industry. The tenure term specifies the length of tenure of land usage, usually around 50 years, and depends on

the purpose of the land¹¹. The land will be taken back by the state after the tenure expires and so far there is no mechanism to negotiate an extension of the lease contract when it is approaching expiration¹². Those two terms have a great negative impact on the secondary market of entitled land, as will be discussed later.

Despite the above-mentioned restriction, the entitled land represents the closest form of property rights in China to full ownership, as is suggested by its name. Apart from entitled land, there are two other types of land in China: allocated land in urban areas and communal land in rural areas. The advantages of entitled land over those two types of land are reflected in the transferability and security. Firstly, entitled land is the only type of land that can be transferred freely between private individuals. After the lease contract is signed and entitled land is transferred from government to a private individual, the usage right can be sold or rented to other individuals, within the limitations of the tenure and purpose terms of the lease contract. One crucial economic implication of the transferability is collateralization. Since entitled land can be transferred from the current land user to other private parties, including banks, in face of the former defaulting on the bank loans, entitled land is the only type of land accepted by commercial banks as recognized collateral. On top of that, the title of the land has a strong positive spillover effect on the collateralization of all constructions that sit on it. As Chinese commercial banks do not accept constructions as the collateral when the borrower does not have the transferable usage right of the land beneath, owning the entitled land is essentially a necessary condition of the collateralization of the constructions above it. As a result, owning entitled land and being able to pledge both the land and constructions above the land as collateral would greatly boost the borrowing capacity of private firms that are usually financially constrained.

Secondly, entitled land is associated with the lowest risk of being expropriated, either by the government or by third-party individuals. The protection against government expropriation comes from the legal enforcement of the lease contract. Chinese law stipulates that any breach of the contract from the government side, or any withdrawal of the land by the government before the tenure expires, requires that the government compensate the land user with the market value of the land and the constructions above the land. The high value of the compensation and the strict enforcement of this lease contract greatly reduce the possibility that entitled land will be expropriated by the government, an event that rarely happens in China¹³. The protection against

expropriation by other private individuals comes from a registration system, exclusively designed for entitled land. This registration system ensures that relevant information, including the names of land users and the whole history of transactions, including selling, leasing and pledging as collateral, will be recorded and made available to access by institutions such as banks and courts¹⁴. The registration system ensures the exclusiveness of the land usage in terms that other parties cannot mis-claim the usage right of the land. As a result, the entitled land system greatly eliminates concerns regarding government and third-party expropriations, and provides the security that is critical for investment decisions.

A.2. Shortage of Supply

Despite the economic importance of entitled land, its total amount is still remarkably small in China. Entitled lands did not exist until 1993¹⁵ when the change in the land management law allowed for this new form of land as a method to increase government fiscal revenue and promote economic growth. In the absence of a large-scale nationwide entitlement scheme¹⁶, as occurred in Peru in 1996 and Argentina in 1989, entitled lands in China are provided in a gradual way; each year, the government takes back a certain amount of previously allocated/communal land and then auctions it as an entitled land.

Table I shows the statistics for the national annual entitled land supply from 1993 to 2011. As there is no entitled land withdrawal from the market as no land tenure has yet expired, the total amount of the entitled land in China is equal to the sum of the aggregate primary market land supply all-year long, or 2.5 million hectares. This is only 1.3% of the 192 million hectares of inhabitable land in China or 0.36% of 960 million hectares of China's total territorial area. The majority of the inhabitable land still exists in the form of communal land, which amounts to 186.6 million hectares¹⁷. Thus, there is a huge amount of land that could be converted into entitled land. This figure again emphasizes that it is the property rights protection associated with land titles that is in short supply in China, instead of the total amount of land.

The main reason for the shortage of entitled land is the curb deliberately imposed on the entitled land supply by the central government, with the intention of preserving sufficient cultivated land and ensuring food security for the world's largest population. This curb is implemented by a quota system. For each year, the total amount of land supply quota, an amount that is usually much

lower than the aggregate national demand, is worked out by the central government. Then this quota is divided by each level of subsidiary government, from the highest provincial government to the lowest village government. This system means that each year the aggregate entitled land supply is fixed by the quota proposed by the central government, a quota that is lower than the total amount required by the primary market.

One sign of the existence of the land quota system is provided by the cross-sectional distribution of land supply in China. Despite the fact that those provinces on the southeast coast demonstrate a higher rate of economic growth and demand for land, it is the northwest provinces that are associated with the higher growth rate of land supply¹⁸(see Figure 1). It is a quota system that demonstrates a certain political-orientation in ignorance of economic interest. This deviation from the maximization of economic value also contributes to the high land price on the southeast coast compared to the northwest inner land provinces, as demonstrated in Figure 2.

A.3. Predominating Role of Primary Market

In most cases, a depressed primary market would lead to thriving alternative methods of land purchase, such as a secondary market or even black market. However, due to various institutional restrictions in China, the secondary and black markets are not fully functional as a substitute for the primary market, leading to a detrimental shortage of entitled land and depressed investments.

The secondary market for entitled land is quite small in China compared to the primary market. The annual transaction volume, by the year 2007- when the latest data is available - was only 62 thousand hectares, around one-quarter of the total supply of entitled land in the primary market in that year. This indicates that only 7% of existing entitled land by the end of 2007 changed hands. A stronger indication of the stagnation of the secondary market is the lack of growth trends. As the annual supply in the primary market grew at a rate of 9% per annual from 2003 to 2010, the annual supply in the secondary market barely grew, with an even smaller transaction volume in 2007 compared to in 2003¹⁹.

The reason for the minuscule and stagnant secondary market comes from the restrictions imposed by the usage purpose term and the tenure period term specified in the land lease contract. The detailed land use purpose, usually grants firms of one particular sector the exclusively right of usage, greatly reduces the number of candidates who are qualified to buy the land and decreases

the liquidity of the secondary market. For instance, many pieces of lands in the economic develop zones²⁰ require that only IT firms are allowed to use them. This liquidity issue is exacerbated given that firms within the same industry are most likely to be subject to the same macroeconomic or regulatory shocks and thus this correlation between the profitability of firms makes it harder for distressed firms to find buyers for this entitled land. At the same time, the tenure term also imposes a negative restriction on the land market. As the tenure term of each lease contract is fixed and cannot be extended via each transaction in the secondary market, this means that the purchaser of entitled land from the secondary market only obtains the usage right of the *residual* year left in the contract. On top of that shortened tenure, the prospect of pledging the second-hand land as collateral for bank loans is also dramatically dampened. Chinese commercial banks, which have concerns about land being taken back by the government, refuse to issue loans against collateral with lease contracts of less than 20 years. As a result, the purchaser of a piece of land with a lease that expires within 20 years would not benefit from any loans that could be obtained by the land purchaser in the primary market.

The black market for entitled land is mainly referred to as illegally using land for business operations. In China, the most widely illegally used land type is communal land. Despite the fact that communal lands are strictly prohibited by law for business usage²¹, they are often illegally used because they account for a much larger portion of inhabitable land and are less occupied compared to allocated land. However, renting one piece of communal land for business exposes the land user to multiple risks, mainly the counter-party risk and the administration risk. The counter-party risk comes from the fact that the lease contract signed between the land user and the communal collectivity is not protected by law and thus is subject to opportunistic behaviour. Any breach of the contract by one party, usually the communal collectivity, with the intention of the renegotiation of a new contract for a higher rent, would usually lead to the economic losses of land user without any compensation²². Therefore, leasing a piece of communal land exposes the land user to the risk of being blackmailed by the land owners. The administration risk is the risk of the contract negotiations over the communal land being detected and then the land being confiscated or constructions demolished by the government. As business-purposed construction on communal land could never be registered as a legal construction, and as local government has the authority to demolish or confiscate any detected unregistered constructions, it is not hard to see

that any constructions on illegally used communal land face a great risk of being expropriated by the government.

On top of the various risks attached to communal land usage, the non-alienation property of communal land hinders its function as collateral for external finance. Unlike entitled land, communal land cannot be legally alienated from its collective-owner to other institutions in any form. Therefore, commercial banks never accept communal land as collateral as it cannot be legally transferred to the bank in the event of a default by the borrower. This non-alienation property of the land also hinders any constructions on the land being pledged as collateral²³.

B. Political Intervention of Entitled Land Supply

In this section we are going to set out the institutional background as a justification for using the political arrangement as an instrument for land supply. Chiefly, we would like to demonstrate that the decision on the replacement of a city mayor satisfied two conditions for a valid instrumental variable: the relevant condition and the exclusive restriction. The relevant condition requires that the replacement of city mayors has a significant impact on the local land supply. The exclusive restriction requires that the replacement of city mayors is not directly correlated with local economic performance, especially the investment behaviour of local small and medium-sized enterprises.

B.1. Relevant Condition

As mentioned before, the annual amount of entitled land supply for a local government is curbed by the quota system, with the intention of overcoming the incentive of local government to over-supply the local land market²⁴. For each year, the provincial government, after receiving its land quota from its higher government, divides the quota and it is allocated to all of its subsidiary governments, or city governments. This system has two important features that determine the behaviour of the city government. Firstly, the total quota that is to be divided among city governments is fixed. This is because the quota received by its provincial government is decided by the central government two levels above and is thus completely out of the reach of the city governments²⁵. This makes the game of quota allocation a complete “zero-sum” game, that is, one more hectare of land to one city means one less hectare to others. Secondly, the city governments have certain influences over provincial governments in regard to quota distribution. This is mainly because city governments

have an advantage in terms of local knowledge and information and the provincial government is relying on the city government for the implementation of certain policies. This non-negotiable provincial government quota and negotiable city quota create a “tournament” situation, forcing city governments to compete with each other to make as much of a lobbying effort as possible.

Both formal and informal channels are employed to make the lobbying influence of the city government over the provincial government possible. The formal channel is used mainly to over-report the local requirement for entitled land. Due to their limited access to local information, the higher government would normally require the local government to hand in their annual land requirement in reference to a quota allocation decision. Bearing in mind that local governments have every incentive to over-report and the reported demand in most cases has no relationship with real demand, the provincial government nonetheless gives great weight to the local reported demand in the quota allocation²⁶, probably due to the fact that this is the only information source on local land demand. The informal influence is exerted via private meetings between the leaders of the city government, usually city mayors and the provincial leaders in charge of quota allocation. The quota distribution plan will be revised several times before it is officially announced (Sum, 2012) and the opinion of the local government will be constantly sought in order to exclude the possibility of strong objection from local governments. This provides local governments with an opportunity to lobby for a higher local land supply quota²⁷. Even after the quota is officially set, lobby activities will not stop because the distribution of a flexible quota, the quota that is reserved for eventualities²⁸, is still worth fighting for.

The local government’s influence over its higher government relies to a large extent on its mayor, due to his political connections and his role of oversight and coordination. Firstly, the city mayor is usually more connected with the leaders in the higher level compared to his peers. For instance, the rule issued by the Organization Department of Chinese Communist Party requires that the city leader also be a member of the party committee in the province. This arrangement grants city mayors more opportunity to get acquainted with and communicate with provincial leaders. Secondly, the city mayors, as heads of the government, are usually being counted on as pivotal people, organizing and monitoring the whole government for the implementation of the policy²⁹, making the mayor an indispensable person in terms of organizing the complex tasks of preparing for lobbying³⁰.

Considering the competitive nature of local government in lobbying higher government for a larger land quota and the importance of the city mayors in that process, it is not surprising that the replacement of a city mayor would bring about disadvantages to the city³¹. Columns 1 to 3 of Table II demonstrate the difference of total land supplies between a city with mayoral change and a city without one. For every year between 2006 and 2012, those cities with a mayoral change are associated with a land supply 20% lower than a city without a mayoral change.

B.2. Exclusive Restriction

A more challenging task is to show that our instrument satisfies the exclusive restriction, namely that the replacement city mayor is not associated with the investment, our dependent variable, directly or indirectly, but via channels other than the land supplies. Although it is impossible to exhaust every possibility that mayoral replacement may affect investment, we made several attempts to exclude the most obvious possibilities. We firstly demonstrate that the decision is not correlated with the city's economic performance as it is purely a politically/administratively-driven issue. Secondly, we show that the replacement of local mayors, apart from affecting the land supply, has a limited impact on other policies that could lead to individual firms' investment. Those variables include the local tax rate, local government expenditure, and local firms' investment opportunities. Thirdly, we argue that the new mayors are not systemically less pro-business compared to the replaced mayors, as demonstrated by the consistency in the characteristics of various city mayors over the years.

Firstly, the decision to replace a city mayor, especially its timing, is a political or administrative one rather than an economic one. Table III shows the data on the regression analysis of the timing of the replacement of the city mayor. The dependent variable is a mayoral replacement dummy variable that assigns 1 for those city-year observations when the mayor is replaced and 0 otherwise. The independent variables include mayor's age, a technocrat dummy, the mayor's length of time in office and various economic performance measures, such as the city's GDP and FDI growth. We use GDP and FDI growth as a control variable because they are important figures used by the higher government to measure the economic performance of local mayors³². The regression result strongly suggests that the timing of a mayor's replacement is not an economic decision but a political one, as suggested by the fact that all coefficients for local economic measures are insignificant, while

political ones, such as a mayor's age and time in office, have significant impacts³³.

Another piece of evidence that the city mayoral replacement decision is not triggered by economic factors is the annual odds rate of mayoral replacement, illustrated by columns 1 and 2 of Table IV. It documents the possibilities of all cities replacing mayors for each year. If the replacement of the mayor is a response to a good or bad performance in a certain year, then those years with an overall extremely strong economic performance, such as 2011, or an extremely bad one, such as 2009, should be associated with higher overall replacement of mayors. However, that is not observed in the data, where the overall replacement rate of city mayors is almost constant. The only spike in the replacement rate is in 2008, a major government succession year for all levels of Chinese governments³⁴. This again suggests that the decision of mayoral replacement is a political decision, not an economic one.

Secondly, we illustrate that the decision is not likely to be correlated with other variables that are correlated with firms' investments. The major suspects are the tax rate and government expenditures, two variables to a great extent subject to the intervention of local government and with great economic significance for the investment decisions of firms. For instance, if the government also reduces the fiscal expenditure that previously played the role of promoting the local economy, then the title-investment correlation over-estimates the causation of title protection and investment. In columns 4 to 6 and columns 7 to 9 of Table II we illustrate the taxation rate and fiscal expenditures between cities with mayoral replacements and cities without. There is no significant difference between the two, suggesting that taxation and fiscal expenditure are not likely to be substantially affected by the mayoral replacement. The main reason for the abnormally high sensitivity of the entitled land supply to the replacement city mayor is because the land supply is controlled by a quota system that needs a lobbying effort from higher government. This lobbying effort is both time-sensitive³⁵ and mayor-dependent. As a result, the land supply is more subject to the replacement of the city mayor.

Another possibility is that the changes in investment for those cities with a mayoral replacement derive from the changes of investment opportunities, rather than the changes of entitled land supply. If those cities with their mayor replaced happen to be those with less investment opportunities, then our title-investment correlation may capture the lower investment opportunities rather than the decreased land supply. The results in columns 10 to 12 of Table II alleviate this concern. We

use the average growth rate of capital expenditures of firms within the same province and industry to approximate the investment opportunity for each firm in our sample. The result shows that cities with and without mayoral replacements have on average similar firm-level investment opportunities.

Thirdly, we argue that the decreased investment is not likely to be brought about by certain characteristics of the newly appointed mayor or by the political risk that is associated with mayoral replacement. If the new mayors are systematically less pro-business compared to the replaced ones, then the reduction in investment could be a natural response to a change of expectation for future local economic policy, rather than the shortage of land supply during the year of the mayoral replacement. This concern could be partially alleviated by columns 3 to 8 of Table IV, which illustrate that the characteristics of mayors, including age, tenure length and background, are almost constant all-year along.

II. Data Matching and Statistical Descriptions

A. Data Resource and Matching

Our dataset comes from three main sources. Firstly, the firm-level balance sheet and income statement data that provides information about capital expenditure levels and other characteristics of the firm. Secondly, the land characteristics, such as land area, location, usage purpose and tenure length, and land transaction information, such as the purchase year and price. Thirdly, the information about the city mayors, including the city mayors' characteristics, such as age, educational background and the length of period since taking office. Apart from the above three main sources, the local macroeconomic information, such as GDP and FDI growth rate, and local fiscal policy information, such as tax rate and fiscal expenditures, are also necessary to control for.

The dataset we use for unlisted firms is the Oriana dataset, which is the Asian and Pacific part of the Bureau van Dijk database. The data are from two data providers: Credit Reform China and the WVB. The Oriana database is the largest and most comprehensive database of unlisted firms in China³⁶. It includes more than 26 million unlisted companies in the Asia-Pacific region and more than 2 million of these are located in China. There are 220,000 companies that have relatively complete observations in the 10-year span from 2003 to 2012. For each observation, the information contained in the Oriana database is quite rich: apart from the standard balance sheet

and income statement information, other information about employment, sharing-holding structure and locations is also provided. One important feature of the Oriana database is that it provides the Chinese name for each company, which makes it possible to merge it with another dataset, as discussed in later parts.

The information of the land purchase record comes from the official website of the Land and Resource Department of the central government³⁷. It is the most authoritative and comprehensive database about entitled lands in China and contains a total of 400,000 observations of land transactions that have occurred in the past 10 years³⁸. The dataset is quite detailed: for each piece of entitled land that is sold by the government, three categories of information will be disclosed: (1) the characteristics of the land, such as location area; (2) the features of lease contracts, such as usage purpose, starting and expiration year and the maximum construction ratio; and (3) users' information, such as users' names and business sectors.

The variable used to match the unlisted company dataset and the land transaction dataset is the name of the firms. To make this matching possible, the name of each firm is displayed in Mandarin in both datasets. There are two concerns about the matching procedures using firms' names. The first problem is the duplicated name problem, where two companies have the same name, which is quite likely given the large number of firms existing in China. However, a set of regulations prohibits this situation from happening. Chinese companies are required to begin with the name of the jurisdictions wherein they are registered, which is usually the name of their province, city or county³⁹⁴⁰. This excludes the possibility that firms located in various jurisdictions have the same name. For those firms located in the same jurisdiction, the local registration bureau prohibits firms' names having more than four of the same Chinese characters as other companies, let alone the whole name. The above regulations thus exclude the possibility of duplicated names within the same jurisdiction. The second concern is the misspelling of names in the dataset, leading to a mismatch of those firms. To overcome this problem, we use other information, mainly firms' sectors and addresses, to help check the validity of the matching result.

Using the companies' names and other ancillary information, we match the database of companies' balance sheet information with their land purchase history⁴¹. A total of 5,279 matched firms bought land in the six-year period from 2006 to 2011, with a total of 6,237 land transaction records. The matched observation is about 2.5% of the total number of firms that exist in the Oriana dataset⁴².

This is consistent with the calculation using national data⁴³ and the anecdote that only around one in 100 firms are allowed to buy entitled land in China⁴⁴. This provides strong evidence that Chinese unlisted firms are subject to severe constraints brought about by the limited supply of entitled land.

The relatively small number of matched observations compared to the total scale of both samples raises a concern about the representativeness of the data. To address this concern, we calculate the ratio between the aggregate land supply in our dataset and the official land supply. For each year and city, we first obtain the sampled land supply by aggregating all land transactions that appear in our dataset. We then calculate the sample ratio by dividing the sampled supply in our dataset by the official land supply, which covers all land transactions in that area. Those ratios along time-series dimensions are reported in Table V. For each year, the mean, median and standard deviation of the cross-sectional distribution of the sample ratio of all cities are reported. If our dataset over-sampled observations of certain cities while under-sampling observations of other cities, then the standard errors would be extremely high and the deviation between the mean and median value would also be high. If the dataset over-sampled observations of certain periods, then there would be a dramatic shift of the mean and median in that period. However, both the annual standard errors and cross-year fluctuation of the mean and median are moderate, suggesting that the sample is not likely to over-represent firms in particular areas or periods. On average, the lands that appear in our dataset are of similar size but of lower price for each unit of size, as suggested by a lower mean of the sample ratio when measured by the values of the lands.

We use the city mayoral replacement database from He and Sun (2012), who hand-collected the 821 city mayors' political careers for a timespan from 1996 to 2012. The main information sources of that database are official documents such as the "Yearbook of China's Cities", the "Yearbook of China" and China Daily on line⁴⁵. The database covers 275 cities in China and is the most comprehensive mayoral database so far. For each observation about the city mayor, the database provides information about both their personal details and political career. Their personal data includes age, educational background, place of origin and whether they are technocrat. The political career section includes a list of cities that they have governed before and the timespan during which they governed. The tenure information about where and when they took office enabled us to match the database of city mayors with the firm-level database we have.

Apart from the local land supply, other economic-related variables are also gathered as control

variables. Those variables include measures of the local economic situation and local fiscal situation. Those economic variables include the growth rate of GDP and FDI and total fixed asset formalization. The local fiscal variables include the local tax rate and the fiscal budget as a ratio of local fiscal. All the above information was collected from the CSMAR database, a widely used comprehensive database of Chinese regional data. Observations were also double-checked with the information provided by the “Yearbook of China’s Cities”, the official documents about regional economic performance in China.

B. Statistical Description

Table VI provides the statistical description of the data used in this study. Panels A to C display the characteristics of the unlisted firms, the entitled land purchased and the cities.

Panel A of Table VI reports the first year-end observation of balance sheet information of all firms in order to illustrate the financial situation of firms before purchasing the entitled land. The statistical description demonstrates that these firms are subject to severe financial constraints due to the insufficient amount of bank loans. As all firms in our sample are unlisted, they do not have access to a stock or bond market, so that bank loans are their only source of external finance. Although the firms in our sample are relatively established (with a median age of six years by the end of 2009), large in scale (with median total assets of 5.8 million USD and median employment of 131) and healthy in their operation (with median Return over Asset (ROA hereafter) around 2% and tax rate 7%), the amount of bank loans they obtained is extremely small. The average ratio of loans as a percentage of total assets is merely 6.57% by mean or 0.02% by median. A close-to-zero median value for the bank loan ratio indicates that almost half of those unlisted firms have no external finance experience at all. This is consistent with the figure that 41% of private unlisted firms have no experience of external finance, a finding reported in the “Chinese Entrepreneur Group Financing Need Survey” (2010) that surveyed 2,000 private firms in south-east China. This is in sharp contrast to the high level of capital expenditure (5.78% of total asset annually) and the tangible assets of firms (30% of total assets).

On the other hand, the purchase of the land is an important investment for firms. The median value of the land is 0.47 million USD, 0.08% of the median level of firms’ total assets. Given the size of the land purchase, it should have a substantial impact of the investment and external finance

behaviour of firms. This is confirmed in Table VII.

Columns 1 to 3 describe the average investment, external finance and profitability of those firms granted the quota for purchasing entitled land. For each variable, the growth rate compared to the previous year's level is demonstrated for each year for a period of five years around the event of entitled land purchasing. For all three variables, the residual value is reported after controlling for the city average and the industry average fixed asset growth rate. Although it is far from strong evidence of causality between the entitled land purchase and investment, the table suggests a correlation between the land purchase and all the major economic performances of the firms. During the year of the land purchase, investment and external finance experienced a jump of 54% and 85%, respectively, while the increment for profitability is delayed for another year but is still quite substantial. The increment is not likely to be associated with the established trend as there is very little increment in the years before the event. This increment is not likely to be a temporal effect either as there is no sign of a reverse in the future two years. However, in order to establish causality between property rights protection and investment, more sophisticated econometric methods are required, methods we will discuss later.

III. Empirical Analysis

In this section we employ the Ordinary Least Squares (OLS hereafter) regression and instrumental variable regression to explore the effect of the entitled land purchase on the investment behaviour of those unlisted firms in China. We demonstrate that the variation of the probability of the firm being permitted to purchase land, when instrumented by the exogenous shocks caused by city mayoral replacement, is the source of changes in investment for those who receive the quota for land purchasing.

A. *First Stage Regression*

As mentioned before, the replacement decision of city mayors has important economic implication over local entitled land supplies and thus should influence the probability of local firms purchasing entitled land. This influence is captured by the following regression:

$$1_{[LandPurchasing]_{it}} = \alpha + \beta 1_{[MayoralReplacement]_{it}} + \gamma \text{ control variables}_{it} + \epsilon_{it} \quad (1)$$

The dependent variable is the land purchasing dummy, a dummy variable that assigns 1 to firms that purchase land in one particular year and 0 otherwise. The main independent variable is the mayoral replacement dummy, the dummy variable that is 1 if the firm’s city mayor is replaced in that particular year and 0 if not. Logit regression is implemented to estimate the change of probability of the firm purchasing land when the local mayor is replaced. The result of the first stage regression is illustrated in Table VIII. Column 1 displays the regression result where there are no controls except the year fixed effect. The negative coefficient suggests that for those firms located in a city where its mayor is replaced that year, the firms are associated with a decline of almost 20% in the probability of receiving the quota for land purchasing. The coefficient is significant statistically and economically. This is consistent with columns 1 to 2 of Table II, which report that the decrease of land supply caused by mayoral replacement is around 20%. On top of this, the single mayoral replacement dummy, together with the year dummy, explained a great deal of the variation of the land purchasing probability, alleviating the concern of a weak instrument. Column 2 displays that the scale of the coefficient for the land purchase dummy remains unchanged when a series of control variables are included in the regression. Those variables consist of firms’ size, leverage ratio, tangible asset ratio and ROA, and an industry-fixed-effect dummy.

One question is whether the replacement of city mayors will have persistent effect on the land supply. In Column 3, two lags of the mayor replace dummy are included in the logit regression. The coefficient for the first lag is also negative, despite the fact that it is smaller in its scale compared to its current value. This suggests that there is an over-year effect of a mayoral replacement of the quota supply, probably due to the time needed for new mayors to familiarize themselves with their new jobs. The positive coefficient of the second lag suggests that the new mayor boosts the local land supply to a higher-than-average level one year after holding the position. This is consistent with the theory that local government has a great incentive to push local economic growth at the beginning of an electoral term (Deng, Gyourko and Wu, 2012).

Columns 4 and 5 provide analysis of the other two factors that may affect the possibility of firms receiving quotas for entitled land. The first one is the level of local government fiscal deficit.

Local governments, which retain 100% of the proceeds of land sales, have a strong incentive to over-supply the land, especially when the government is presiding over a deficit. Because over-spending governments are counting on the land sale proceeds to balance their budgets, one would expect that local government deficits should be positively correlated with the sale of land titles in the next year. This is confirmed by the result displayed in Column 4, where with the coefficient of the previous year’s local government deficit level is positive and statistically significant in predicting the probability of one firm receiving the quota for purchasing the entitled land. Importantly, adding the local government deficit variables does not change the scale of the coefficient of the mayoral replacement dummy. This rules out the possibility of the mayoral replacement dummy being a result of the government’s higher deficit.

The second variable is the total amount of local aggregate land supply. Intuitively, being located in a city with a higher aggregate land supply would substantially increase the possibility of the firm obtaining one piece of land. The coefficient of regression illustrated in Column 5 suggests that the firm is more likely to obtain the land if the local supply is promoted and this relationship is quite strong, as evidenced by a t-statistic of more than 10. Note that the coefficient of the mayoral replacement dummy, although smaller in scale compared to previous regressions, is no longer negative or significant. This decrease in the scale of coefficient suggests that the relationship between the probability of a firm obtaining the entitled land and mayoral replacement comes from the change of city-level land supply.

B. Second stage regression

We hypothesize that when firms are constrained by the lack of entitled land, the endowment of the entitled land will bring about an abrupt increment in investment, either because the risk of being expropriated is reduced (the security channel) or because ample collateral can be provided (the collateral channel). In this section, two different methods of regressions, OLS and instrumental variable regressions, are implemented to estimate the following equation:

$$\Delta CapEx_{it} = \alpha + \beta 1_{[LandPurchase]_{it}} + \gamma control\ variables_{it} + \epsilon_{it} \quad (2)$$

The dependent variable is the changes of the capital expenditure of each firm for each observable

year compared with previous years' level, normalized by the value of land purchased. Notice that the capital expenditure here is the residual value in terms that the proceeds from purchasing entitled land have already been subtracted from the capital expenditure. Therefore, it is a measure of the scale of land-induced investment. The independent variable we are interested in is the land purchase dummy, which assigns the value 1 to the firm-year observation who purchased the land and 0 otherwise.

The OLS regression suggests a very strong and significant relationship between land purchasing and capital expenditure, as illustrated in Column 1 of Table IX. The coefficient of the land purchasing dummy variable, after controlling for a series of firms' characteristics and fixed effects, is 40%, a value of both statistical and economic significance. It indicates that for 1 RMB that is invested in land purchasing, firms usually spend an extra 0.4 RMB in other associated investments.

This boost in investment could be far more than a one-off effect: investments a few years after the land purchase may also benefit from the security and collate-ability provided by the land title. In Column 2, two lags of land purchasing dummy are added to the regression to capture the land-induced investment in later years after the title is purchased. The coefficient of the current year investment is almost unchanged. The coefficients of land purchasing for the investment in the first and second year after the land purchase are -22% and -3% respectively, indicating a gradual decline of investment level due to the fading away of the title effect. Considering that the current year jump in capital expenditure is over 40%, the total increment of investment in the first three years is around $(40\% - 22\% - 3\%) = 15\%$ of the total value of the land titles.

The coefficient estimated using the OLS regression is subject to an endogeneity concern and could be biased if there is an omitted variable, probably the investment opportunities, that are correlated with both the land purchasing decision and the investment decision. Instrumental variable regression is applied to overcome the endogeneity problem. The replacement of the city mayor, as it satisfied the relevant condition and the exclusive restriction, is a valid instrument to tease out the endogenous demand of the entitled land from its exogenous supply.

The coefficient of equation 2, with the land purchase dummy being instrumented by the city mayoral replacement dummy, is illustrated by Column 3 of Table IX. Compared to the OLS regression, the coefficient obtained from the instrumental variable regression is doubled in scale, increasing from 40% to more than 100%. This suggests that for every 1 RMB invested in entitled

land purchasing, firms invest more than 1 RMB in the exact same year of land purchasing.

One salient difference in the scales of coefficients between the OLS regression and the IV regression should be carefully addressed. The coefficient of the Instrumental variable regression is almost twice the scale of the coefficient yield by OLS regression. There are three possibilities that the IV estimate is higher than the OLS one. The first possibility is that some measurement error tends to decrease the scale of the OLS estimate. We found this explanation implausible as the IV estimate are supposed to be subject to a similar downward bias were there any measurement errors. The second explanation is the IV estimate, instead of eliminating the omitted variable problem, exacerbated that problem because that the instrument variable may be positively linked with the outcome variable and the exclusive restrictions are not satisfied (Pande and Udry, 2005). Again we found this explanation less attractive given that we have excluded several main channel through which the instrument variable is correlated with the outcome variable. The last explanation, proposed by Imbens and Angrist (1994), suggests that the IV estimate is no more than a estimate of local average treatment effect (LATE). That is, the IV estimate can only account for the behaviours of those "complier", a sub-population whose behaviours, described by the endogenous regressor, would change according to the value of the instrument. This LATE perspective suggests that the IV estimate captures the sensitivity of investment to land title supply of those "marginal land users", whose land title endowment would be hinges on that the mayor is not replaced. It could be the case that the investment sensitivity of those marginal firms are higher than other firms, which are either too large or too small to care about the land titles.

We also estimate the change in investment over the first and the second lag of the land purchasing dummy variable. The result, as illustrated by Column 4 and 5 of Table IX, shows that the coefficients of the first and the second lag of land purchasing dummy are both negative. This means the investment displays a similar pattern to the one described by OLS regression: it peaks in the year of land purchasing, and then declines gradually. Those coefficients suggest that in the first three years after the land purchase, there is a $(105\% - 2.75\% - 39.5\%) = 62.75\%$ increment in investment compared to the value of the purchased entitled land. This is almost four times that of the three-year OLS estimate.

Another instrumental variable is the total amount of local land supply⁴⁶. The coefficient of the current land purchase dummy shrinks marginally but the t-statistics almost doubled. This is

mainly because the second instrumental variable, the local land supply, is highly correlated with the probability of individual firms receiving the land and, as a result, has a lower standard error associated with the estimate of the coefficient. The economic scale of the lags of the land purchasing dummy remains unchanged. The three-year increment in investment is $(100\%3 - 2.92\%2 - 43.3\% =)$ 296%. This is similar in economic scale to the estimate using the mayoral replacement as the instrument.

C. Robust Check

Table X introduces a series of technical robustness tests of the main instrumental variable regression. Column 1 reports the result of a two-staged instrumental variable regression with the first stage being the probit regression. Theoretically, the probit regression should yield a result more robust to the outliers compared to the logit regression and thus the power of the whole test is increased. This replacement leads to an increase of our main coefficient from 105% to 141% and a marginal increment of t-statistics as well.

Columns 2 and 3 report different measures of the increment in investment promoted by land purchasing. Column 2 illustrates the RMB value of increases in investment, rather than the investment increment as a ratio relative to the value of the land purchased. The coefficient of the land purchase dummy is of both economic and statistical significance. It suggests that those firms that purchased land in that year invest 1 million RMB more compared to those firms that did not purchase land in that year. Column 3 is the increment in investment per hectare of land and the coefficient suggests that there is an extra 0.36 million RMB investment associated with each additional hectare of land.

Columns 4 and 5 illustrate the sum of the increment in investment within a period of two years before and after the land purchase. The coefficient in Column 4 suggests that, within the next two years, the investment boost is more than twice the value of the land purchased and the coefficient is also statistically significant. This scale is similar to the result estimated using multiple-instrument variables described in Table IX. The coefficient in Column 5 illustrates that the increment shown in Column 4 is not likely to come from an established trend, as the increment in investment for those land purchasers for a period two years before purchasing the land is quite small.

In columns 6 to 8 we test if those firms with limited land supply are associated with higher levels

of title-investment sensitivities. If the title-investment sensitivity investigated by previous discussions is valid, then that coefficient should be more pronounced for those firms in more urgent need of entitled land, either due to their protection against expropriation or collateralization functionality. We hypothesize two factors associated with the demand of protection from entitled land: its previous land purchasing history and the relative abundance of local land supply. Firstly, those who purchased the entitled land before are facing a more relaxed constraint relative to those who have no land at all, under the assumption that their land is not being used at its full capacity, so the marginal productivity of the land is still positive. This predicts a higher title-investment sensitivity for those first-time purchasers. In Column 6 of Table X, we exclude all firms that have purchased entitled land before and the coefficient is around 5% higher than our baseline IV regression result in terms of scale. The increase is small, mainly because the total observation number of firms that have purchased land before is quite limited.

We also check the local abundance of entitled land supply as a complementary test of firms' demand for entitled land. Those firms located in a place with an abundant entitled land supply, either because of a higher chance of land purchasing before or land purchase in the secondary market, should be associated with a lower investment-land sensitivity. It is a stylized fact that Chinese land supply is extremely biased in favour of large-scale cities, especially provincial capitals⁴⁷ and cities with economic zones⁴⁸. Firms that are located in the counties have a much smaller chance of obtaining entitled land. We thus compared those firms located in the provincial capital cities and cities with economic zones with those located within small counties. This hypothesis is confirmed by the regression results in columns 7 and 8 of Table X. Those firms located in a city where the land supply is scarcer react more strongly when they purchase a new piece of entitled land.

The other concern is that the government may intentionally sell land underpriced as a form of subsidies to the firms. We checked this possibility using the proxy of secondary market premium over the primary market. As the land transaction in the secondary market occurred between private individuals, the secondary market price is immune to the political favouritism. Under the assumption that some land in the primary market are underpriced, the premium over the secondary market price over the primary market price, as a result, is a measures of the extent of underpricing, given the local land growth rate are controlled. We obtained the city-level secondary market average transaction price in 2007⁴⁹ and calculate the secondary market premium for each city. I then exclude

all above-medium observation and implement the same regression as shown in Column (3), Table IX, controlling for the average annual growth of primary market land price. The coefficient is quite close, though a little smaller, to our main result, suggesting that the secondary market premium, caused by the political favouritism, is not playing a dominate role in driving the result we obtained.

As the time span of our sample covers the period from 2006 to 2011, one alternative interpretation of our title-investment sensitivity is that it was mainly caused by the fiscal stimulus measures released after 2009⁵⁰ that led to both land granting and investment promotion. If this alternative hypothesis is true, we would expect increased title-investment sensitivity for the post-2009 sample. We test this alternative hypothesis by splitting the data into two parts: observations before 2009 and those after 2009. The result can be seen in columns 10. Contradicting the alternative hypothesis, the coefficient associated with the pre-2009 sample is higher compared to the coefficient for the whole sample. This suggests that fiscal stimulus packages are not the drivers of the positive effect of land titles on investment.

D. Investment opportunities

One concern about this study is that the mayoral replacement could be correlated with the investment opportunities of local firms. Although we already use the replacement of city mayors as an instrument to eliminate the source of variance that comes from the endogenous demand for entitled land supply, this does not rule out the possibility that the replacement of mayors is coincidentally correlated with a decrease in investment opportunities, which would lead to an over-estimate of title-investment sensitivity.

As our firms are unlisted, there is not sufficient information available that could be used to calculate Tobin's Q or other relevant measures of investment opportunities as implemented in the literature. Instead, we use the local economic performance and industrial economic performance as proxies of the investment opportunities of individual firms. The underlying assumption is that firms are highly homogeneous cross-sectionally, both along geographic dimensions and industrial dimensions. This assumption seems to be a strong one, but several attributes of manufacturing companies in China make it relevant and realistic. Firstly, constrained by technology, most Chinese small and medium-sized enterprises are engaged in the low-margin, low-tech, export-oriented manufacturing. As a result, their investment opportunities are largely driven and determined by

the macroeconomic conditions of the international market. Secondly, as Chinese companies are to a high degree constrained by red-tape and regulations, their investment opportunities are also greatly determined by changes in regulations, either at the local or central government level. Those two features of Chinese companies mean that they demonstrate a higher level of homogeneity in their investment opportunities⁵¹.

We use four measures to proxy the local economic performances: growth rate of GDP, FDI, local average tax rate and the government's fiscal expenditure. Among those four measures, GDP and FDI are the standard local economic performance indicators and the tax rate and fiscal expenditures are the economic policies that are frequently employed to boost local investment.

The instrumental variable regressions similar to equation 2 are implemented, with the first lag of all above-mentioned investment opportunities incorporated as control variables. The results are displayed in columns 1 to 4 in Table XI. First, notice that the coefficient of our main variable of interest, the land purchasing dummy, remains the same in economic scale and statistical significance for all five regressions. This suggests that our result is not driven by the investment opportunities that coincide with the replacement of city mayors. Secondly, the signs of the coefficients for those proxies are consistent with what one would predict. All proxies, except for the average tax rate, are associated with a positive sign, indicating that firms react positively to investment opportunities and investment-promoting policies, such as lower tax rates or higher fiscal expenditures.

Another method to proxy the investment opportunities is to use the average growth rate of industry-level fixed asset investment, under the assumption that firms in one industry are facing the same investment opportunities. Here, two measures of industrial growth rate are used: the national average growth rate and the local averaged growth rate, either at the city or provincial level. Using the local average growth rate has the advantage of capturing the heterogeneity across localities in industrial growth and investment opportunities. In order to investigate the effect of investment opportunities by sector, we implement the regression in the form of Equation 2 and the industry averaged growth rates are used as control variables. The regression result is demonstrated in columns 6 to 8. Firstly, the coefficient of our main variable of interest, the land purchase dummy, remains unchanged when the industrial investment opportunity proxies are added. Secondly, the coefficient of those industrial proxies is positive, indicating that firms' individual investment opportunities are tightly correlated with the investment opportunities of the whole industry.

E. Government Subsidies

One related concern is that the correlation between land purchasing and investment could be from government subsidies, rather than the investment opportunities. These government subsidies could be in various forms, such as a government contract, an implicit guarantee over bank loans, or even the promise of land quota in exchange for a certain amount of investment and employment in the local area. The government subsidies have the potential to bring about the land purchasing and investment simultaneously. The difference between these government subsidies and investment opportunities is that the government subsidies have weaker cross-sectional correlations and it is almost impossible to observe or identify them in the dataset.

As the government subsidies depend on the condition that those subsidized firms are politically connected, we attempt to alleviate the contamination of government subsidies by eliminating those firms that are tightly connected to the government. Admittedly, one can argue that political connection in our dataset must be pervasive as those land purchasers are the top 2% of firms in China that are granted the opportunities to purchase land. However, this practice still allows us to exclude the possibility that our result is driven by the differential degree in political connections and the uneven distribution of government subsidies. The way to achieve this is to exclude those firms with the highest level of political connections. If the result is almost unchanged when the most politically connected firms are omitted, one can conclude that government subsidies are not likely to be the driver of our result.

We use four variables to measure the extent to which the firms are politically connected. The first measure is the ownership of the firm. Firms with their ultimate controller being the government are categorized as state-owned companies and the rest are private companies. The state-owned firms are far more likely to receive subsidies from the government and thus more contaminated by the spurious causation between land purchasing and investment. We implement the regression of equation 2 for each subgroup, state-owned companies and privately owned companies. We control for investment opportunities using local GDP and FDI. The result in columns 1 to 2 of Table XII shows that private companies that are supposed to have much less political connection and less possibility of receiving a government subsidy demonstrate a coefficient similar to the whole sample. This suggests that concern regarding government subsidies is not a major issue in our dataset.

The following two indicators of political connection we employ to split the dataset are tax rate and long-term loans. There are multiple enterprise income tax rates in China⁵². A lower tax rate only applies to firms within the strategic industries or state-supported industries, such as the IT industry. Firms with lower tax rates usually have better political connections either because politicians are encouraged to pay more attention to the growth of strategic industries or because those with political connections are more likely to be categorized as being affiliated to those strategic industries so that they can benefit from low tax rate. Another indicator is the long-term loans. The long-term loan, payment of which is due in more than one year, is usually referred to as a “project loan”. That is because any state-owned banks, when issuing longer-than-one-year loans, require a borrower to have state-certified projects as the purpose of the loan. The absence of such a project means that banks can only issue working capital loans, with a term shorter than one year. It is obvious that those with political connections are more likely to obtain a state-certified project and thus a long-term project loan.

The results, with sub-samples split by the tax rate and the long-term loans, are reported in columns 3 to 6 of Table XII. Columns 3 and 4 report the coefficient estimated using the sub-sample of those firms with an all-year higher and lower-than-median tax rate, respectively. Columns 5 and 6 report the coefficient estimated using the sub-sample of those firms without and with long-term loans, respectively. Those with less political connections, namely those with higher tax rates and no long-term loans, are associated with a similar coefficient compared to either those with political connections and the whole sample, suggesting that government subsidies play quite a small role in driving the result we obtained before.

The last indicator of political connections comes from two characteristics of the land purchased by the company, namely the size of the land and the construction ratio. As Chinese local governments are famous for using large pieces of land as lures to attract investment for higher economic growth and employment⁵³, a large area of land is a clear indicator that the land purchaser is connected. The construction ratio is a constraint on the height of the building over the land by restricting the maximum ratio of construction area relative to the land area. As the construction ratio is completely controlled by local government and increasing the construction ratio is greatly beneficial to the land purchaser, great lobbying efforts are made and those with a higher construction ratio should have a better political connection. We split the dataset according to whether the purchased land is

associated with a top 10% measured in area, value or construction ratios. When those with top land are excluded, the coefficient of the regression is slightly smaller relative to the whole sample and it is still significant. This is another indication that the correlation between the land purchasing and investment is not completely derived from the omitted government subsidies.

F. Effect of Mayoral Replacement

As we would like to test the causal relationship between the shrunk land purchasing and decreased investment, when the land supply is instrumented by the replacement of the city mayor, the exclusive restriction requires that the replacement of city mayors is completely uncorrelated with the decrease in investment, via a mechanism other than the land supply channel. One concern is that the replacement of a city mayor could be directly linked with the decreases in investment. The most likely case would be that once a pro-business city mayor is replaced, expecting a less favourable business environment, firms then cut their investment, leading to a spurious causal relationship. Apart from the mean-shifting in the quality of city mayors, the pure uncertainty that is caused by a city mayoral replacement is also investment-depressing. In both cases, although the trigger for the city mayor's replacement is a political one, its effect could be economic.

We use relative economic performance and tenure length to capture the degree of quality shifting and the political uncertainty brought about by the city replacement decision, respectively. More specifically, we use the difference in GDP growth between the one under the replacement mayors and the city averaged one to measure the depressing effect of having a less pro-business mayor. The better the replaced city mayor, compared to the city average, the more likely it is that the decrease in investment is coming from the less pro-business mayor rather than the decreased land supply, and we are more likely to have over-estimated the effect of the land supply on investment. The result after controlling for the relative GDP growth rate is illustrated in Column 1 of Table XIII. The coefficient of land purchase dummy, our main variable of interest, remains unchanged, suggesting that our result is not likely to come from those anti-business new mayors. In Column 2 the control variable is replaced with FDI growth rate, another indicator of the attitude of city mayors toward business. The result is still unchanged.

We use the tenure length of the replaced city mayor to measure the political uncertainty brought about by the mayoral replacement. Everything else being equal, the decision to replace an established

mayor, a mayor who has been in office for a long time should have a more negative impact on business compared to a replacement decision where city mayors are frequently replaced. That is, the past tenure length of a replaced city mayor should be positively correlated with the investment-depressing political uncertainty that was brought about by the replacement decision. The result is demonstrated by Column 3 of Table XIII. The coefficient of the mayoral replacement dummy is also unchanged, as evidenced by a slightly smaller economic scale and unchanged t-statistics, when the previous tenure of a former city mayor is controlled for. Note that the coefficient of the previous city mayor's tenure is indeed negative, indicating that the political uncertainty causes a lower level of investment. In summary, above two regressions alleviate concern that decreased firms' investment is positively correlated with the decreased land supply because they are both coincidentally depressed by the mayoral replacement event or the related uncertainty.

G. Security Channel

The security channel (Beslay, 1995) describes the mechanism that property rights, or land titles in this case, can eliminate the risk perceived by the land user of being expropriated by the government, and thus provide a greater incentive to invest.

We could address the security channel issue by checking the legitimacy of the alternative methods of land use, the leased communal land in the rural area. If there were better property rights protection in the alternative methods of land use, then firms' demand for entitled land and the title-investment sensitivity would both decrease. The cross-sectional heterogeneity of the protection of alternative land use comes from the fact that in one province, Guangdong, the property right protection is better protected. This is because the lease contract to use the communal land, an important alternative land usage, is recognized by the government and supported by the court, whereas it is universally illegal in all other provinces of China. The legitimacy of the use of vast areas of communal land as an alternative resource of land security greatly decreases the security need for entitled land. Crucially, this measure for security channels is not correlated with the collateral channel. This is because the usage of leased communal land is not accepted by the bank as collateral so that they cannot be used to obtain extra bank loans. Therefore, this enables us to tease out the effect of the security provided by the entitled land from the effects of the role of collateral.

The result is illustrated in Table XIV. The first column is the result estimated using equation 2 only for those firms located in Guangdong. To compare with that, Column 2 demonstrates the result associated with firms in all other provinces in China. It is evident that the firms in Guangdong display a much lower level of title-investment sensitivity. One concern about this result is that it comes from a lower demand for entitled land rather than an expanded supply. However, this is highly unlikely to be the case. Guangdong, with its GDP per capita of 58 thousand RMB (9.4 thousand USD) in 2013, is among the richest and most developed provinces in China. Its location, on the southeast coast and adjacent to Hong Kong, along with its favourable economic policies, grants it extra advantages in economic development over other provinces. Its demand for land is supposed to be higher as a result of its attractiveness for business. This means that the coefficient of Column 1 should be even lower were Guangdong developing at the average speed for China, which is lower than its current figure.

Another concern is that the lower coefficient may result from some other unobserved institutional difference between Guangdong and other parts of China, given the great difference in economic growth between the two. To eliminate this concern, we use two other provinces, Zhejiang province and Jiangsu province, as comparisons with Guangdong. Those two provinces share three prominent characteristics with Guangdong: they are all located on the southeast coast, have similar total populations and are among the top performers in regard to economic growth⁵⁴. The only difference, as with the rest of China, is that the lease contract over the communal land between the land user and the rural collectivities owners is not endorsed by law in those two provinces. The regression result of those two provinces is illustrated in Column 3 of Table XIV. The scale of the coefficient of Jiangsu and Zhejiang provinces is quite close to the national average, reported in Column 2 and is much higher than Guangdong province's level, as reported in Column 1. This suggests that our result is less likely to be driven by some unobserved institutional differences between Guangdong and other provinces in China.

H. Collateral Channel

The other channel through which the property rights protection may affect investment is the collateral channel. The collateral channel (De Soto, 2010) is associated with the fact that the entitled land, with its capacity for being collateralized, could help lift the financial constraint faced

by the land users and thus promote investment. It predicts that, other things being equal, those firms that are subject to more severe financial constraints are benefiting more from being permitted to purchase entitled land. In order to characterize the extent to which firms are subject to financial constraints, we explore the difference in the *supply* and the *demand* for external finance among firms. Those firms with greater demand and scarcer supply in terms of raising capital externally are supposed to be subject to a great degree of financial constraint.

We use the industry-level data to characterize the demand for external finance of a firm in a certain industry, following the strand of literature pioneered by Rajan and Zingales (1998). In their paper, Rajan and Zingales (1998) construct the index of the dependency on external finance for each sector by calculating the percentage of external finance as the total finance of firms in the US, where the financial market has less friction. Those industries in which US firms are associated with a higher ratio of external finance are regarded as industries more reliant on external finance. Braun (2003) and Ponticelli (2012) later apply this method to the ratio of tangible assets as a percentage of total assets, proposing that those industries with a higher level of tangible assets are in more need of external finance, as those large-scale fixed investments usually cannot be sufficiently financed internally.

We use the US firms index of dependence on external finance, from Rajan and Zingales (1998), and index of tangible assets, from Braun (2003), as measures of financial constraints. For each index, we split the data into two groups: the above-the-median group and the below-the-median group, and implement the regression of the equation 2 for each group. The results are illustrated in the first four columns of Table XV. Those are more financially constrained, either measured by dependence on external finance or tangibility, display a higher level of title-investment sensitivity, consistent with the hypotheses that collateral channel limits investment when the collateralizable assets are scarce.

On the supply side, we use three firm-level characteristics as measures of firms' capacity to mobilize external finance. The first two measures are the scale and the age of the firms. Those firms of larger scale and those in their business for a longer time may raise external capital easier and are thus subject to a lower financial constraint. Hadlock and Pierce (2010) argue convincingly that those two variables, scale and age, are associated with a lower degree of information asymmetry and bankruptcy probability. As a result, they are significantly linked to a higher level of external finance.

The prediction of financial constraints using those primary variables yields a much better performance compared to using more sophisticated measures⁵⁵. Likewise, we split the whole dataset into two, one with above-median observations and one with below median observations, and implement the regression of the equation 2. Consistent with our hypotheses, those larger and older firms, which are less financially constrained, are associated with reacting less aggressively toward the incidence of being permitted to purchase the entitled land. This result also indicates that the collateral channel is functioning for Chinese firms.

The third variable I use to measure the capacity of firms for mobilizing external finance is the independent index provided by the Oriana database. The independent index is constructed in a way that more independent firms are associated with a higher value. Those independent firms, without the financial aid from their parent company, are facing a higher level of financial constraint and thus higher title-investment sensitivity. The result reported by columns 9 and 10 of Table XV confirms this prediction. The coefficient of the independent sub-sample is much higher compared with the dependent sub-sample, with much larger t-statistics.

I. Impact of other factors

The impact of the entitled land purchasing, which significantly increases the firms' investment as demonstrated before, should by no means be limited to investment exclusively. Other factors, such as external finance, profitability and employment, are all expected to increase when more entitled lands are accessible for expansion of the businesses of the firms. Firstly, the collateral channel suggests that there is an expansion of external finance when the land and constructions above it are collateralizable. Secondly, a relaxed assumption that most investment decisions are profit-maximizing and associated with positive net present value projects leads to the conclusion that those firms' profits will increase. Lastly, the expansion of business will naturally generate more employment.

In this section we are going to test whether those above-mentioned three factors will react positively with the land purchasing events. Similar to previous regressions, we implement the regression of equation 2 with the land purchase dummy being instrumented by the replacement city mayor. To test the impact on external finance, we substitute the dependent variable into the annual changes of the bank's short or long terms, divided by the total value of the land purchased. The

result of the regression is shown in Column 1 of Table XVI and the coefficient for the instrumented land purchasing dummy is both positive and statistically significant, suggesting that the firm that purchases the land receives more bank loans in the same year. Note that the coefficient is more than 1, meaning that the scale of the bank loans bypassed those of the entitled land. That is mainly due to the positive spillover effect of entitled land over the collateralization of other assets of the firms. Chinese banks do not accept constructions as collateral as long as the usage right of the land beneath it is not an entitled land. Therefore, obtaining the title of the land makes all constructions about to be built over the land collateralizable and the increased bank loans could bypass the value of the land itself.

In order to detect the long-term effect of the land purchasing over external finance, the first two lags of the dependent variable are also used for regression and the results are reported in columns 2 and 3. The coefficient for the first lag of the land purchase dummy is positive while the coefficient for the second lag is negative. Neither of them is significant though. This indicates a U-shaped curve, namely that the bank loans continue to grow one year after obtaining the land and only decline after the second year. The average increase in bank loans from the first three years after the land purchase is around $((130\% \times 3 + 54\% \times 2 - 42\%) / 3) = 150\%$. This is quite a substantial number, suggesting that having the land can dramatically change the financial situation of the firm. This ratio of the increment of external finance to the increment in investment (including the total payments of entitled land) is around 70%, suggesting that a majority of new investment associated with the land purchasing is from external resources.

The regression analysis of the profitability is demonstrated in columns 4 to 6. We use the same setting of the instrumental variable regression with the dependent variable replaced by the growth rate of the profitability normalized by its level the previous year. The coefficients reflect a clear pattern of growing profits after the land is purchased. The first, second and third year are associated with increments of 212%, 295% and 130% respectively, and the speed of increases peaked one year after the land purchase. The average increment for each year of profitability is around 221% and is very likely to continue to grow when the time horizon is extended⁵⁶. The employment of those land purchase experiences a similar pattern of increasing, as suggested in columns 7 to 9. The dependent variable is the increment of the employment normalized by its previous year's value. The coefficients reflect a clear pattern of growing employment after the land is purchased. The average growth rate

over the first three years is 154%.

IV. Conclusion

This paper investigates the effect of property rights protection on investment. In order to address the endogeneity problem and to establish a causal relation between the two, we employ a novel instrumental variable, the replacement of city mayors within the Chinese context. There are two prominent features of the Chinese land system. Firstly, entitled land plays a critical role in providing property rights protection and promoting investment, but there is a strict restriction on the supply of entitled land imposed by a quota system. Secondly, the city mayors, with their political connections and local knowledge, have influence in relaxing the constraints of the quota system through their lobbying efforts for higher local land supply. Therefore, the replacement of city mayors leads to a decrease of local land supply and thus a lower level of investment. The instrumental variable regression with 5,000 unlisted private companies reveals strong evidence that property rights protection promotes investment, with the impact exerted via both the security and the collateral channels. For each 1 RMB that is invested in purchasing land, there is more than 1 RMB investment induced that year. The land-related investment accounts for 47% of GDP growth in China for the period between 2006 and 2011.

We also make several attempts to illustrate that the exclusive restriction of the instrumental variable is satisfied, namely that the investment is not linked to the mayoral replacement via channels other than the decreased land supplies. Firstly, the decision of city mayoral replacement is a politically driven rather than an economically oriented decision. Secondly, other economic policies, especially enterprise tax and fiscal expenditures, are less likely to be affected by the city mayoral replacement decision relative to the local land supply. Thirdly, the decrease in investment is not likely to result from a dampened expectation of the economic policies of new mayors or the economic uncertainty brought about by the mayoral replacement. Fourthly, the decrease in investment is either likely to be brought about by the extra investment opportunities or by political connections.

Notes

¹For instance, the Washington Consensus (Williamson, 1989) listed the 10 most important institutions that may affect investment and long-term economic growth.

²One example of a failure to detect a positive relationship is reported by Field (2005), who finds that the endowment of land titles in Peru does not bring about the expected external finance for slum residents because of the faulty local bankruptcy system.

³However, economic factors may explain the decision of whether or not the provincial officials are promoted, although the extent to which GDP will affect the political careers of city or lower-level officials is still inconclusive. See Li and Zhou (2005) and He and Sun (2012).

⁴We use the title-investment sensitivity to estimate the total investment that was induced by the land purchase, given that the total land sale proceeds in China was 4.12 trillion RMB. As the title-investment sensitivity is achieved from the industrial land, our final result could be under-estimated, as the other two types of land – the residential land and commercial land – are associated with even higher levels of investment once purchased.

⁵Also estimated using the 1.05 title-investment sensitivity.

⁶China's GDP grew at an average of 3.141 trillion RMB, or 506 billion USD during those four years.

⁷For instance, the government's intervention in the real estate market is largely regarded as the dominant factor of that business.

⁸It is suggested by Ayyagari, Demirgüç-Kunt and Maksimovic (2010) that the decision on land quota allocation is somehow political: those who purchased land are much more politically connected compared to those without land purchasing history.

⁹In general, the communal lands are strictly prohibited from being released to non-collectivity members for non-agricultural use. See Article 2 and Article 63 of the Land Administration Law. However, the Guangdong government allows this lease contract over communal land. See Administrative Measures of Guangdong Province for the Circulation of the Right to the Use of Collectively-owned Land for Construction Purposes (2005).

¹⁰There are many other measures regarding financial constraints, such as those by Almeida et al. (2004) and Lamont et al. (2001). However, almost all of those measures require the value of the

dividend payment. Chinese firms are notorious for not paying dividends, not because of financial constraints but because of poor corporate governance. See Faccio et al. (2001) As a result, all the above measures are noisy in that they have a tendency to measure corporate governance on top of financial constraints.

¹¹The tenure is 70 years for residential land, 50 for industrial land, and 40 for commercial land.

¹²Although, in practice, the total amount of land with an expired tenure is quite small and there is no universal treatment for land with an expired tenure.

¹³Indeed, the odds of being expropriated for the entitled land are much lower than those of other types of land, especially allocated land. For instance, the Shenzhen government, with the intention of increasing the efficiency of land, expropriated several allocated lands but no entitled land, although the ratio of entitled land is larger in Shenzhen than to the allocated land.

¹⁴In China, the registration information of assets is usually not open to private individuals.

¹⁵The first entitled land auction was implemented in 1987 in Shenzhen, but the large supply of entitled land started five years later after the change in the land administration law.

¹⁶There was a regional land titling scheme that was implemented in Shenzhen starting from 2009.

¹⁷The rest are allocated lands, which account for 2.5 million hectares.

¹⁸This is consistent with the strategy of central government to develop the north west provinces to reduce the inequality between provinces.

¹⁹One implication of the small secondary market is that the transferability channel, another channel through which property rights could affect investment by increasing the liquidity of the secondary market, is to a large extent muted in our studies. See Beslay (1995) for a detailed theoretical discussion of the transferability channel. Therefore, we only need to focus on the other two channels, the security channel and the collateral channel.

²⁰An economic develop zone is similar to a industry park where favorable policies are granted to attract investment and promote economic growth.

²¹Land administration law prohibits the use of communal land in rural areas for business purposes.

²²In practice, it is not uncommon that some member of the collectivity attempt to invalidate the contract by claiming the deal was signed by corrupt commune leaders and thus do not reflect the collective will of all members of the commune. The annulment of the contract in most cases is supported by the local court.

²³Another reason is that any business-oriented construction above communal land is illegal, so banks do not accept them as collateral due to the aforementioned administrative risks.

²⁴The incentives of local government to over-supply come from politics (a better political career for a leader), the budget (100% of the proceeds from the sale of entitled land will be attributed to local government) and taxation (firms that receive land would generate more taxable profit). See Tian and Ma (2006) for more details.

²⁵One exception is Shenzhen City, where the local land supply quota is directly set by the central government.

²⁶When considering the land quota allocation, higher government puts the local reported demand on top of other macroeconomic factors, such as GDP, FDI or fixed asset formalization (see Sun (2012)).

²⁷One anecdote is that when the central government made the official national quota for 2012, officials from the Land and Resource Division, which is in charge of national land quotas, met eight provincial governors, all with intentions of creating their local land quotas.

²⁸Usually, higher government will retain 10% of the quota for eventualities, e.g. the land requirement from a large-scale investment project commanded by central government in the local area. A majority of those quotas will be finally distributed to local government and those who lobby most aggressively will have a higher chance of receiving those quotas.

²⁹On the other hand, the position of secretary of the municipal party committee of one city is treated more like a decision-making role.

³⁰Many anecdotes suggest that it is the city mayor who holds the local government meeting, preparing for the lobby work.

³¹This negativity may come from (1) the time wasted in the gap between the tenures of two mayors, (2) the disincentive for the old mayor to lobby when informed he or she is about to leave, or (3) the lack of experience or political connections of the new mayors when lobbying.

³²See Li and Zhou (2005) and Whiting (2001).

³³Chinese Communist Party regulation states that mayors have to retire at the age of 60 and that a mayor cannot hold tenures for more than two five-year terms. As a result, the age and completed tenure length should significantly affect the probability of the mayor being replaced.

³⁴This wave of succession of local mayors occurred after the 17th national congress of the

Communist Party of China, in which the central government leaders were replaced.

³⁵For most cities, the quota of its annual land supply is determined in the first quarter of the year.

³⁶Most Chinese datasets cover only those listed companies, greatly limiting the number of firms included. Those that do cover private unlisted firms, especially the Industrial Enterprises Dataset for those above a designated size, have not updated their records since 2009.

³⁷The website is: www.mlr.gov.cn/tdsc/. Local city government is required to hand in their land sale information to central government to comply with the “six measures” regulation about the land market released by the state council in 2006. As many observations are repetitive, the total available observations in the database area round 100,000.

³⁸As many observations are repetitive, the total available observations in the database area round 100,000.

³⁹From “Measures for the Implementation of Administration of Enterprise Name Registration”, State Administration for Industry and Commerce of the People’s Republic of China.

⁴⁰For instance, the New Hope Group, the first registered private company in China, was really named Sichuan New Hope Group, with Sichuan being the name of the province the New Hope Group is registered in. Those companies that do not have the local jurisdictions’ names in front of their names are those registered at the State administration for industry and commerce, indicating a huge economic scale and the strong political connections of the company.

⁴¹We adopted two other matching criteria to check the robustness of the matching technique. In one robustness check we use a firm’s location as an extra matching criterion and in another robustness check we use only the first six Chinese characters of the firm’s name. The result using both matching criteria is quite close to the result presented in the paper.

⁴²The main reason for the relatively small match of the firms is a limitation of the Oriana database. It contains around 220,000 companies that have a relatively complete all-year long observation, a relatively small number compared to the total number of 4.95 million companies in China.

⁴³With the number of private companies approaching 5 million and all land transaction from 2006 to 2011 amounting to 100,000, only 2% of firms were allowed to buy land.

⁴⁴Interview with the Deputy Director of High Technology Zone of Baoding City, China.

⁴⁵They also make occasional reference to Baidu Baike, the Chinese version of Wikipedia.

⁴⁶Potentially, the local land supply could be a reaction to the investment opportunities. However,

considering that here only 2.5% Chinese companies were allowed to purchase land in a total of seven years, the absence of entitled land is a much more restrictive constraint compared to the lack of investment opportunities.

⁴⁷For instance, it is estimated that Hangzhou, the capital city of Zhejiang province, with a population of 4% of the province, receives a total land quota of 26% of the land (Report on Land Market Development of Zhejiang Province in 2014).

⁴⁸Many special economic zones were established in the period from 2002 to 2006 in order to gain extra land supply quotas (see Cartier (2001)).

⁴⁹Year 2007 is the last year when this figure is published.

⁵⁰This is the largest fiscal stimulus package ever in the history of China, with 10 main measures and a total amount of investment of more than 8 trillion RMB (1.3 trillion USD). However, as most of the subsidized investments are implemented by SOEs, its impact on private firms could be quite limited.

⁵¹For instance, Zhou, Delios and Yang (2002) document that FDI in China demonstrates a clear pattern of clustering in the cities with Special Economic Zones (SEZs) and Opening Coastal Cities, suggesting that there is a high spatial correlation between investments in China predicated on the economic policies of local governments.

⁵²In general, there are three levels of income tax rate for enterprises in China: 25%, 20% and 15% (only for government-supporting enterprises). However, in practice, there are various tax-reduction policies.

⁵³Also see Tian and Ma (2009).

⁵⁴By the end of 2013, the GDP per capita of Guangdong, Zhejiang and Jiangsu were 58, 74 and 68 thousand RMB (or 9.4, 12.0 and 11.0 thousand US dollars) respectively, ranking fifth, first and second respectively among all provinces in China.

⁵⁵Another practical reason to use those two variables is that they do not require certain variables that are not available for unlisted companies, such as dividend payouts.

⁵⁶As years go by, the number of observations decrease dramatically so that we can only check the effect second lag of land purchasing year over profitability.

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Figure 1. Figure 1 Annual Growth Rate of Entitled Land Supplies in China in 2013

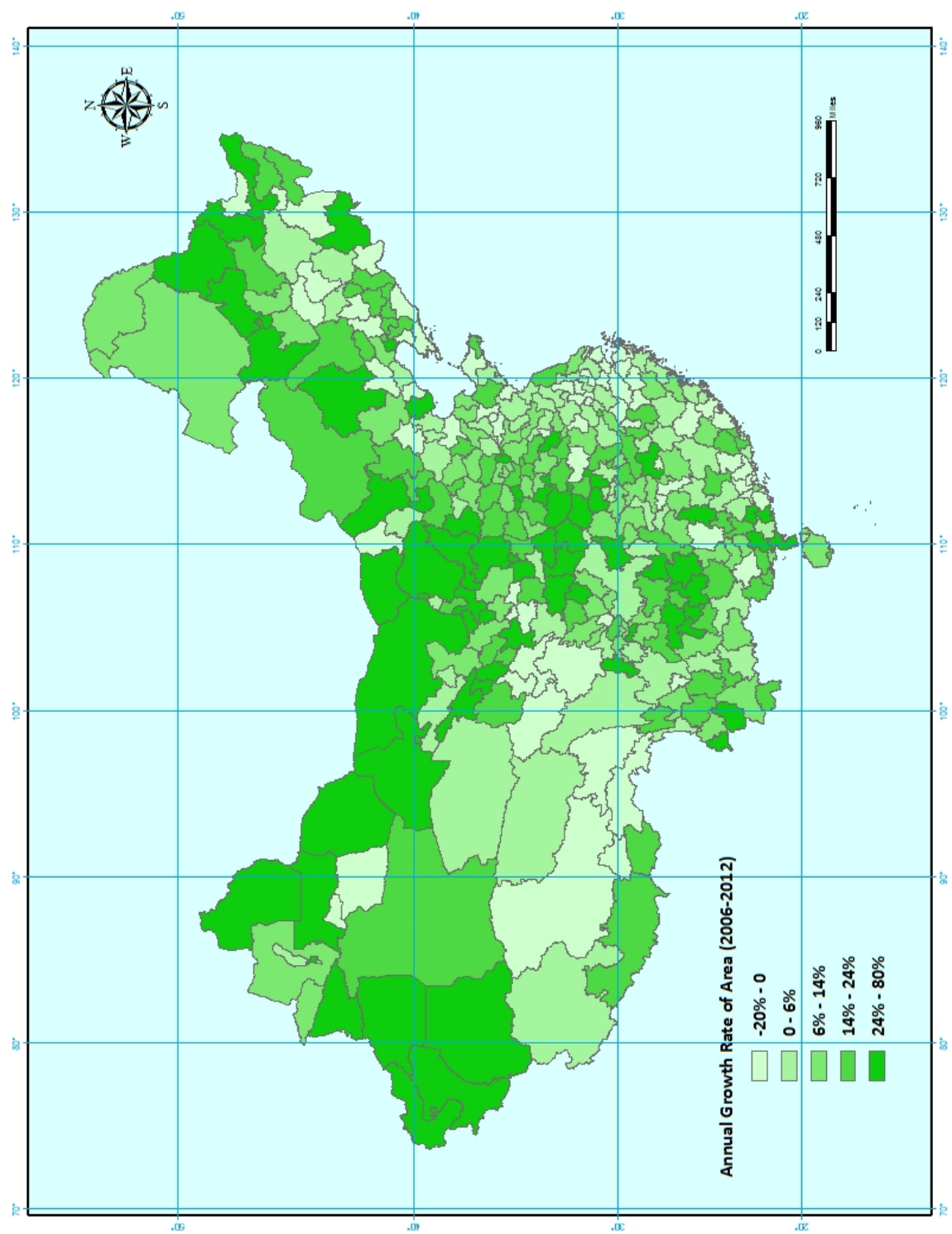


Figure 2. Figure 2 Average Price of Entitled Lands in China in 2013

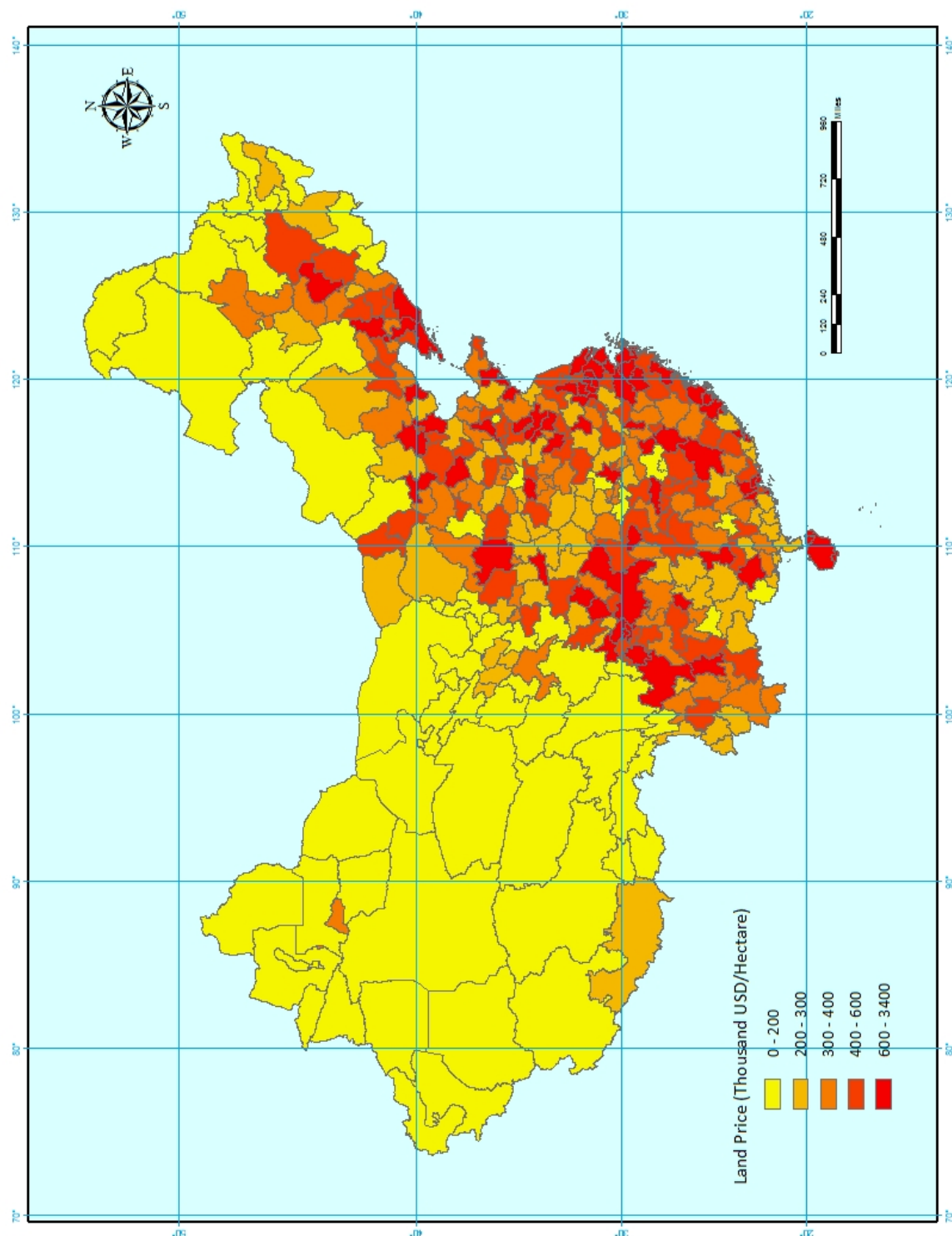


Table I Annul land supply in China

	Total Area	Primary market			Secondary market		
		Entitled land Area	Price	Allocated land Area	Entitled land Area	Price	
Before 1993	346	0	-	346	-	-	
1993-2002	158	62	-	97	-	-	
2003	259	194	2.8	65	70	8.6	
2004	244	182	3.5	62	67	7	
2005	230	166	3.6	65	51	9.9	
2006	307	233	3.5	74	70	8.2	
2007	342	235	5.2	107	62	11.5	
2008	234	166	6.2	68	-	-	
2009	362	221	7.8	141	-	-	
2010	433	294	9.4	139	-	-	
2011	593	335	9.6	258	-	-	
Cumulated	4775	2579	-	2196	-	-	
% of total inhabitable land	2.49%	1.30%		1.19%			

This table demonstrates the annual supply for all types of lands in China for both primary and secondary market. The Primary market includes the entitled land and the allocated land. The secondary market consists of only the entitled land as the allocated land are not allowed to be alienated from the land users. The data comes from "The Yearbook of Chinese Land and Resources". The data for the secondary market is not available after 2007 when Yearbook stops reporting that item. All the area are measured in thousands of hectares and all prices are measured in Million RMB per Hectare (0.16 Million USD per Hectare)

Table II The Comparisons between Cities with and without Mayoral Replacement

	Land Area		Δ Tax Rate		Δ Fiscal Expenditure		Δ Private Fixed Asset Investment					
	No Replace (1)	Replace (2)	T-test (3)	No Replace (4)	Replace (5)	T-test (6)	No Replace (7)	Replace (8)	T-test (9)	No Replace (10)	Replace (11)	T-test (12)
2006	824.71	713.93	0.85	-0.04	-0.02	-0.91	-0.01	0.02	-1.79	0.30	0.26	0.86
2007	929.92	736.35	1.36	0.74	-0.01	0.56	0.00	0.01	-0.47	0.29	0.28	0.12
2008	592.78	420.64	2.55***	-1.03	-0.23	-0.46	-0.02	0.01	-0.99	0.27	0.36	-1.90
2009	724.01	592.20	1.19	-0.06	-0.03	-0.61	0.03	0.02	0.39	0.30	0.30	0.01
2010	947.88	808.13	1.29	-0.01	-0.03	0.69	0.07	0.03	1.84	0.32	0.26	1.04
2011	1607.81	1401.72	1.31	0.04	0.00	0.59	-0.09	-0.01	-0.98	0.23	0.27	-0.82
Overall	937.85	778.83	2.89***	-0.08	-0.06	-0.06	0.01	0.02	-0.77	0.29	0.26	1.02

This table compares the total land supply, changes in tax rate, fiscal expenditure and the aggregate investment between cities with a mayoral replacement and cities without mayoral replacement for a period spanning from 2006 to 2011. The *Land Area* represent the average annual city level supply of entitled land and it is measured in Hectares. The growth rate of tax rate, fiscal expenditure and private fixed asset investment are all calculated using the its increment value normalized by its last year level. A T-statistics of the t-test between the cities with and without mayoral replacement are reported, with *, **, *** being associated with significance at the 10%, 5%, and 1% respectively.

Table III Predictions of the Probability of City Mayoral Replacement

	Pr[Mayoral Replacement]	Pr[Mayoral Replacement]	Pr[Mayoral Replacement]
	(1)	(2)	(3)
Duty Length	0.0777*** (11.35)	0.0777*** (11.35)	0.0790*** (11.72)
Age	0.00427** (2.52)	0.00427** (2.52)	0.00415** (2.48)
1[Technocrat]	0.00391 (0.28)	0.00374 (0.27)	0.00382 (0.28)
1[Higher Education]	0.064 (0.84)	0.0627 (0.83)	0.0964* (1.85)
1[Middle]	0.0428* (1.91)	0.0429* (1.92)	0.0447** (2.04)
1[West]	-0.016 (-0.73)	-0.0156 (-0.71)	-0.0207 (-0.97)
1[Northeast]	0.0386 (1.35)	0.0387 (1.35)	0.0366 (1.28)
$\Delta GDP[t-1]$	-0.103 (-0.78)		
$\Delta FDI[t-1]$	0.0000283 (0.04)		
$\Delta GDP[t-1](\text{Local Demeaned})$		0.0263 (0.24)	
$\Delta FDI[t-1](\text{Local Demeaned})$		0.000232 (0.35)	
$\Delta GDP[t-1](\text{Year Averaged})$			0.104 (0.62)
$\Delta FDI[t-1](\text{Year Averaged})$			0.000126 (0.10)
Constant	-0.276 (-1.01)	-0.273 (-1.00)	-0.29 (-1.31)
N	1888	1888	1971
R Square	0.422	0.422	0.425

This table reports the probit regression of the possibilities of mayoral replacement on variables regarding the characteristics of mayors and indicators of local economic performances. The *Duty Length* is the total years since the mayor started his duty as city mayor. *Age* is the current age of city mayor. *1[Technocrat]* is the dummy variable with value 1 for those technocrat mayors and 0 for all others. *1[Higher Education]* is the dummy variable with value 1 for those mayors with higher degree and 0 for all others. *1[Middle]*, *1[West]* and *1[Northeast]* indicate whether the city is located in middle, west or northeast of China. *GDP[t-1]* and *FDI[t-1]* are the local growth rates for GDP and FDI. *, **, *** indicate significance at the 10%, 5%, and 1% respectively.

Table IV The Tabulation of the Characteristics of City Mayors for Time Dimension

	Probability of Mayoral Replacement		Average Duty Length		Average Age		Ratio of Technocrats	
	Mean (1)	S.D (2)	Mean (3)	S.D (4)	Mean (5)	S.D (6)	Mean (7)	S.D (8)
2003	0.24	0.43	3.34	2.27	49.43	4.59	0.30	0.21
2004	0.16	0.37	3.88	2.49	50.25	5.01	0.23	0.18
2005	0.16	0.37	4.30	2.75	50.55	5.17	0.35	0.23
2006	0.29	0.46	4.24	3.33	50.50	5.22	0.24	0.18
2007	0.16	0.37	4.44	3.47	50.99	5.02	0.32	0.22
2008	0.39	0.49	3.64	3.52	50.41	5.16	0.38	0.24
2009	0.09	0.29	4.15	3.48	51.00	5.00	0.22	0.17
2010	0.19	0.40	4.05	3.29	51.33	5.13	0.32	0.22
2011	0.22	0.39	2.35	3.80	50.91	5.10	0.27	0.20
Overall	0.27	0.44	3.90	3.41	50.48	5.03	0.35	0.23

This table tabulates the characteristics of city mayors for time dimension. The *Probability of Mayoral Replacement* is the likelihood of one mayor being replaced in one particular year. The *Average Duty Length* is the average year for which the city mayors have been working in current position. The *Average Age* is the averaged age for all city mayors for a particular year. The *Ratio of Technocrats* is the ratio of mayors with technocrat backgrounds as the total number of city mayors. The mean and standard deviation are reported for each variable.

Table V The Ratio of Sampled Land Supply Relative to Total Land Supply

	By Land Pieces			By Land Area			By Land Value		
	Mean (1)	Median (2)	S.D (3)	Mean (4)	Median (5)	S.D (6)	Mean (7)	Median (8)	S.D (9)
2007	0.32	0.20	0.33	0.31	0.32	0.22	0.27	0.12	0.24
2008	0.23	0.16	0.20	0.28	0.25	0.21	0.14	0.11	0.13
2009	0.24	0.22	0.13	0.28	0.25	0.15	0.12	0.08	0.12
2010	0.41	0.43	0.17	0.50	0.47	0.20	0.19	0.12	0.21
2011	0.23	0.22	0.11	0.27	0.24	0.15	0.20	0.07	1.02
2012	0.38	0.34	0.19	0.47	0.49	0.21	0.37	0.11	0.51
Overall	0.28	0.25	0.22	0.32	0.31	0.22	0.21	0.10	0.57

This table tabulates various measures of the ratio of sample land entitled supply relative to the total entitled supply in China. For each city and each year, a ratio is measured by total land pieces, by land area and by total land value. For each measure, the mean, median and standard deviation value for the cross-sectional distribution is reported.

Table VI The Statistics Description of Firms, Land Transactions, Mayors and Cities

	Mean	Median	S.D.	10th Percent	90th Percent	Obs.
<i>Panel A. Firm Characteristics</i>						
Founding Year	1999.47	2003.00	38.64	1992.00	2007.00	5761
Employment (Thousand)	833.28	131.00	5980.29	35.00	1100.00	5928
Total asset (MillionUSD)	156.23	5.84	1642.73	1.00	145.89	5983
Sales (Million USD)	135.46	7.99	2216.06	1.30	124.50	5969
Cash (%)	16.37	14.67	10.25	4.94	30.59	587
Capital Expenditure (%)	4.52	5.78	16.85	-13.79	21.02	5867
Total loans (%)	6.57	0.02	11.47	0.00	23.43	5959
Long-Termed Loans (%)	5.21	0.00	9.70	0.00	17.83	5981
Short-Termed Loans (%)	1.20	0.00	4.68	0.00	0.00	5959
Tangible Asset (%)	33.79	30.73	20.68	8.78	64.04	5983
ROA (%)	3.23	2.13	11.49	-6.01	12.55	5983
Tax Rate (%)	11.47	7.45	229.03	0.00	32.92	4530
<i>Panel B. Land Characteristics</i>						
Total Value (Thousand USD)	1969.14	476.82	12940.75	72.78	3136	6237
Total Area (Hectare)	3.94	1.65	8.49	0.38	8.48	5668
Price Per Hectare (Thousand USD)	407.74	278.67	1301.54	105.28	643.60	5668
Max Construction Ratio	122.75%	100.00%	210.73%	0.00%	200.00%	2444
<i>Panel D. City Characteristics</i>						
Locao GDP (Million USD)	2450.24	1881.28	2153.39	506.22	5087.55	22506
Population (Million)	231.41	181.02	158.98	79.93	398.31	10478
Budget Ratio (%)	177.54	135.65	136.46	96.61	292.08	22505
County Dummy	0.28	0	0.45	0	1	6210
Province Capital Dummy	0.24	0	0.43	0	1	24539
Economic Zone Dummy	0.41	0	0.49	0	1	18648

This table reports the statistics descriptions regarding to firms, lands, mayors and cities. The *Founding Year* is the year on which the firm is founded. The *Employment* is the total number of employees. *Total Loans* are the sum of long-termed loans, which expired in more than one years and short-termed loans, which expired within one year. The *Capital Expenditure* is the increment of total fixed asset net of the total depreciation. *Tangible asset* are the total amount of Property, Plant and Equipment. *Tax Rate* is the total tax relative to the total profitability. The *Max Construction Ratio* is the largest allowed construction area relative to the land area for each piece of land. All variables for the city mayors are similar with descriptions in Table III. The Budget Ratio is the total city government fiscal expenditure divided by the all on-balance sheet fiscal revenues, which does not include the large scaled proceeds from land sales. The County dummy indicates if the firm is located at a county rather than a city. Province Capital dummy indicates if the firm is located at a capital city of a province. The Economic Zone Dummy indicates if the firm is located in a city with economic zones. *, **, *** indicate significance at the 10%, 5%, and 1% respectively.

Table VII Growth Rate of Investment, Finance and Profitability Tabulated by Years

	Δ Capital Expenditure (1)	Δ Finance (2)	Δ Profitability (3)
T-2	0.03	0.23	0.11
T-1	0.11	0.27	0.14
T	0.54*	0.84**	0.18
T+1	-0.14	-0.14	0.56*
T+2	-0.11	0.29	0.32

This table tabulated the averaged growth rate of investment, external finance and portability for all firms in our sample from 2 years before their land purchase to the 2 year after the land purchase. The residual growth value of all three variables after controlling for the industry and regional average growth rate. *, **, *** indicate significance at the 10%, 5%, and 1% respectively.

Table VIII First Stage Regression

	Pr[Land Purchase] (1)	Pr[Land Purchase] (2)	Pr[Land Purchase] (3)	Pr[Land Purchase] (4)	Pr[Land Purchase] (5)
1[Mayoral Replacement][t]	-0.197*** (-3.05)	-0.192*** (-2.96)	-0.208*** (-3.14)	-0.208*** (-3.18)	-0.064 (-0.76)
1[Mayoral Replacement][t-1]			-0.187*** (-2.93)		
1[Mayoral Replacement][t-2]			0.116** (2.02)		
Local Govn Deficit Level [t-1]				0.242*** (4.86)	-0.0224 (-0.34)
Local Land Supply [t]					0.00243*** (10.57)
Local Land Supply [t-1]					-0.00200*** (-6.93)
Local Land Supply [t-2]					-0.00219*** (-10.70)
Total Asset		0.0391*** (2.93)	0.0391*** (2.93)	0.0449*** (3.32)	0.0424*** (2.84)
Leverage Ratio		-0.0669 (-0.70)	-0.0624 (-0.65)	-0.0539 (-0.56)	0.0458 (0.43)
Fixed Ratio		-0.183 (-1.48)	-0.179 (-1.44)	-0.293** (-2.29)	-0.328** (-2.35)
ROA		0.546*** (2.66)	0.537*** (2.61)	0.589*** (2.84)	0.534** (2.34)
Constant	-4.998*** (-4.91)	-5.461*** (-5.28)	-5.464*** (-5.28)	-5.612*** (-5.42)	-15.61 (-0.03)
Fixed effects	Year	Year*	Year*	Year*	Year*
	Industry	Industry	Industry	Industry	Industry
N	11784	11784	11738	11577	9477
R Square	0.0203	0.0216	0.0227	0.0233	0.0456

This table reported the result of probit regression of probability of land purchase over a series of variables as the first stage regression of the instrumental variable regression. *1[Mayoral Replacement]* is the dummy variable whether the firms is located in a city with mayor replaced at that year. *Local Govn Fiscal Expenditure* is the local government fiscal expenditure relative to its fiscal revenue. *Local Land Supply* is the sum of supply of entitled land in the city where the firm is located in. *, **, *** indicate significance at the 10%, 5%, and 1% respectively.

Table IX Second Stage Regression

	OLS			Δ Capital Expenditure				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1[Land Purchase][t]	0.419*** (17.83)	1.404*** (5.39)	1.051** (2.44)			1.002*** (4.11)		
1[Land Purchase][t-1]		-0.226 (-0.93)		-0.0275 (-0.08)			-0.0292 (-0.24)	
1[Land Purchase][t-2]		-0.0345 (-0.13)			-0.395 (-0.86)			-0.433 (-1.53)
Total Asset	0.0215*** (3.98)	0.353*** (6.38)	0.0048 (0.67)	0.0145*** (2.60)	0.0122*** (2.00)	0.00478 (0.75)	0.0144*** (2.59)	0.0122*** (2.08)
Leverage Ratio	-0.0684* (-1.74)	-1.173*** (-2.88)	-0.0376 (-0.85)	-0.0483 (-1.19)	-0.0477 (-1.15)	-0.0284 (-0.63)	-0.0405 (-0.98)	-0.0409 (-0.98)
Fixed Asset Ratio	-0.0395 (-0.77)	-0.552 (-1.04)	-0.02 (-0.37)	-0.0275 (-0.51)	-0.0122 (-0.23)	-0.0186 (-0.34)	-0.0283 (-0.55)	-0.0168 (-0.32)
ROA	0.218** (2.42)	2.496*** (2.70)	0.0829 (0.78)	0.184** (2.01)	0.169* (1.80)	0.0788 (0.77)	0.179* (1.91)	0.146 (1.55)
Constant	0.144 (1.19)	1.369 (1.10)	0.226** (1.99)	0.119 (1.23)	0.142 (1.41)	0.0552 (0.25)	-0.0147 (-0.07)	0.00925 (0.04)
Fixed Effect	Year *Industry	Year *Industry	Year *Industry	Year *Industry	Year *Industry	Year *Industry	Year *Industry	Year *Industry
Instrument	NA	NA	Mayor Replacement	Mayor Replacement	Mayor Replacement	Local Land Supply	Local Land Supply	Local Land Supply
N	11841	12697	11577	11577	11527	11053	11073	11082
R Square	0.0269	0.039	0.0028	0.0232	0.0191	0.0037	0.0236	0.0177

This table reports the OLS and instrumental variable regression of the firm level capital expenditure over the land purchase event and a series of control variables. The capital expenditure is measured as the increment of the Property, Plant and Equipment net of total depreciation, and then normalized by the total value of the land purchase in the 6 years time. The $1/[\text{Land Purchase}]$ is the dummy variable that assign value of 1 for those firms with entitled land purchase in a particular year. It is instrumented by the mayoral replacement event. The *Total Asset* is the log of firms' total asset. The *Leverage Ratio* is the ratio of the firm's total liability divided by total asset. The *fixed Asset Ratio* is the ratio of the total fixed asset (Property, Plant and Equipment) divided by total asset. The *ROA* is the ratio of profitability divided by total asset. *, **, *** indicate significance at the 10%, 5%, and 1% respectively.

Table X Robust Check

	Probit First stage	\$(\Delta \text{Investment})\$		\$(\Delta \text{Investment})/\text{Hectare}\$		\$\Delta \text{Capital Expenditure}\$ Investment(t-t-1)		Exc. Counties		Exc. Large cities		Exc high sec mkt premium		Before 2009	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1[Land Purchase][t]	1.412*** (2.73)	999.9*** (4.03)	366.1** (2.52)	2.139*** (5.07)	-0.3085787 (-1.06)	1.108** (2.48)	0.569 (1.52)	1.262621* (1.80)	0.922** (1.98)	1.109** (2.22)					
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				Yes	
Fixed Effect	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year				Year	
Instrument	*Industry Mayor	*Industry Mayor	*Industry Mayor	*Industry Mayor	*Industry Mayor	*Industry Mayor	*Industry Mayor	*Industry Mayor	*Industry Mayor	*Industry Mayor				*Industry Mayor	
	Replacement	Replacement	Replacement	Replacement	Replacement	Replacement	Replacement	Replacement	Replacement	Replacement				Replacement	
N	11577	16953	15407	11362	11357	10893	8486	5227	5788	6544					
R Square	NA	0.0032	0.0045	0.009	0.005	0.002	0.0063	0.0017	0.0336	0.0042					

This table reports the results of robust checks for the second stage instrumental variable regression. Only the coefficient of the land purchase dummy is reported. Column (1) is the result where the probit regression is used for the first stage regression. Column (2) reports the changes of investment measured by absolute value, instead of relative value compared with land value. Column (3) reports the changes of investment value per hectare of land. Column (4) reports the changes of investment in the future 2 years instead of one. The changes of investment in the previous 2 years are reported in Column (5). The regression result based on the subsamples of: first time purchaser, those not located in counties, and those not located in large cities are reported in Column (6), (7) and (8) respectively. The results for pre- and post- subsamples are reported by Column (9) and (10), respectively. The result of increment of investment measured in a absolute term for all available observations, instead of limited to those land purchasers, are reported in Column (11). **, *, and *** indicate significance at the 10%, 5%, and 1% respectively.

Table XI Controlling for Investment Opportunities

	Δ Capital Expenditure					
	(1)	(2)	(3)	(4)	(5)	(6)
1[Land Purchase][t]	1.083*** (2.63)	0.913** (2.41)	0.884 (0.70)	1.176*** (2.61)	1.202** (2.36)	1.152** (1.98)
Δ GDP	1.047** (2.24)					1.243** (2.50)
Δ FDI		0.00183 (1.27)				
Δ Tax Rate			-0.00679 (-1.26)			
Δ Fiscal Expenditure				0.0164 (0.27)		
Δ Industry Investment					0.0546 (0.63)	
Δ Local Investment						-0.0019 (-0.08)
Δ Local Industry Investment						-0.0851 (-1.17)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effect	Year	Year	Year	Year	Year	Year
Instrument	*Industry Replacement	*Industry Replacement	*Industry Replacement	*Industry Replacement	*Industry Replacement	*Industry Replacement
N	11305	10764	3066	11307	10448	9751
R Square	0.0025	0.0037	0.0112	0.0021	0.0029	0.0022

This table reports the result of the second stage of instrumental variable when the investment opportunities are controlled by various methods. Only the coefficient of The 1[Land Purchase] is reported. The 1[Land Purchase] is dummy variable that assign a value of 1 for those firms who purchased the land in that particular year and 0 for otherwise. *GDP* and *FDI* are changes of local GDP and FDI in the last year before the land purchasing. *Tax Rate* is the average tax rate levied by the local government. *Fiscal Expenditure* is the changes of fiscal expenditure normalized by local fiscal revenue. *Avg. Land Price* is the changes of average price for entitled land supplied by local government. *Industry Investment* is the average growth rate of all firms in the same industry. *Local Investment* is the average growth rate of all local firms. *Local Industry Investment* is the average growth rate of all local firms that operate in the same industry. *, **, *** indicate significance at the 10%, 5%, and 1% respectively.

Table XII Controlling for Political Connections

	Ownership		Tax Rate		Δ Capital Expenditure		Long Term Loans		Large Land or High Const Ratio	
	Subsidies	No Subsidies	Subsidies	No Subsidies	Subsidies	No Subsidies	Subsidies	No Subsidies	Subsidies	No Subsidies
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(7)	(8)
1[Land Purchase][t]	-0.398 (-0.54)	1.086** (2.50)	0.858 (1.15)	1.339 (1.54)	0.364 (0.54)	1.412*** (2.61)	0.769 (0.89)	1.146** (2.23)		
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effect	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year
Instrument	*Industry	*Industry	*Industry	*Industry	*Industry	*Industry	*Industry	*Industry	*Industry	*Industry
	Mayor	Mayor	Mayor	Mayor	Mayor	Mayor	Mayor	Mayor	Mayor	Mayor
	Replacement	Replacement	Replacement	Replacement	Replacement	Replacement	Replacement	Replacement	Replacement	Replacement
N	268	11309	3112	3541	6295	5282	1747	9830		
R Square	0.0006	0.0025	0.0106	0.0112	0.0038	0.0028	0.0182	0.0015		

This table reports the result of the second stage of instrumental variable when the connection with government are controlled by various methods. Only the coefficient of The 1[Land Purchase] is reported. The 1[Land Purchase] is dummy variable that assign a value of 1 for those firms who purchased the land in that particular year and 0 for otherwise. Column (1) and Column (2) are associated with the State owned companies and private companies subsample, respectively. Column (3) and Column (4) are associated with subsamples with a lower-than-median and higher-than-median tax rates, respectively. The Column (5) and Column (6) are associated with firms with and without long-termed loans, respectively. Column (7) and Column (8) are associated with those firms with land of large scale or with high construction ration and those firms without, respectively. *, **, *** indicate significance at the 10%, 5%, and 1% respectively.

Table XIII Controlling for Mayor's Relative Economic Performance and Political Uncertainty

	Δ Capital Expenditure		
	(1)	(2)	(3)
1[Land Purchase][t]	0.941** (2.40)	1.038** (2.45)	0.825** (2.48)
Rel. GDP	0.983* (1.75)		
Rel. FDI		-0.00819 (-1.58)	
Tenure Length			-0.00248 (-0.45)
Controls	Yes	Yes	Yes
Fixed Effect	Year	Year	Year
Instrument	*Industry Mayor Replacement	*Industry Mayor Replacement	*Industry Mayor Replacement
N	11182	11182	9324
R Square	0.0032	0.0027	0.0027

This table reports the result of the second stage of instrumental variable when the connection with government are controlled by various methods. Only the coefficient of The 1[Land Purchase] is reported. The 1[Land Purchase] is dummy variable that assign a value of 1 for those firms who purchased the land in that particular year and 0 for otherwise. The Rel GDP and Rel FDI are the average growth rate of GDP and FDI for years when the city is governed by current city mayor relative to the all-year average growth rate. The Tenure Length is the total years of serving for current office before the mayors are replaced. *, **, *** indicate significance at the 10%, 5%, and 1% respectively.

Table XIV Security Channel: Province With Different Protection of Alternative Communal Land Leases

	Guangdong (1)	Δ Capital Expenditure All Other Provinces (2)	Zhejiang and Jiangsu (3)
1[Land Purchase][t]	-0.096 (-0.142)	1.119** (2.51)	0.81 (0.48)
Controls	Yes	Yes	Yes
Fixed Effect	Year	Year	Year
Instrument	*Industry Mayor Replacement	*Industry Mayor Replacement	*Industry Mayor Replacement
N	534	11043	2694
R Square	0.0425	0.0023	0.0047

This table reports the result of the second stage of instrumental variable when the connection with government are controlled by various methods. Only the coefficient of The 1[Land Purchase] is reported. The $1[\text{Land Purchase}]$ is dummy variable that assign a value of 1 for those firms who purchased the land in that particular year and 0 for otherwise. Column (1) reports the regression result for the subsample consisting of only Guangdong Province. Column (2) reports that for the subsample of all other provinces excluding Guangdong Province. Column (3) reports the subsample for Zhejiang Province and Jiangsu Province. Tenure Length is the total years of serving for current office before the mayors are replaced. *, **, *** indicate significance at the 10%, 5%, and 1% respectively.

Table XV Collateral Channel: Measures of Supply and Demand of External Finance

	Δ Capital Expenditure									
	Tangibility		External finance Dependency		Firm Size		Firm Age		Firm Independent Index	
	Const (1)	Unconst (2)	Const (3)	Unconst (4)	Const (5)	Unconst (6)	Const (7)	Unconst (8)	Const (9)	Unconst (10)
1[Land Purchase][t]	1.46 (1.47)	0.985** (2.07)	0.878 (1.56)	0.719 (1.31)	1.451** (1.99)	0.785 (1.54)	1.248* (1.86)	1.147* (1.65)	1.406** (2.36)	0.388 (0.61)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effect	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year
Instrument	*Industry	*Industry	*Industry	*Industry	*Industry	*Industry	*Industry	*Industry	*Industry	*Industry
	Mayor	Mayor	Mayor	Mayor	Mayor	Mayor	Mayor	Mayor	Mayor	Mayor
	Replace	Replace	Replace	Replace	Replace	Replace	Replace	Replace	Replace	Replace
N	5194	6383	5877	5700	6218	5359	5555	5075	8479	3098
R Square	0.0023	0.0031	0.0054	0.0054	0.0072	0.0007	0.0039	0.0033	0.0006	0.0436

This table reports the result of the second stage of instrumental variable when the connection with government are controlled by various methods. Only the coefficient of The 1[Land Purchase] is reported. The 1[Land Purchase] is dummy variable that assign a value of 1 for those firms who purchased the land in that particular year and 0 for otherwise. Column (1) (Column (2)) reports the coefficient for the firms located in the industries with higher (lower)-than-median tangibility ratio for their US counterparties. Column (3) (Column (4)) reports the coefficient for the firms located in the industries with higher (lower)-than-median external finance dependency for their US counterparties. Column (5) (Column (6)) reports the coefficients for the firms with a larger (Smaller)-than-median size. Column (7) (Column (8)) reports the coefficients for the firms with a longer (Shorter)-than-median existing years. Column (9) (Column (10)) reports the coefficients for the firms with (without) a controlling parent company. *, **, *** indicate significance at the 10%, 5%, and 1% respectively.

Table XVI Effect of Entitled Land Purchasing over External Finance, Profitability and Employment

	Δ Loans			Δ Profit			Δ Employment		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1[Land Purchase][t]	1.307*** (3.15)			2.125* (1.75)			0.293*** (4.13)		
1[Land Purchase][t-1]		0.542 (1.10)			2.952** (2.10)			0.0391 (0.69)	
1[Land Purchase][t-2]			-0.422 (-1.07)			1.307 (1.01)			0.132** (2.43)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effect	Year	Year	Year	Year	Year	Year	Year	Year	Year
	*Industry	*Industry	*Industry	*Industry	*Industry	*Industry	*Industry	*Industry	*Industry
	Mayor	Mayor	Mayor	Mayor	Mayor	Mayor	Mayor	Mayor	Mayor
Instrument	Replacement	Replacement	Replacement	Replacement	Replacement	Replacement	Replacement	Replacement	Replacement
N	11726	11862	6593	16950	16967	11308	16481	16788	11216
R Square	0.1128	0.1616	0.2382	0.0681	0.0569	0.0433	0.0009	0.0155	0.0014

This table report the effect of the entitled land purchasing over other real effects, including external finance, profitability and Employment. Only the coefficient of The 1[Land Purchase] and its lags are reported. The 1[Land Purchase] is dummy variable that assign a value of 1 for those firms who purchased the land in that particular year and 0 for otherwise. The changes of total loans, consisting short-term loans and long-term loans, after being normalized by the value of the land purchased, are used as dependent variable for regression of Column (1)-(3). The Change of profitability, normalized by profitability of previous year's level, is used as the dependent variable for Column (4)-(6). The change of employment, normalized by the level of last year employment, is used as the dependent variable for Column (7)-(9). *, **, *** indicate significance at the 10%, 5%, and 1% respectively.