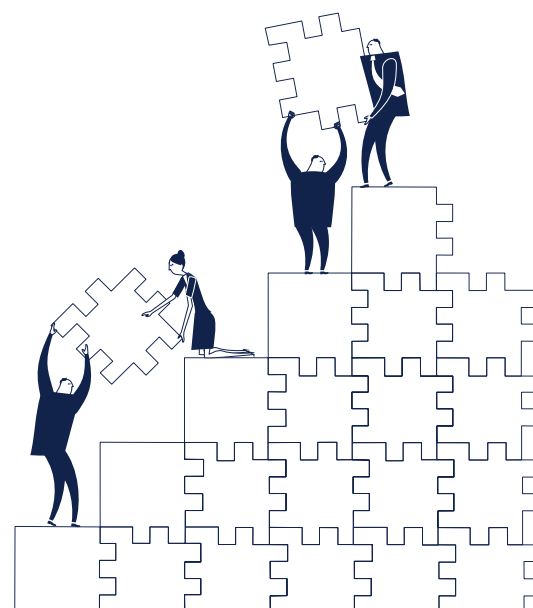# Saïd Business School
# Research Papers

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# Property Rights Protection and Investment: a Natural Experiment from China

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## ABSTRACT

This paper utilizes a natural experiment to examine the role of the protection of property rights in promoting investment. In order to explore a title-granting scheme in Shenzhen, China, I collect a sample of 83 listed SOE firms, with 32 of them holding about-to-be-entitled lands. Those landholders exhibit both a sharp short-term 7.8% additional increase in stock market price and a long-term 63% extra increase in investment, when compared with non-landholders, despite that there is no pre-event structural difference between the two. These increases in value are a result of having solved hold-up problems rather than a result of increased collateral values because those politically connected SOEs under analysis are financially unconstrained. Cross-sectionally, those firms with weaker pre-event protection against hold-up are associated with greater increases in share price and investment. Potentially, solving the hold-up problem of all unentitled land would bring about value of 2.2 Trillion RMB, almost triples Shenzhen's GDP in 2009.

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Keywords: property right, land title, natural experiment, investment

One fundamental and widely accepted reason for strengthening property rights protection to promote investment is that property rights solve hold-up problems (see Williamson 1976, Klein, Crawford and Alchian, 1978, Hart, 1995). On a theoretical level, the hold-up problem arises in a bilateral monopoly bargaining game where one party needs to make a sunk-cost investment. Given the problem of incomplete contracts, the player would under-invest fearing that he or she will be forced to share future cash-flows with the other party with bargaining power, after the investment has been sunk (Demsetz, 1967; Alchian and Demsetz, 1973). The solution to this hold-up problem is a commitment mechanism to pre-commit *not* to expropriate the investor's future cash flow. A property right can serve as the commitment mechanism in this case, thus providing security to investors. This mechanism is known as a security channel (Besley, 1995).

However, empirically identifying this security channel, through which property rights protection promotes investment, is always difficult. This difficulty is two-fold. Firstly, a causal relationship between the strengthened property rights protection and increased investment is hard to establish. Any observable correlations between the two are subject to the endogeneity problem. This means that the enhanced investment and better protection of property rights could be co-determined by another omitted variable, e.g. technological advancement. This could also mean that causality works in the opposite direction, with increases in investment promoting the protection of property right[1]. Secondly, even if it is confirmed that the protection of property rights leads to higher investment, one can hardly pin down through which channel the impact is exerted. For instance, an alternative collateral channel, advocated by De Soto (2010) and recently confirmed by Chaney, Sraer and Thesmar (2012), could also result in a causal relationship between strengthening property rights and increased investment. Under the assumption that firms are financially constrained, the collateral channel works in the following manner: lands that receive property rights protection can be pledged as collateral for external finance, relaxing the previously binding financial constraints and thus promoting investment[2]. In most settings, the security channel and the collateral channel are indistinguishable because the demand for investment that is induced by more secured property rights and the supply of credit that occurs when the collateral value has increased due to property rights protection occur at the same time.

In this paper, I utilize a natural experiment that helps simultaneously solve the two empirical problems mentioned above. This natural experiment involves an *exogenous* and *universal* strengthening of property rights protection introduced by a title-granting scheme implemented in the Shenzhen government that was announced on 25 November 2009. Under the title-granting scheme, all firms that previously occupied "allocated land" (a form of untitled land with weak property rights protection) were allowed to obtain titles for their land and enjoy a higher level of property rights protection. The strengthening of the property rights is *exogenous* because the entitlement of the allocated land was only a by-product of a policy intended to increase local land supply[3]. This alleviates the endogeneity concern that the government's decision to grant titles was driven by investment opportunities for the allocated landholders. The program is universal as all allocated lands received titles and there was no discretionary decision made about the inclusion of

2

individual firms. This eliminates concerns about potential selection bias that might mean those firms with the greatest investment opportunities participate in the program.

In order to explore this natural experiment, I constructed a sample consisting of all 83 listed SOEs (or privatized SOEs) firms that are headquartered in Shenzhen. One crucial advantage of our sample lies in the fact that political connections help separate the security channel from the collateral channel. In China, the existence of immense state-owned banks has led to a highly distorted financial system that favors SOE firms. Politically connected firms enjoy favorable loan policies and rarely face financial constraints (Fan, Wong and Zhang, 2007; Song, Storesletten and Zilibotti, 2010). As collateral channels are based on the assumption that firms are financially constrained, and since political connections relax this constraint, our sample effectively shuts down the collateral channel. All investment effects must therefore come through the security channel.

The sample is separated into a treatment group and a control group according to the individual landholding situations of the firms. While all firms originally held allocated land before being listed, only 32 firms still occupied allocated land at the end of 2009 when the title-grant scheme took place. These 32 firms constitute the treatment group, while the other 55 constitute the control group. The allocated landholding situation is exogenously determined by whether the firm implemented an IPO or took part in an M&A transaction after 2001, since when a decree by the Shenzhen government has required that all allocated lands associated with post-2001 IPO or M&A deals be converted into fully titled lands.

I find an instantaneous stock market reaction as well as a long-run real impact of the natural experiment. Within a two-day window following the official announcement of the title-granting scheme, firms in our treatment group on average exhibited an extra cumulated abnormal return (CAR) of 7.8% compared with the control group. The effect is statistically and economically significant. This CAR is corresponding to a 49 million increase in value per hectare of land. Considering that the total area of unentitled land amounts to 450 square kilometers, or 45000 hectors, the total potential value that could be brought about by solving the hold-up problem in Shenzhen is 2205 Billion RMB, almost triples Shenzhen's GDP in 2009, which was 820 Billion RMB.

Notice that this 7.8% extra CAR is a *residual* effect because the relevant land value is subtracted from the CAR to correct for the effect of land value appreciation. As a land title is granted to the current landholder for free, the extra value brought by the land title must be subtracted in order to capture the pure value released by the land titles in solving the hold-up problem.

The real impact was also phenomenal. Within next 3 years after the announcement, the firms within the treatment group were associated with a 63% extra increase in investment relative to the control group. There were also significant increases in other real performances variables, including external finance (52%), employment (8%) and profitability(34%).

In order to further confirm the effect of the security channel, I explore the cross-sectional heterogeneity of characteristics in pre-event property rights protection. Security channel theory hypothesizes that firms with ex ante weaker protection of property rights would react more aggressively to the event as less benefit is internalized for those firms. I use two measures to analyze

the extent of pre-event property rights protection. The first measure is that of tenure expiration. Ceteris paribus, those firms whose land tenures have expired are expected to be associated with a higher risk of being expropriated compared to firms with unexpired tenure. The second measure is that of local government connections. As the majority of land being expropriated is taken back by local government, a connection with the local Shenzhen government is expected to greatly lower the risk of being expropriated. I find that this was indeed the case. Those firms with a lower level of protection, either in terms of tenure or local government connections, exhibited a higher level of CAR and increments in investment. This result is in support of the security channel hypothesis.

Two sources of problems may affect our estimation. (1) The treatment group and the control group may differ in certain characteristics, observable or unobservable, and these differences may bring about differences in post-event performance, thereby causing an upward bias in our estimation. (2) The stock market reaction may result from a pure distribution effect, namely land value appreciation. I make two attempts to alleviate the first concern. Firstly, I demonstrate that there is no systemic difference between the treatment group and the control group in terms of the main corporate characteristics that may affect long-term performance, including political connections, corporate governance structures and industry distribution. This similarity also extends to the key elements of the financial statements, such as ROA and Tobin's Q, measures reflected in the accounts at the end of 2009 and evidenced in the changes between 2006 and 2009. Secondly, in order to alleviate the concern of unobserved characteristics, I exclude those firms listed after 2001 and reach a similar scale of property rights-investment sensitivity. If the difference in firms' performance after 2001 is determined by some unobservable characteristics, or self-selection decisions that are related to the listing year, those firms that were listed after 2001 should have exhibited increasing variance in unobservable characteristics. As a result, excluding those firms should lead to a lower coefficient if those features are related to post-event performance. The fact that my data demonstrate a result of similar scale suggests that the unobservable feature problem is not a severe issue.

I tackle the issue of the distribution effect by exploring the differences among non-landholders. As those non-landholders are not granted land titles, there is no distribution effect. However the security channel indicates that, under the assumption that titled land is under-supplied in Shenzhen, those who have access to the Shenzhen land market are associated with a positive CAR. This is evidence of value unlocked by land titles that solves the hold-up problem. Consistent with this prediction, I find that firms that were associated with a higher possibility of purchasing land in Shenzhen, such as firms headquartered in Shenzhen and firms that had higher business exposures in Shenzhen, displayed a higher CAR within a two-day window after the announcement of the launch of the title-granting scheme. This evidence confirms the existence of a security channel in a context in which the distribution effect is silenced.

This paper is related to the literature on property rights protection and investment. As part of a large and diverse literature dealing with property rights protection for households[4], Field (2005; 2007) explores the natural experiment of an urban squatter land entitlement scheme that was implemented in Peru in 2004 and finds a significant enhancement in investment. Galiali and

Schargrodsky (2010) find results of similar scale using Argentinean survey data. As their papers mainly focus on the changes of behaviors in squatting households living in slums, their results leave open the question of what the response of firms operating in a relatively developed environment would be. In that vein, I see my work as a complement to and an extension of their work in detecting the causal link between property rights and investment in a more entrepreneurial world. Another advantage of exploring data of listed firms has been that I have been able to see the daily stock market price of firms under analysis. The instantaneous, positive and significant market reaction to the announcement of the title-granting scheme gives the argument presented in this paper more credibility in its assertion that value was released by this particular change in policy.

This paper is also linked with existing literature that attempts to distinguish the property rights channel from the collateral channel, through which the property rights protection affects investment. In one important contribution, Johnson, McMillan and Woodruff (2002) demonstrate that property rights can influence investment in ways other than the collateral channel. They survey firms within five post-communist transition economies and find that firms re-invest less of their retained profit when perceived property rights protection is weak, even if they have sufficient collateral for external finance. This paper shares the same theme in detecting the role of the property rights channel when the collateral channel is muted. While their paper only exploits the cross-sectional variation at the firm level, the natural experiment setting in this paper has allowed me to extend their research by adding a more dynamic flavor and more rigorous identification by utilizing the difference-in-difference methodology.

The rest of this paper is organized as follows. Section I presents the institutional background to the natural experiment taking place in Shenzhen. Section II presents the data. In section III and section IV, the empirical results of the differences in market reactions and in real economic performance between the landholding and non-landholding firms are presented. In section V, I explore the effect of non-landholders' access to Shenzhen land market over firms' performance in stock market reactions. Section VI concludes.

# I. The Institutional Background: Title-Granting Scheme in Shenzhen

In this section I provide an description of institutional background. I demonstrate that the legal protection of property right for allocated land is extremely weak and the title-granting scheme, by offering legal protection to land users, presents an opportunity to solve this under-investment problem.

## A. Pre-event Property Right Protection Situation

There is a large amount of land in Shenzhen with no proper title attached to it. Those lands are called "allocated lands"[5]. An "allocated land" is a piece of land that is allocated by the government to SOEs by means of a fiat order. These allocated lands are a legacy of the central-planning

economic system that dominated China before the 1990s. In this central-planning economy where all market-based land transactions were forbidden, direct distribution from the government to SOEs was the only method of conveying land to its user. The title status of allocated lands and corresponding weak property rights protection were mainly unchanged during the period of progressive land system reform from the 1990s to 2000s. By the end of 2009, the total area of allocated land in Shenzhen was 113 square kilometers, almost ten percent of its non-agricultural land. Most of it is being used by SOEs or privatized SOEs[6].

Compared with fully entitled land, allocated land is exposed to a higher level of risk of being expropriated. Expropriation may come from either the government or other private individuals. Government expropriation is made possible by the out-dated legal status of allocated land and the absence of an extensible tenure system. By design, the allocated land is state-owned land that is provided for firms to use for free. There is no legal mechanism to prohibit the government from taking back the allocated land[7]. As the land user does not have to make any payment for the usage, and accordingly, the government does not have pay any compensation to landholder when expropriating the land. Although the Shenzhen government stipulates a 30-year tenure[8] for all allocated land, most of those tenures, as they started in the 1980s, have expired or are approaching their expiration date. Moreover, there is no effective mechanism for land users to negotiate an extension to their tenure[9]. Allocated land without protection of tenure is especially vulnerable to government expropriation; cases of the government expropriating allocated land are very common. In the most recent case, the Shenzhen government took back 12 plots of allocated land in one campaign aiming at improving land-use efficiency during 2012.[10]

Vulnerability to expropriation by other private citizens comes from the absence of a registration system for allocated land. The Shenzhen government does not have a unified registration bureau for title registrations, and all previous land distributions are not properly registered  especially for those allocated lands. A lack of registration undermines exclusiveness in the use of land and this issue is reflected at both the distribution stage and use stage. When land is being allocated, the lack of registration causes a "multiple allocation" problem. That is, different government departments, out of self-interested motivations, issue multiple fiat orders to allocate the same piece of land to more than one land user. Naturally, this has caused many disputes about the legitimate right to the land. The dispute over the land also rises after the land is allocated. Although the transaction of the allocated land is explicitly forbidden, there are many illegal transactions in the form of "informal lease contracts"[11]. As there is no centralized registration bureau to record information regarding transactions over the land, one piece of land could be sold to multiple buyers, making it impossible to identify the legal user of the land. Numerous anecdotes illustrate the severity of this problem. A developer wished to demolish an existing building on a piece of land for a renewal project, but six separate individuals claimed that the land was allocated to them. Each of them could produce a bona fide certificate from various government officials and their total compensation amounted to ten times the value of the land itself. In the end, the developer was forced to abandon the renewal project[12].

*B.   Title-Granting Scheme*

This lacking of protection and under-investment problem is addressed by a title-granting scheme. On 13 November 2009, the Shenzhen government announced the "City Renewal Program". The core of this program is that all those allocated lands distributed many years ago are now allowed to obtain titles[13]. The risk of being expropriated either by the government or other private citizens dramatically declines with the endowment of the land titles. The newly entitled land has better protected tenure and a registration system to ensure the exclusive right of its user. The new 30-year tenure is endorsed by a legal contract between the government and land use, rather than a fiat order. Expropriating the land before tenure expires requires that the government pay a large amount of compensation, measured by the market price of the land and constructions above it. A new file with user rights and a history of transactions, leasing and collateralization records was constructed in the registration bureau to ensure exclusivity and to avoid future disputes with other rights claimants. These measures greatly alleviated land users' concerns regarding land being expropriated and enhanced the incentives for investment.

Two other features of the title-granting scheme are worth emphasizing. Firstly, the title-granting scheme is *exogenous* in that the improvement of economic activity on the allocated land is not the main purpose of the policy. Without this exogenous characteristic, one might concern that the policy, which was designed to promote investment, was driven by other factors such as investment opportunities. The purpose of the title-granting scheme was to relax the previous tightening land supply by granting land titles to those "squatted lands" that account for a larger area than the allocated land. The squatted lands are those occupied by farmers residences and the total area of squatted land is 330 square kilometers, almost three times that of the allocated land. As those lands are larger in area and lower in productivity, granting titles to those lands is prioritized relative to allocated land. Before the "City Renewal Program", there were a series of policies targeting an increasing land supply by releasing the squatted land[14].

Secondly, the title-granting scheme is *universal* in that all allocated lands are affected by this policy. Without this universal characteristic, one might concern that the improvement in economic activity is caused by a selection bias. Namely, those who have better investment opportunities are more likely to be included in the title-granting scheme. This is not the case in this title-granting scheme as all lands  as long as they are located within the jurisdiction of Shenzhen government  are automatically qualified for this title-granting scheme.

Two other conditions must be satisfied so that the title-granting scheme will have a significant impact over firms' behavior: (1) There must be a shortage of land supply in Shenzhen City and (2) the alternative method for those allocated land to receive titles must be limited. The violation of either of above conditions means that title-granting scheme is redundant. Firstly, Shenzhen is famous for its shortage of entitled land supply. As a Special Economic Zone, Shenzhen is not allowed to extend its boundary, as all other Chinese cities are, in order to prevent the favorable policy that was issued exclusively to Special Economic Zones from leaking to other areas. Any boundary changes need approval from the State Council, the highest administrative institute in China, and

the boundary has remained unchanged in the last 30 years since Shenzhen was established[15]. As a result, Shenzhen is facing an extremely tight land supply, evidence in the highest construction area as percentage of total area in China, 46%, almost double the level of 24% of its populous neighbor, Hong Kong. By the end of 2008, it was reported that residual land available for transfer by the local government was less than 43 square kilometers. That was not enough to fulfill the requirement for construction for the next three years.

Secondly, the other channels for granting titles to allocated land are fairly restricted. The "direct conversion" of allocated land to entitled land is allowed by law, but in reality is prohibited by conflicts of interest with local government. The local government is allowed to "convert" an allocated land into entitled land, by granting the land titles to its current user. However from the perspective of the government, this conversion is dominated by the "expropriation-auction" method, in which the government expropriates land and then auctions it to the highest bidder. The government prefers the latter since the "expropriation-auction" method, not only generates a higher transaction price by attracting the bidder with highest subjective value toward the land, but also grants the government a higher share of the proceeds. The government retains 100% of the proceeds from transaction while in the "conversion" method only 40% of total proceeds go to the government[16]. As a result, no firm is allowed to convert the allocated land into entitled land except for those about to initiate an IPO or M&A, as discussed in next section.

In summary, the City Renewal Policy is a unique method of dramatically strengthening the legal protection of previously allocated land. It takes place in a city with both a shortage of entitled land and a previously rigid land policy. Moreover, it is exogenous and universal so that it is not related to the investment opportunities of individual firms. While it is clear that the City Renewal Policy will grant more legal protection of the property rights to land users, there remains an empirical question as to the impact of this policy on stock prices and real-world performance of the land users, a question that will be explored in the next section.

# II.   Data and Sample

This section discusses how the sample is constructed and how it is segmented into the treatment group and the control group. I illustrate the comparison between the treatment and the control group in terms of various pre-event characteristics and no systematic difference appears. Then I show that there is a significant difference between the two in post-event responses, both in short-term stock market reaction and in long-term real investment.

## A.   Sample, treatment and control group

The analysis requires a sample of all Shenzhen firms with political connections. To achieve that, I obtain all firms that were listed in China before 2009, at which point the natural experiment occurs, regardless of the exchanges where they are listed. I then keep only SOEs or privatized SOEs firms headquartered in Shenzhen. SOEs firms mean those firms where the government, central or local,

controls the majority of its stocks. Privatized SOEs are those firms that used to be SOEs but now the majority of shares are in the hands of private individuals. In order to identify if a firm is a SOE or a privatized SOE, I use the information of listed year and IPO prospectus. Those firms that were listed before 1998 are SOEs or privatized SOEs since the first genuine private firm that was listed on Chinese exchanges finished its IPO in 1998[17]. For those listed later than 1998, I downloaded the prospectus of those firms and checked if the firm was founded by a private individual or reformed from an existing SOE entity. After excluding financial institutions and real estate companies, I obtained a sample of 83 firms.

I then partition the sample into the treatment group and the control group. The treatment group consists of those beneficiaries of the title-granting scheme. They have allocated land under control by the end of 2009 when the title-granting scheme was announced. The control group includes those firms that do not have allocated land, although they may operate in those entitled lands.

The key variable in this study is whether listed firms have allocated land that will receive titles in the City Renewal Program. The information came from self-disclosures of landholding firms, either via a special disclosure report or their annual report. There are 32 listed firms that disclosed their land position. The disclosure was partially compulsory: all listed companies on the Shenzhen stock exchange are required to make a special disclosure report when accumulated increases/decreases within the past three trading days reach a threshold of 20%[18]. There are 17 firms disclosing their land holdings via a special disclosure report. The rest voluntarily disclosed their landholding in their annual reports following the title-granting Scheme.

Although the regulation body does not require a particular format or specific information, most firms did provide sufficient detail. Indeed, I managed to find key details about the land belonging to these firms: their location, area, and current usage and whether it was shared with other users. For example, SHENZHEN SEG CO. LTD disclosed that their firm has two pieces of land:

*". . . The first piece is located in Bagua Industry Park. It is now a three-floor factory with a construction area of 1,593 square kilometers. The tenure is from 1985 to 2015. Currently it is leased out with an annual rent of 600,000 RMB. . . The second piece is controlled by our subsidiary, Sege Baohua Co. Ltd. It is in Huaqiangbei Industry Park. The total area is 2,213 square meters and with a construction area of 10,509 square meters. The tenure is from 1982 to 2012. Currently it is leased out with an annual rent of 25 million RMB . . . "*

I cross-check our information with other resources. For instance, HuaChuang Securities, one of the top investment banks in China, released a Special Report about this title-granting scheme in Shenzhen and listed all the firms that could benefit from it. Our list has a large overlap with the HuaChuang Securities list of beneficiaries of the title-granting scheme.

I obtain the daily stock prices and financials information of listed firms from the China Securities Market and Accounting Research (CSMAR) database. It is the largest and most comprehensive database of its kind and contains all trading prices and financial statement data for listed firms trading on both the Shanghai and Shenzhen exchanges. For the financial statement data, I use data from the semi-annual report of 2009 as it is the last report released before the launch of the City

Renewal Program on 13 November 2009. I also use land-price information in Shenzhen to estimate the value of a title when allocated land changed to public land. These land prices are found on the website of the "Urban Planning Land and Resources Commission of Shenzhen Municipality", the government land agency, and "Soufang Web", the largest online land information provider in China.

## B.    Treatment/Control group's similarity in pre-event characteristics

One immediate question is why firms in the control group do not have allocated land. This is due to a change in IPO/M&A policy in Shenzhen in 2001. Before 2001, allocated status was maintained when the landholder is listed or acquired by other firms. In January 2001, the Shenzhen government required that all allocated land must to be converted to entitled land when its holding company is publicly offering its shares or experiencing a major M&A event. This move was to seek a fairer transaction value for the state-owned asset[19]. As a result, all SOE enterprises that were listed or engaged in M&As after 2001 have no allocated land, while those listed and that underwent M&A before 2001 do. Figure 1 demonstrates the time sequence of entitlement of Shenzhen's allocated land.

Table I illustrates the difference in observable characteristics between the treatment group and the control group. Column (1) is the whole sample of 83 firms. Column (2) is the treatment group consisting of all allocated landholders. Column (3) is the control group which contains all non-landholders. The control group is further stratified into two groups, those allocated after 2001 (column 4) and those involved in acquisition after 2001 (column 5). The t-statistics of the t-test of column (3) (4) and (5) compared with column (2) are presented in parentheses.

Four major characteristics of those firms are illustrated. The major event time includes the established year and the listed years of those firms[20]. Not surprisingly, the landholders are listed earlier compared with the non-landholders and the main difference derives from the sub-sample of firms that are listed after 2001. Another difference between the landholders and non-landholders is the proportion of SOEs: 77% of landholders are SOEs while only 58% of non-landholders are SOEs. This closer political connection is also reflected in the party member ratio and city government official ratios, two main measures for political connections, although the difference is only marginal and insignificant. The rest of Table I shows two other aspects of those politically connected firms: their corporate governance and their industry. Those two variables are tightly related to firms' performance (Core, Holthausen and Larcker, 1999) and thus any difference in those two respects, between the treatment and the control group, may also cause bias in our result. However there is no significant difference in either the corporate governance or industry distributions. Overall, firms in the treatment group resemble those in control to a great extent over those observable variables.

Apart from those observable differences, there could be some unobservable differences in characteristics between the treatment and the control group that could lead to a performance difference. In columns (1) to (3) of Table II there is a comparison of a list of financial statement characteristics by the end of 2009. The economic performances of the two are almost identical, as demonstrated by a similar Tobins Q and ROA. The difference is that those firms in the treatment group are

on a smaller scale, as evidenced in a smaller total asset, employment and profit. However this difference in scale does not necessarily mean a difference in recent-year productivity. It may come from the difference in scale of those firms when they were established. In columns (4) to (6), there is a comparison of increment in performance from 2006 to 2009 between the treatment and control groups. All t-statistics are statistically insignificant. This suggests that the recent year performances of the treatment and control groups are almost identical.

To summarize, despite the fact that the firms in the treatment group are listed earlier and are smaller in scale compared to the control group, they are almost identical in terms of political connections, corporate governance, industry distribution and performance over the past three years. This alleviates concerns that our result is driven by the differences in firm characteristics between the treatment and control groups.

## C. Difference in performance after the event

On 25 November, the Shenzhen government announced that a "City Renewal Program" was about to be implemented[21]. This program was to distribute titles to the land occupiers of allocated land. Figure 2 is the CAR of the treatment and control groups within 60 trading days around the announcement of the policy. The CAR is estimated using the Fama-French (1992) three-factor model with a beta estimation window lasting from 250 to 40 trading days prior to the event. The difference in stock market reaction between treatment and control groups is stark. During the first two days after the event, the treatment group reacted to the news with a jump of over 15% with respect to the CAR while the reaction of all control group firms was less than 1%. The reaction was completely driven by the event. This is no pre-existing difference between the treatment and the control groups. The effect is also long-lasting: the difference remains very high even 30 days after the event.

Figure 3 displays the investment level of the treatment and the control group before and after the announcement of the entitlement scheme. While for the control group there was no major change in the trend in recent years, there was a spike in the amount of investment that starts in 2010 and ends around 2013. This rise in investment peaked in 2011, which is one year later than the launch of the title-granting scheme. The difference between the treatment group and the control group is a more than 70% increment relative to the level in 2007.

Table III formalizes the information provided in Figure 2 and Figure 3. In panel A, there is an extra CAR of around 13% between the landholders and non-landholders within a two-day window after the title-granting scheme is announced. Apart from some leakage of information before the announcement day that pushed the stock price of landholders up by 4%[22], there was no significant difference in CAR between the two groups in a period lasting from 30 to five days before the event and the period from the second to the 30th day after the event.

One concern about the stock market reaction is that it merely illustrates a distribution effect rather than solving a hold-up problem. Namely, since the land title has value, the increases of the market prices of those landholders may completely reflect the value of land title they are about to

receive, rather than the value that is about to be unlocked by those titles by solving the hold-up problem that previously had a detrimental effect on firms' investment. To overcome this problem, one should subtract the value of the land title from the abnormal return in order to obtain a residual CAR that corresponds to pure value of security channel. I use the market value of the would-be entitled land as a proxy of the value of the land title. (The would-be entitled land is currently allocated land that is about to be converted into entitled land.) Notice that as the value of would-be entitled land is always larger than the value of the titles, this method will generate a lower bound of the value created by title net by solving the hold-up problem.

I estimate the value of would-be entitled land by multiplying area and price. Land area information is obtained from disclosures made by the listed firms. Land-price information is provided using the average recent transaction price in the neighborhood of the allocated land, found on "Soufang Web". In the fifth row I report the residual CAR. The result is still positive and significant. There remains a 9% gap in residual CARs difference between that of the landholder and the non-landholders.

Panel B of Table 3 reflects the changes of investment within six years around the announcement of the title-granting scheme. For the first two years after the announcement, the landholders experienced an increase in investment of 99% when compared to the 2007 level, while there was only a 31% rise in non-landholders. The difference in investment for 2012 to 2013 was also as large as 30%.

# III.   Analysis of Stock Market Reaction

In this section I use multivariate regressions to investigate the difference between the landholders and non-landholders in the short-term CARs. I illustrate that (1) landholders exhibit a much higher CAR relative to non-landholders and (2) in line with the security channel, those firms with weak pre-event property rights protection are associated with a higher CAR.

## A.   Base-line Regression

Table IV provides the results of multivariate regression analysis across firms within the sample of Shenzhen's politically connected firms. I estimate the following base-line model:

$$CAR_i = \alpha + \beta \, land \, dummy_i + \gamma \, control \, variables_i + \epsilon_i$$

The dependent variable is the CAR, the cumulative abnormal return within two days after the announcement. The main independent variable is the land dummy, which is assigned a value 1 for the landholders and 0 for non-landholders. Column (1) illustrates the result from the regression without any control variables and fixed effects. The coefficient of the landholding dummy is around 12.3% and is highly statistically significant. In column (2) the regression includes control variables and industry and exchange-fixed effects. The control variables consist of firms' financial statement variables, such as total assets, leverage ratio, tangible asset ratio, Tobins Q and ROA, and political

connection variables such as SOE dummy and listing year. The coefficient of the landholding dummy is almost the same compared with column (1), indicating that the difference in CAR does not derive from the observable difference in firm characteristics.

In column (3), I use the *residual* CAR as the dependent variable. As mentioned before, the residual CAR is the CAR with the value of the entitled land subtracted. Remaining statistically significant at 1%, the coefficient decreases to 7.8%. This result suggests that the value of the entitled land is taking up to 5% of the market capitalization, a relatively large-scale value. Moreover, the fact that the value unlocked by solving the hold-up problem bypasses the market value of the entitled land illustrates the importance of the perceived security in investment decisions when encountering the risk of being expropriated.

One concern about this result is that it is driven by some outliers, i.e. firms with the largest land value relative to their market capitalization. In column (4), I exclude four firms with the largest land value/market capitalization ratio. The coefficient increases instead of decreases compared with our benchmark regression in column (3) and is still statistically and economically significant. This greatly alleviates the concern and supports the suggestion that that the above result is a universal effect.

From column (5) I attempt to measure the absolute value of the market price appreciation, against the total area and total value of the land. The hypothesis is that if the stock market reaction is indeed resulting from the land, under the mild assumption that the firm's investment per unit of land is fixed, those firms with a large area of land, measured by total hectares or total value of the land, should display a higher response in terms of total value of market price appreciation. The dependent variables of column (5) is the increase in the total market capitalization realized within a two-day window after the announcement of the title-granting scheme, net of the value of the would-be entitled land. The independent variable of column (5) is the total area of the would-be entitled land. The positive coefficient in column (5) suggests that for each extra hectare of land, there is an increase of 49 million RMB in the firm's value. This emphasizes the importance of property rights protection in promoting investment and maximizing social value and it has great economic implications. If all unentitled lands, amounting to 450 square kilometers, are about to receive titles, the total value would release value of 2.2 Trillion RMB, almost three times of Shenzhen's GDP in 2009.

## B. *Heterogeneity in Property Rights Protection*

In this section I explore the cross-sectional heterogeneity among firms. If the absence of the enforcement of the title is the root of the under-performance of those allocated landholders, those which are more restricted before the entitlement should display a more substantial reaction when the restriction is lifted by the title-granting scheme. I use two different measures for the property rights protections. The first measure is the residual tenure of the land. In Shenzhen, allocated land usually has 30 years of tenure[23]. Although the government can also take the land before the tenure expires, the expiration of the tenure greatly increase the likelihood of the land being taken back by

the government. As most of the land was allocated in the early 1980s, when the Shenzhen Special Zone started, tenures of a majority of allocated land have already expired. Only 11 out of 32 firms announced that their land tenures have not expired. I categorize the firms according their land tenure status as those with expired tenure have less legal protection.

The effect of the residual tenure on landholding firms is illustrated in column (6). The dependent variable is the residual CAR,namely CAR net of the value of the entitled land. The independent variable is the tenure dummy which assign 1 to those firms with a unexpired tenure and 0 if tenure has expired. The result is in line with the prediction of the security channel. The negative coefficient suggests that those firms with expired tenure or with weaker protection of property rights have higher increases, of more than 5%, in CAR compared with firms with unexpired tenure. The coefficient is significant at the 10% significance level.

Our second measure for the property rights protection is the connection of a firm with the Shenzhen government. As by far the largest risk to the allocated land comes from the Shenzhen government taking back the land[24] a good connection with the Shenzhen government can decrease this risk and provide the firm with better protection. I measure the political connection of a firm with the Shenzhen government by checking if it is owned directly or indirectly by the Shenzhen government. In the treatment group, there are 12 firms that belong to Shenzhen government and the rest are ultimately controlled by central government or large-scale private conglomerates. The result, shown in column (7),confirms that those with a weaker connection to the Shenzhen government perform better. Those firms with a Shenzhen government connection are outperformed by more than 4% compared with SOEs affiliated to central government and private firms in two-day market performance. The result is at 10% significance in t-tests.

The fact that Shenzhen firms are associated with a lower abnormal return helps exclude another interpretation of the result  the anticipation effect of the market. The anticipation effect suggests that the movement of the stock price may not be a pure reaction to the current event, but may also incorporate the expectation of other events occurring. This is especially true about China as the Chinese government, under certain economic situations, may release a series of stimulus measures to promote investment[25]. Because of the correlation between the policy releases, one policy would greatly increase the possibility of sequential policies being issued. In that case, the land-granting scheme may be a herald of future local fiscal stimulus policies and the stock market reaction could incorporate the aggregated effect of foreseeable policy change. However, this is not likely to be the case in this title-granting scheme. Firstly, as I mentioned above, the main target of this title-granting scheme is to increase land supply by granting titles to squatted land rather than to improve the performance of those allocated landholders. The entitlement of the allocated land is merely a by-product. Secondly, because any local economy promoting fiscal policy would benefit Shenzhen firms to a greater extent relative to other firms because of the local protectionist nature of Chinese governments (Bai et al, 2004; Boyreau-Debray and Wei, 2005). If the main part of the stock market reaction comes from the anticipation of future economic stimulus, one would see that the Shenzhen firms react more aggressively when the news is announced.

Overall, the result confirms that firms that are associated with a weaker protection exhibit a higher abnormal return, in line with the hypothesis that it is the endowment of the land title that drives the abnormal market reaction.

## C. Robust test

In this section I stratify the sample according to various criteria in search of more evidence that the rise in market capitalization derives from the role of property rights protection that decrease the risks of being expropriated faced by the landholders. The regression setting is the same as the one shown in column (3) of Table IV with the dependent variable being the CAR net of the value of the entitled land.

One main concern is that the treatment group and the control group are not randomly allocated. Although I demonstrate that there is no difference for various observable characteristics, it could be the case that some difference in unobservable features is driving the result. Two main differences between the treatment and the control group, the different year of being listed and the SOE portion, may be correlated with the unobservable result-driving characteristics. If this is the case, those firms that are listed in closer years should have similar unobservable characteristics compared with those firms that are listed in years that are further apart. For instance, two firms both listed in 1995 should have smaller unobservable difference compared with one firms listed in 2009 and one firm listed in 2005. Moreover, including firms listed *before* and *after* year 2001 raises concern of the self-selection problem. That is, firms with certain characteristics, intentionally delay their listing time in order to benefit from the post-2001 land policy and the post-event performance difference is merely a reflection of this characteristics. This self-selection problem also suggests that using a sub-sample consisting of firms listed before 2001 should yield a smaller result if unobservable characteristics between the treatment and the control group contribute substantially to our result.

The result is shown in column (1) and column (2) of Table V. In column (1) is the regression result of the whole sample, which is the same as column (3) in Table IV. In column (2), I only include in the regression those firms that are listed before 2001, when the IPO-related land policy was changed. As illustrated by Table I, there is no significant difference in the IPO year between the treatment and the control group firms listed after 2009. If the result is driven by certain characteristics that are also correlated with the listing year, then the second regression, with listed years closer to each other, should be associated with a lower coefficient compared with the second one. However, the result shows that the opposite is true. The coefficient of the whole sample is almost the same compared with the coefficient from regression of whole sample. This result reconfirms that our result comes from the value of the land instead of the unobserved characteristics that are associated with the firm listing year.

Secondly, I partition the sample according to the ownership of those firms. SOE firms, as they already enjoy a better property rights protection, should be associated with a lower reaction when their lands are entitled. In this sense, the SOE is merely another measure of the pre-event property rights protection, along with two other measures (i.e. expired tenure and Shenzhen government

connections). I stratify the sample into SOE and non-SOE sub-samples. If the CAR results from the strengthened property rights protection, the non-SOE sample should respond more aggressively. This hypothesis is supported by the data. The coefficient of the SOE sub-sample, illustrated in column (3), is smaller than that of non-SOE sub-sample, illustrated in column (4). This result suggests that the result does not derive from the ownership difference between the treatment and the control group.

Thirdly, I segment the sample according to the extent to which the firms are financially constrained. As discussed before, one salient feature of our sample is that firms in the sample are not facing severe financial constraints because they are politically connected SOEs. Central and local government provide implicit guarantees for the loans issued to those SOEs affiliated to them so that commercial banks have few concerns over the possibilities of SOEs defaulting. Extra collateral, in that case, adds no value to those firms at all and, as a result, the collateral channel is naturally muted (Boyreau-Debray and Wei, 2005). If this assumption is not true, i.e. that financial constraints and collateral channel are also playing a role in our sample, one would expect that those firms with a higher level of financial constraint would be associated with a more aggressive response to the stock market as more land is now pledgeable as collateral. In column (5) and column (6) I test this hypothesis. I use the Scale-Age (SA) measure, following Hadlock and Pierce (2010)[26], to quantify the extent to which firms are financially constrained. In contrast to the prediction of the collateral channel, those firms that are financially constrained in column (5) display a lower level of reaction compared with those with lower levels of financial constraint in column (6). This result renders us more confident that our sample is immune to the collateral channel and captures purely the effect of property rights by solving the hold-up problem.

One important issue regarding SOEs in China concerns their efficiency. Due to poor corporate governance, SOEs are usually criticized for draining government's resources by investing in non-profitable projects. Our data provide evidence that the opposite is true; SOEs are indeed engaged in investments that maximize their profit. Firstly, the fact that there is a positive *residual* CAR suggests that SOE firms are making positive NPV projects. Moreover, I segment the sample according the investment opportunities measured by Tobins Q. If SOE firms are making investment decisions to exploit their profitable investment opportunities, one would expect that within those firms with high Tobins Qs there is a larger difference between the landholders and non-landholders than within those firms with low Tobins Q. If, on the other hand, the investment decision they made is not relevant to the profitability of a project, then there would be no difference between the two. The results in column (7) and column (8) indicate that SOE firms also maximize their profitability. The coefficient of the regression of the higher Tobins Q sub-sample is higher relative to that of low Tobins Q firms by almost 50%. This suggests that the SOEs are also profit maximizers.

Another source of the change of the stock market price is from the changes of discount rate, or beta. A decrease in beta leads to a higher market price, even when the expected future cashflow is constant. A sudden change of discount rate, although not likely, is not completely implausible given the fact that the firms' land may provide more business opportunities. In Figure 4, I plot

the average beta of the treatment group over a time span of five years prior to five years after the announcement of the title-granting scheme. There is no sign of a decrease in beta. In fact, the average beta of the firms in the treatment group is in a growing trend from 2006 to 2009, which indicates that the share price should have decreased were it not for the cashflow effect. This evidence confirms that the increases of share price are resulting from the change of future cashflow instead of the future discount rate.

# IV.    Analysis of Real Effect

In this section I utilize a difference-in-difference method to explore the differential effect in the investment for the firms in the treatment group compared with those in the control group.

## A.    Base-line Regression

Table VI provides the result of a multivariate regression analysis across firms within the sample of Shenzhen's politically connected firms. I estimate the following base-line panel data regression:

$$Investment_i t = \alpha + land_i + post_t + \beta \ land_i * post_t + \gamma \ control \ variables_i + \epsilon_i$$

The dependent variable is the capital expenditure for each firm each year between 2007 and 2013, in either the treatment or control group. The parameter of interest is the interaction term between the *land*, the landholding dummy variable, and the *post*, the post-event dummy indicator. *Control variables* consist of the pre-treatment characteristics of those firms that includes total assets, book leverage ratio, ROA, tangible asset ratio, cash holding ratio,SOE ratis and listed year. The regression results are illustrated in Table VI. Column (1) is the regression result for the base-line settings. The coefficient of the interaction term between the land dummy and post dummy is 0.63, which indicates that there is an increase of 63% in total investment for those landholding firms in the four years following the announcement. This is also statistically significant.

However, the result of differences in increases between the treatment and the control group may stem from any policy or economic situation change that has differential effects between landholders and non-landholders. I use three different methods to exclude the possibilities of the other source of real performance difference to ensure that this extra increase in investment is indeed resulting from the fact that treatment group firms have land. I demonstrate that landholders' enhancement in investment is more illustrative during the first two years immediately after the event than the two years after that. Then, I illustrate that the firms that are weakly protected before the event are associated with a higher level of investment increment. Lastly, I show that the firms with higher CAR increase their investment more dramatically.

Firstly, I further decompose the post-event period into two parts, the period between 2010 and 2011 and the period between 2012 and 2013. If the enhancement in investment is indeed derived from the title-granting scheme, which started in 2009, then the investment increases during the two-year period immediately after the launch of the program should be associated with a higher

level of investment relative to that of the second two-year period, under the assumption that the long-delayed investment will take place immediately once the title is granted. In column (2), I put a dummy variable that is 1 for the year 2010 to the year 2011 and 0 otherwise, and I interact this year [2010, 2011] dummy with the interaction of land and post, the variable of interest in regression in column (3). The coefficient of the $Year[2010-2011]*Land*Post$ is positive and statistically significant. This suggests that those landholding firms are investing 28% more in 2010 and 2011 compared with 2012 and 2013. The fact that treatment group firms display a higher level of investment immediately after the title-granting scheme supports my hypothesis that the title-granting scheme is the root of sequential years' enhancement in investment.

Secondly, I explore the heterogeneity of pre-event protection of property rights across firms to see if those firms that are less protected before react more aggressively to the title-granting scheme. As mentioned before, I use two different measures for the property rights protection. In column (3) I use a dummy variable indicating if the 30-year tenure of the allocated land held by that firm has expired or not. The dummy variable is assigned a value 1 if the tenure has not expired and 0 if it has expired. I then interact the expiration dummy with the $Land*Post$, the variable of interest in column (1). This coefficient of the new interaction is negative, although not statistically significantly so. This suggests that firms that are under stronger protection because their tenure has not expired are associated with less post-event investment enhancement because they already internalized the partial benefit of title protection.

In column (3) I used a connection with the Shenzhen government as a measure of the extent to which property rights are protected. Those firms that are affiliated to the Shenzhen government are less likely to experience land expropriation, simply because the majority of land expropriation comes from the Shenzhen government. I put a dummy variable that assigns 1 to Shenzhen-affiliated firms and 0 to other firms. The coefficient of the interaction term between the Shenzhen connection and the $Land*Post$ is displayed in column (3). It is negative and statistically significant, indicating that those firms with strong pre-event protections due to political connections with the Shenzhen government experience a less aggressive response.

Thirdly, I investigate the relationship between the instantaneous CAR and the long-run increases of investment. If the investment enhancement and the CAR are both the result of the entitlement of the land, then there is a positive relationship between the two. Under the assumption that the rate of return between various investment opportunities faced by landholders are roughly the same, those firms holding investment opportunities with a higher NPV project are about to have large profit, reflected in a higher level of cumulative return. In column (5) I display a dummy named CAR above median, which is assigned a value 1 if the two-day residual CAR is about the median level of the treatment group. I then interact this variable with the $Land*Post$, the variable of interest in column (1). The coefficient of the new variable is both positive and significant. That is, those firms with a higher-than-median CAR are associated with a level of investment increment.

*B. Other Real Performance Variables*

The higher level of increment in investment of landholders leaves one wondering whether the title-granting scheme has effect over other real variables. There are three variables that are of particular interest for our study: external finance, profitability and employment. External finance shows how those investments are funded, or what the ratio of internal/external finance in the whole investment is. Profitability conveys whether the investment is made over positive NPV projects. Finally, employment levels illustrate whether the title-granting scheme has any impact on the labor market and on solving the unemployment issue.

In column (6) of Table VI the dependent variable is external finance. The coefficient indicates that the landholding firms raise 52% more capital than the non-landholders, both compared with 2007. The coefficient is also statistically significant. The scale of this coefficient is smaller than that of investment. This indicates that firms are using both their internal and external capital to fund their new investment implemented on the newly entitled land.

In column (7) and (8) the employment and profitability are dependent variables, respectively. The coefficient of the interaction term of $Land * Post$ are both positive. The scale of the coefficient indicates that the landholding firms exhibit a 8.3% extra and 34.2% extra increases in profitability increments after the title-granting scheme compared with non-landholding firms. The fact that the scale of increases in employment is much less than those of investment reveal the capital-intensive nature of the new project, probably due to adopting more advanced technologies. At the margin, its expansion is less reliant on hiring more people but more reliant on making more fixed investment. The fact that the increase in profitability is a less compared with investment increases indicates the decreasing marginal productivity of those large-scale investments.

*C. Robust Check*

Similar to part C of section III, I divide the sample along four dimensions to check if the difference in performance across the sub-sample is in line with the predictions of the role of the property rights protection. The panel data regression setting is the same as the one shown in column (1) of Table VI, with the dependent variable being the capital expenditure for each firm each year between 2007 and 2013.

I firstly use a sub-sample of the data, including only firms that are listed before 2001. As mentioned before, one concern for this study is that the result is driven by the differences in some list-year-related unobservable characteristics between the treatment and the control group. The other concern is a self-selection bias exist. Firms with certain characteristics choose to be listed after 2001 and those characteristics lead to a difference performance. The above two issues suggest that using a sub-sample consisting of firms listed before 2001 should yield a smaller result if unobservable characteristics between the treatment and the control group contribute substantially to our result. A comparison between column (1) and column (2) allows one to reject this hypothesis. While column (1) is the regression result of the whole sample, column (2) shows the result of the sub-sample of firms listed after 2001. The fact that the latter coefficient is slight larger than the former suggesting

that the listing year is not correlated with some unobservable factors that play a major role in the result.

Secondly, I stratify the data according to ownership. Non-SOE firms, due to their weaker political connections, face a higher risk of being expropriated before the event. As a result, their increases in investment should be higher than those of the SOE firms who already internalize the majority of the protection that the land title would bring about. The results in column (3) and column (4) are consistent with this prediction. The coefficient of the SOE group is smaller and statistically insignificant, while that of the non-SOE group is larger and significant.

Thirdly, I segment the sample according to the extent to which the firm is financially constrained. If firms are financially constrained before the title-granting scheme, then the more constrained firms should react more aggressively to the event compared with those less financially constrained. As mentioned before, I use the SA measure following Hadlock and Pierce (2010) as the measure of financial constraint and the hypothesis that firms are universally constrained is rejected. Those more financially constrained firms, illustrated in column (5) are associated with lower increases of investment compared to those non-financially constrained firms illustrated in column (6).

Lastly, I partitioned the sample according to Tobins Q to investigate if firms are making profitable investments. Tobin's Q measures the investment opportunities of the firms, and a higher level of Tobins Q indicates that the firm has more positive NPV investment opportunities. If those SOEs are not maximizing their economic profitability, then one would expect that the coefficient of a regression of the high Tobins Q sub-sample would not be different from those of lower Tobins Q. However, this hypothesis is rejected. The coefficient of high Tobins Q is more than two times that of the low Tobins Q sub-sample, with the former much more statistically significant compared to the latter. The result suggests that SOEs, despite their poor corporate governance, are also making investment decisions in an attempt to maximize their profit.

In summary, the above analysis confirms that the differential effect between the treatment group and the control group comes from the entitlement scheme that grants land titles only to landholders in the treatment group. Other factors, such as unobservable characteristics or collateral channel, appear to contribute little to the result.

# V.   Analysis of Non-landholding Firms

The preceding analysis has provided evidence that the market reaction and investment enhancement of landholders results from the title-granting scheme. There are, however, two concerns about this analysis. The first concern is that the sample size, which is 83, may not be sufficiently large to make a statistically credible estimation. The second concern is that the increases in stock market reaction only reflect a distribution effect rather than a real effect. Although I have already illustrated that firms in the treatment group respond more aggressively to the title-granting scheme relative to the control group with respect to investment, external finance, profitability and employment, the issue of the distribution effect is still worth considering in order to provide more convincing

evidence of the title's role in solving hold-up problems and promoting investment.

In this section I consider non-landholding firms so as to help solve the two above-mentioned problems. Firstly, there are more firm-level observations for the non-landholders, simply because most listed firms in China do not have allocated land in Shenzhen. Secondly, those non-landholders are naturally immune to the distribution effect because no value is conveyed to those firms with land title granting. However, those non-landholders could also potentially benefit from the title-granting scheme, simply because the supply of entitled land is extended. Under the assumption that there is a shortage of land supply in Shenzhen and firms have unsatisfied pre-event land demand, those firms that have positive NPV projects but cannot implement them because of the absence of secured revenue can now buy the land, make the investment and realize investment returns. As a result, one would expect those firms that can buy land in Shenzhen to exhibit a positive abnormal return even if there is no land title granted directly to them[27]. The positive abnormal return should be the discounted value of their return on investment over their would-be obtained land considering their expenditure for the land.

I estimate the following base-line model:

$$CAR_i = \alpha + \beta \, Shenzhen \, dummy_i + \gamma \, control \, variables_i + \epsilon_i$$

It is clear that those non-landholding firms that have access to the Shenzhen market are more likely to benefit from the title-granting schemes. I use a dummy variable, $Shenzhen dummy$, that assign a value 1 to those firms that are headquartered in Shenzhen and 0 to the others, in order to capture the benefit brought to firms located in Shenzhen. $Control \, variables$ consist of the pre-treatment characteristics of those firms that includes total assets, book leverage ratio, ROA, tangible asset ratio, cash holding ratio,SOE ratis and listed year. All landholding firms are excluded so as to eliminate the distribution effect of valuable title granted. The base-line result is displayed in column (1) of Table VIII. The coefficient of the Shenzhen dummy is positive and statistically significant. Its economic scale suggests that those firms that are headquartered in Shenzhen display a 1.1% extra CAR relative to those non-Shenzhen firms.

I then investigated the cross-sectional heterogeneity among firms in their need of protection provided by land titles. The variable I used to quantify the extent of need of the firms to the land titles was asset reversibility. Asset reversibility is an indicator of the cost one firm has to incur in order to liquidate its asset. The easiness of liquidation is related to a firms asset compositions and varies across industries. If the risk of expropriation is the concern of land users, those firms with a lower level of asset reversibility, or a higher liquidation cost, are more sensitive to this risk as any failure for these firms means a larger loss. Following Guiso and Parigi (1999), I use the reverse of the average co-movement of sales of the individual firm, with its industry average as the asset reversibility. A higher level of co-movement across firms within one sector indicates that one firm needs to make a large loss to sell its assets in a fire-sale because other firms within the industry are also subject to the same systematic shock (Pulvino, 1998). As a result, firms in that sector display low asset reversibility.

I followed the method proposed by Guiso and Parigi (1999) to construct a co-movement measure. First, I obtained the sales of individual firms from 2000 to 2009 via the CSMAR database. I then normalized the sale value by subtracting its sample historical mean and then divided it by its standard deviation. The normalized value is then regressed on the industry average sale value on a time-series regression with the R-square taken down. The average industry-level R-square is an indication of the co-movement of that sector and is also the reverse indicator of asset reversibility within that sector. In our sample, the industry average R-square ranges from 0% to 7% with an average level of 0.7%. I excluded all landholding firm observations so as to avoid any contamination of the result from the supply side of the land market.

The interaction term between the industry co-movement and the Shenzhen dummy is the variable of interest. Its coefficient represents the difference in market reaction for Shenzhen firms with higher/lower asset reversibilities. The security channel predicts a positive coefficient for this interaction term, namely firms with a higher demand for security in Shenzhen will be associated with a as higher market reactions once the land title is granted. The result is displayed in column (2). The coefficient of the interaction term is both positive and statistically significant. It confirms that the security channel is effective for those non-landholders.

The second measure of asset reversibility is the average scale of the firms within one sector. Ghosal and Loungani (2000) find that the investment-uncertainty negative relationship is of greater significance for small firm-dominated sectors. That is, industry concentration is a negative indicator of asset reversibility. The rationale they provide is that larger firms face a lower level of asset reversibility because they can re-deploy the asset within many different production lines. This intra-firm diversification capacity decreases the cost when the asset is being disposed of. On the other hand, when lacking this capacity, the disposal cost is pushed up for smaller firms. I use the total sales of the top 10 firms in each industry as a percentage of the total sector share and as a measure of whether the sector is dominated by small firms. The top 10 firms on average take 12% of total sales, with the minimum and maximum values being 0% and 82%, respectively.

The result is shown in column (3) of Table VII. The coefficient of the interaction between the Shenzhen firm and industry concentration is negative and significant. It suggests that for those concentrated industries that the firms are relatively larger in scales, the response to those exogenous shocks was smaller relative to those with smaller firms. This is in line with the fact that the need for the land title protection of those larger firms are relatively weaker as they can re-deploy the asset within the company.

Apart from the variation in the demand for land title protection, I also exploit the heterogeneity of the supply side of the land titles. Firms that are larger in size and with political connections are more likely to obtain the entitled land[28]. In column (4), only SOE firms are included and the coefficient increases from 1.1% to 1.9% with higher statistical significance, despite the fact that a smaller sample is used. In column (5), only firms with a larger-than-median size are included. Again, the coefficient is increased from 1.1% to 1.8%, with higher statistical significance. These two columns provide evidence that the increases in stock market value of those non-landholding firms

are coming from their future purchases of entitled land and the revenue from investment in those lands.

I further investigate the heterogeneity among firms that are not located in Shenzhen. Those firms that already have business exposure in Shenzhen are more likely to purchase land and to take advantage of the extension of land supply in Shenzhen relative to those firms that have no business relationships in Shenzhen at all. I use the percentage of the bank loans from Shenzhen banks as a proxy of a firm's exposure in Shenzhen. On average, 3% of loans are from Shenzhen bank for non-Shenzhen firm, compared with that 79% loans of Shenzhen firm are from Shenzhen banks. The coefficient of the Shenzhen exposure of non-Shenzhen firms is reported in column (6) of Table VII. The coefficient is positive and statistically significant. This indicates that the tighter business connection with Shenzhen the non-Shenzhen firms have, the more likely the firm is to benefit from the title-granting scheme.

# VI. Conclusion

This paper investigates the effect of property rights protection on investment by exploring an natural experiments in Shenzhen, a title-granting scheme. Two features of its empirical setting make this study specially interesting as it does not suffer from the problems that normally plague these types of investigations. (1) The title-granting scheme is both exogenous and universal so as to alleviate the endogeneity and self-selection bias concerns. (2) Firms in the treatment group, those landholders, are not systemically difference from non-landholders in control group, in terms of various pre-event characteristics and performance measures. The fact that firms in our sample are all politically connected provides an rare opportunity to observe the pure effect of security channel, namely the effect of property right protection on investment by solving the hold-up problem, rather than an aggregate effect of security and collateral channel. I find that those firms that were holding allocated land before the scheme are associated with significant increases both in market prices and investments compared with firms without allocated land. The effect is more pronounced for those firms with weaker pre-event protections. The economic application is huge. Potentially, solving the hold-up problems of all unentitled land would bring about value of 2.2 Trillion RMB, almost three times of Shenzhen's GDP in 2009.

# Notes

[1]Besley (1995) provides an interesting case in which peasants in Ghana invest in growing trees in order to protect their property rights to certain plots of land.

[2]Potentially, a third channel, the transaction channel, through which land with property rights is easier to sell at market price, also contributes to investment, although in my setting the effect of this channel is marginal, mainly because the ban on sale is hardly enforced and the pre-event transaction of the allocated land is pervasive.

[3]The main target of the title-granting scheme is to give titles for the squatter-occupied land, which accounts for a larger area in Shenzhen than allocated land.

[4]See Besley (1995), Acemoglu, Johnson, Robinson (2002), Jacoby, Li and Rozelle (2002), Field (2005, 2007), Goldstein and Udry (2008), and Galiali and Schargrodsky (2010). And see Besley and Ghatak (2009) for a good survey.

[5]Another form of unentitled land, squatted land in Shenzhen, also accounts for a large portion of land in Shenzhen. However it is irrelevant to our study.

[6]Data from Wang, Chen and Chen (2012), "some tips from Shenzhen City Renewal Program for western area", research on development, 05, 2012

[7]"Interim Regulations of the People's Republic of China Concerning the Assignment and Transfer of the Right to the Use of the State-owned Land in the Urban Areas", article 47 stipulates that the government has the authority to take back the allocated land without any compensation.

[8]In 2004, the Shenzhen government released the "Provisions of Shenzhen government on Real Estate expired land renewal" that specified the renewal fee for the land that expires. However no owner of the expired land actually handed in the renewal fee for land renewal.

[9]Provisional Regulations of Land Management for Shenzhen Special Economic Zone, 1981

[10]See Huaxia News, 16 March, 2013.

[11]Under a 50-year lease contract, the current land user leases out the land to the buyer who pays all rental fees in a lump-sum.

[12]Interview Kaihong Li, the participants in Shenzhen urban planning, by Nanfang weekend. The problem of absence of registration is most severe for allocated land used by small-scaled firms. For the large-scaled firms that appear in the analysis of this paper, as the information of their allocated

landholding is public information, this problem is not fatal

[13]Some requirements have to be met by the land user for obtaining the approval of government. Those requirements include: 1) the land owner should hand in a proposal for renovation of the buildings above the land, and it has to be approved by the government. 2) about 15% of the total area of the land should be handed to the government for public use.

[14]Other measures, including a policy that promoted voluntary user right registration and granting the land user transaction rights launched in 2004, all ended with failures.

[15]On May 31, 2010, the boundary of Shenzhen was extended for the first time since its establishment in 1981. Its total area increased from 995 square kilometers to 1,948 square kilometers.

[16]That is, the land user receives 60% of the value of the land when it is converted into entitled land.

[17]The first non-SOE firms, New Hope Group, were listed in 1998.

[18]See Regulations on Stock Listing in Shenzhen Stock Exchange.

[19]Procedures regarding property issues in SOE reforms/reorganizations in Shenzhen, 11 January 2001. Shenzhen Government.

[20]Notice that the established year for SOEs may not be the year during which the firm is founded; it may be the year when the firm was reformed from its pre-existing, outdated, centrally planned predecessor.

[21]On 13th Nov, 2009, the news that a title-granting scheme was about to launched appeared in some local newspapers in Shenzhen. However due to the limited influence and lack of credential of those papers, the news was ignored by the public until the government made a official announcement in a press conference on 25th November.

[22]The first round information was released on 13th Nov, 2009 by local news papers. However due to the adverse track record of these newspapers in disclosing reliable information, the information they released does not cause much market reaction.

[23]"Provisional regulation of Shenzhen land administration", Shenzhen government,1981

[24]The risk of expropriation by other private citizens is also lower for those Shenzhen-connected firms. That is because the Shenzhen court, the arbiter of the land rights dispute, is under the control of Shenzhen government

[25]One famous example is that Chinese central bank release sequential policy changes, including

downward adjustments of reserve required rate, with a frequency of one adjustment per month for seven consecutive months, between December 2010 and July 2011, in order to promote GDP growth.

[26]There are many other measures regarding financial constraints, such as Almeida et al. (2004) and Lamont et al. (2001). However almost all of those measures include the value of the dividend payment. Chinese firms are notorious for not paying dividends, not because of financial constraint, but because the poor corporate governance. See Faccio et al. (2001) As a result, all above measures are noisy in that they have a tendency to measure corporate governance on top of financial constraints.

[27]The increase of land supply derives mainly from the previously squatted land by farmers in Shenzhen. The City Renewal Program allows those farmer squatters, once the titles are obtained, to sell the land to firms at any negotiated price.

[28]Qian and Weingast (1997) demonstrate that local governments are competing with each other for investment from foreign or large-scale domestic firms. As a result, larger firms are more likely to receive titles from a local government that has an incentive to use land as a stimulus to promote local GDP. Similarly, firms with political connections are also regarded as main recipients of the land as the local government is the sole land distributer in China.
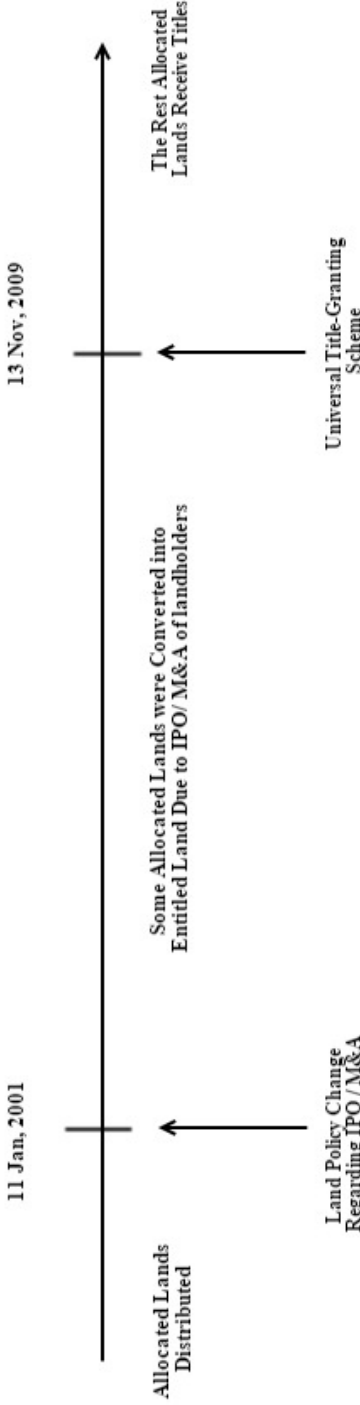
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**Figure 1.** Figure 1 Time Sequence of Entitlement of Allocated Land in Shenzhen



11 Jan, 2001

13 Nov, 2009

Allocated Lands Distributed

Land Policy Change Regarding IPO / M&A

Some Allocated Lands were Converted into Entitled Land Due to IPO/ M&A of landholders

Universal Title-Granting Scheme

The Rest Allocated Lands Receive Titles

**Table I** Statistical Description for Landholders and non-Landholders

| | All Sample | Landholders | Non Landholders | Non Landholders M&A after 2001 | Non Landholders Listed after 2001 |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| **Major Event Time** | | | | | |
| Listed Year | 1996.43 | 1994.58 | 1997.28*** | 1994.95 | 2004.42** |
| | | | (2.44) | (-0.85) | (5.67) |
| Established Year | 1994.27 | 1993.71 | 1994.50 | 1992.81* | 1999.71*** |
| | | | (0.66) | (-1.73) | (3.24) |
| **Political Connection** | | | | | |
| SOE | 64% | 77% | 58% | 51% | 79% |
| | | | (-1.68) | (-1.31) | (0.79) |
| Shenzhen SOE | 24% | 38% | 17%** | 16%* | 21% |
| | | | (-2.09) | (-1.70) | (-0.79) |
| Central SOE | 36% | 46% | 32% | 30% | 36% |
| | | | (-1.27) | (-0.85) | (-0.26) |
| Party Member Ratio | 0.87% | 1.04% | 0.76% | 0.78% | 0.69% |
| | | | (-0.96) | (-0.58) | (-0.55) |
| Previous City Government Officials | 0.31% | 0.45% | 0.23% | 0.28% | 0.08% |
| | | | (-1.6121) | (-1.14) | (-1.43) |
| **Corpoate Governance** | | | | | |
| Stock Incentive Compensation | 20% | 19% | 21% | 14% | 43% |
| | | | (0.19) | (-1.35) | (1.06) |
| Dual Position of CEO and board Chair | 93% | 92% | 93% | 93% | 93% |
| | | | (0.10) | (-0.05) | (-0.05) |
| Percentage of Independent Board Member | 36% | 36% | 37% | 37% | 35% |
| | | | (0.89) | (0.95) | (-0.57) |
| Average age of Board Member | 54.57 | 54.80 | 54.47 | 54.52 | 54.31 |
| | | | (-0.32) | (0.02) | (-0.11) |
| **Industries** | | | | | |
| Commercial | 4% | 0% | 5% | 2% | 14% |
| | | | (1.18) | (0.83) | (2.18) |
| Industrial | 6% | 4% | 7% | 9% | 0% |
| | | | (0.55) | (0.98) | (-0.67) |
| Conglomerate | 11% | 19% | 7% | 7% | 7% |
| | | | (-1.66) | (-1.30) | (-0.84) |
| Utility | 14% | 8% | 18% | 16% | 21% |
| | | | (1.17) | (1.22) | (1.43) |
| Number | 83 | 32 | 51 | 37 | 14 |

This table provides the descriptive statistics for the whole universe of listed firms, landholders and non-landholders, further segmented into those listed after 2001 and M&Aed after 2001. The *SOE* Ratio is the percentage of firms with the ultimate controller being government. The *Listed Year* and *established year* are the year when the firms is approve to float its stock on an exchange market and the year the firm was established respectively. The *party member ratio* is the number of party numbers divided by the total number of employees. The *Previous City Government Officials* is the ratio of board members with previous city government official experience. *Stock Incentive Compensation* is the percentage of firms offering incentive-based compensation to their executives. *Dual positions of CEO and board chair* is the ratio of firms where the CEO and board chair positions are held by two executives. *Independent Board Ratio* is the ratio of firms' independent board member as percentage of total board member. *Board Member's Age* is the average age of all board members. All variables in panel A are from the CSMAR database. The t-statistics of the two-tailed t-test between landholders and non-landholders are illustrated in parentheses. \*,\*\*,\*\*\* indicates significance at the 1%, 5% and 10% level respectively.

**Table II** Firms' Performance by the End of year 2009 and Changes from 2006 to 2009

| | Year(2009) | | | Δ(2006-2009) | | |
| --- | --- | --- | --- | --- | --- | --- |
| | Landholder | Non Landholder | t(Δ) | Landholder | Non Landholder | t(Δ) |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Total Asset (Billion RMB) | 3.48 | 7.61 | -1.76* | 0.31 | 0.43 | -0.43 |
| Sales (Billion RMB) | 0.67 | 1.31 | -1.28 | 0.41 | 0.17 | 0.99 |
| Employment (Thousand headcount) | 1.74 | 6.66 | -1.76* | 0.07 | 0.36 | -0.99 |
| Profit (Million RMB) | 30.40 | 147.00 | -2.24*** | -0.15 | -0.09 | -0.25 |
| Tobin's Q | 3.53 | 3.36 | 0.27 | -0.07 | 0.52 | -1.46 |
| ROA | 0.01 | -0.01 | 0.64 | -0.01 | -0.05 | 0.81 |
| Book Leverage Ratio | 0.57 | 0.53 | 0.62 | 0.01 | -0.01 | 0.31 |
| Tangible Ratio | 0.13 | 0.20 | -1.5 | -0.05 | -0.03 | -0.43 |
| Cash Ratio | 0.19 | 0.17 | 0.72 | 0.04 | 0.03 | 0.43 |
| N | 32 | 51 | | 32 | 51 | |

This table provides the descriptive statistics of the performance of landholders and non-landholders, both measured by the end of 2009 and changes between the end of 2006 and the end of 2009. The third and the sixth column are the two-tailed t-statistics of the two-tailed t-test between landholders and non-landholders. *ROA* is calculated using the net profit divided by total assets. *Book* Leverage Ratio is calculated using the total book liability divided by total assets. *Tangible Ratio* is calculated using total tangible assets (PP&E) divided by total assets. *Cash Ratio* is calculated using the cash holding divided by total assets. All financial data is from the semi-annual report disclosed by the firm on 30 June 2009, the latest available one before the event date of 13 November. *,*,** indicates significance at the 1%, 5% and 10% level respectively.

**Figure 2.** Stock Market Reactions to the Announcement of the Launch of the Title-Granting Scheme
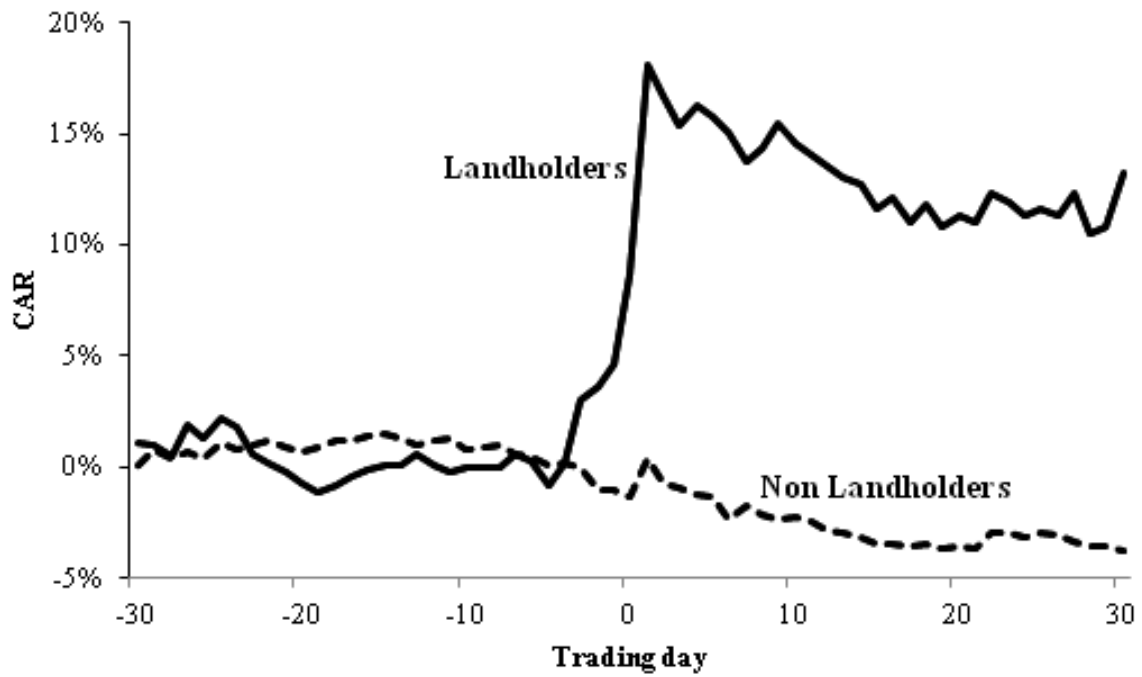


This figure presents the average CAR of all 32 listed firms that disclosed their landholdings around the launch of the City Renewal Program. The solid line is the CAR from 30 days before the event and 30 days after the event. The dashed line is the CAR of 51 non-landholders. The CAR is estimated using the Fama-French (1992) three-factor model with a beta estimation window lasting from -250 to -40 trading days prior to the event.

**Figure 3.** Investment Changes as Responses to the Title-Granting Scheme
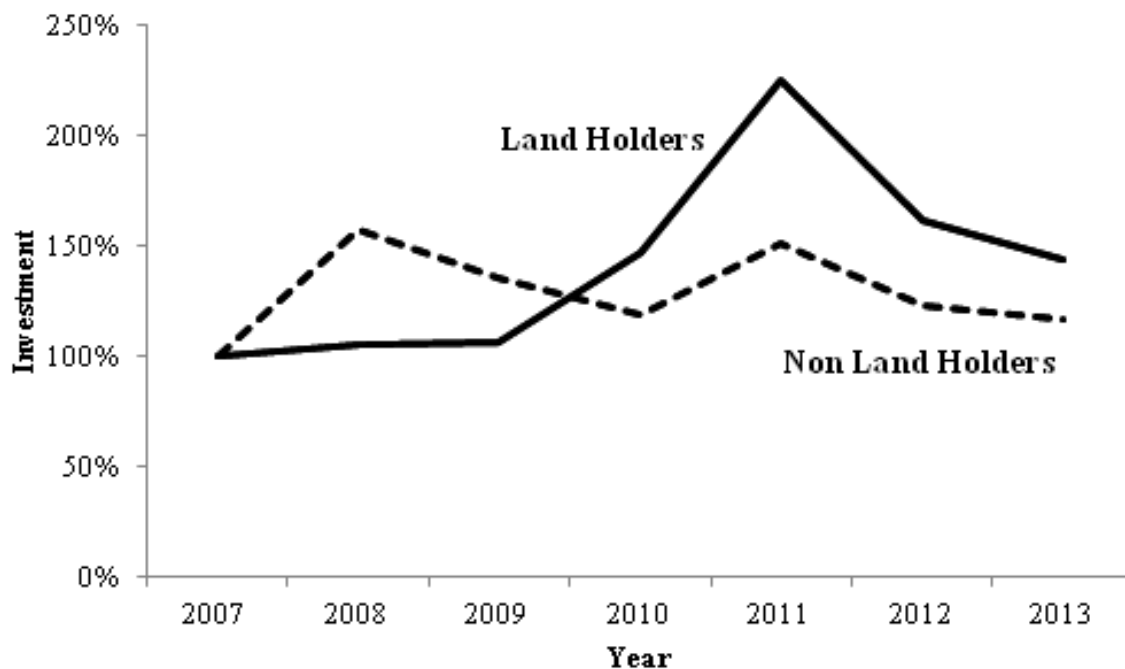
This figure presents the investment changes within a seven-year observation window around the title-granting scheme for landholders and non-landholders. The solid line is the averaged annual investment level for those 32 landholders while the dashed line is the averaged annual investment level for those 51 landholders. All observations are normalized by dividing their 2007 level.

**Table III**  Differences in Stock Market Reactions and Real Responses between Landholders and Non-landholders

| | Total sample | Landholders | Non-Landholders | $\Delta$(t-stat) |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| **Panel A** | | | | |
| CAR [0,2] | 0.04 | 0.14 | 0.01 | 9.64*** |
| CAR [-5,2] | 0.04 | 0.18 | 0.00 | 9.44*** |
| CAR [-30,-6] | 0.01 | 0.01 | 0.01 | 0.08 |
| CAR [3,30] | -0.05 | -0.09 | -0.04 | -1.20 |
| Residual CAR [0,2] | 0.03 | 0.10 | 0.01 | 6.37*** |
| | | | | |
| **Panel B** | | | | |
| $\Delta$Investment [2008-2009] | 1.46 | 1.47 | 1.45 | 0.04 |
| $\Delta$Investment [2010-2011] | 1.52 | 1.99 | 1.31 | 1.74* |
| $\Delta$Investment [2012-2013] | 1.40 | 1.60 | 1.32 | 0.55 |

This table provides the statistics on the stock market reaction and real performance of landholders and non-landholders. The CAR is estimated using the Fama-French (1992) three-factor model with a beta estimation window lasting from -250 to -40 trading days prior to the event. The residual CAR is the CAR net of the normalized value of the would-be entitled land. The Investment is the capital expenditure that was made by specific fiscal year. The fourth column shows the t-statistics of the two-tailed t-test. ,*,** indicates significance at the 1%, 5% and 10% level respectively.

**Table IV** Stock Market Reactions to the Title-Granting Scheme within the Sample of Politically Connected Firms

| | CAR | CAR | Residual CAR | Residual CAR | Mkt Cap Appreciation | Residual CAR | Residual CAR |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Land Dummy | 0.1231*** | 0.1213*** | 0.0778*** | 0.0866*** | | 0.0891*** | 0.109*** |
| | (9.64) | (9.16) | (6.00) | (5.99) | | (6.18) | (5.00) |
| Land Area (Hectare) | | | | | 49.31*** | | |
| | | | | | (9.12) | | |
| Tenure Dummy | | | | | | -0.0543* | |
| | | | | | | (-1.97) | |
| Shenzhen Connection Dummy | | | | | | | -0.0442* |
| | | | | | | | (-1.68) |
| Fixed Effect | No | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange |
| Control Variables | No | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ | 0.598 | 0.598 | 0.439 | 0.458 | 0.576 | 0.463 | 0.473 |
| N | 83 | 83 | 83 | 79 | 83 | 83 | 83 |

This table presents the market reactions to title-granting scheme for all Shenzhen's politically connected firms. The CAR is estimated using the Fama-French (1992) three-factor model with a beta estimation window lasting from -250 to -40 trading days prior to the event. The *residual CAR* is the CAR net of the normalized value of the would-be entitled land. The *Mkt Cap Appreciation* is the appreciation of the market value of firms' equity net of the value of the would-be entitled land. The *Land* is a dummy variable that is assigned a value 1 if the firm has allocated land when the title scheme was announced on 13 November 2009 and 0 otherwise. The *tenure dummy* is a measure of prior-event property right protection. It is assigned a value 1 if the tenure of land has not expired and 0 if it has. The information on land expiration comes from the disclosure reports of landholding firms. The *Shenzhen Connection Dummy* is assigned 1 is the firm is affiliated to the Shenzhen government and 0 if otherwise. *Control Variables* include: total assets, cash ratio, fixed asset ratio, book leverage ratio and ROA. The industry of the firm and its trading exchange are also controlled. T-statistics are presented in parentheses. *, *** indicates significance at the 1%, 5% and 10% level respectively.

**Table V** Robust Tests of Stock Market Reaction

| | Year | | Ownership | | Collateral Channel | | Invest Opportunity | |
|---|---|---|---|---|---|---|---|---|
| | All Sample | <2001 | SOE | non SOE | Constrained | Non Constrained | High Tobin's Q | Low Tobin's Q |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Land Dummy | 0.0778*** | 0.0750*** | 0.0500*** | 0.160*** | 0.0357 | 0.0912*** | 0.09506 | 0.06688*** |
| | (6.00) | (5.40) | (3.93) | (4.99) | (1.55) | (5.01) | (5.07) | (3.13) |
| Fixed Effect | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange |
| Control Variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ | 0.598 | 0.488 | 0.427 | 0.744 | 0.433 | 0.674 | 0.6043 | 0.3427 |
| N | 83 | 69 | 53 | 30 | 42 | 41 | 42 | 41 |

This table presents the robust test of market reactions to the title-granting scheme. The dependent variable of all regression is the residual CAR, as defined above. The *Land* is a dummy variable that is assigned a value 1 if the firm had allocated land when the title scheme was announced on 13 November 2009 and 0 otherwise. *Control Variables* include: total assets, cash ratio, fixed asset ratio, book leverage ratio and ROA. The industry of the firm and its trading exchange are also controlled. T-statistics are presented in parentheses. *, ** indicates significance at the 1%, 5% and 10% level respectively.

**Figure 4.** The Averaged Beta of All Landholders
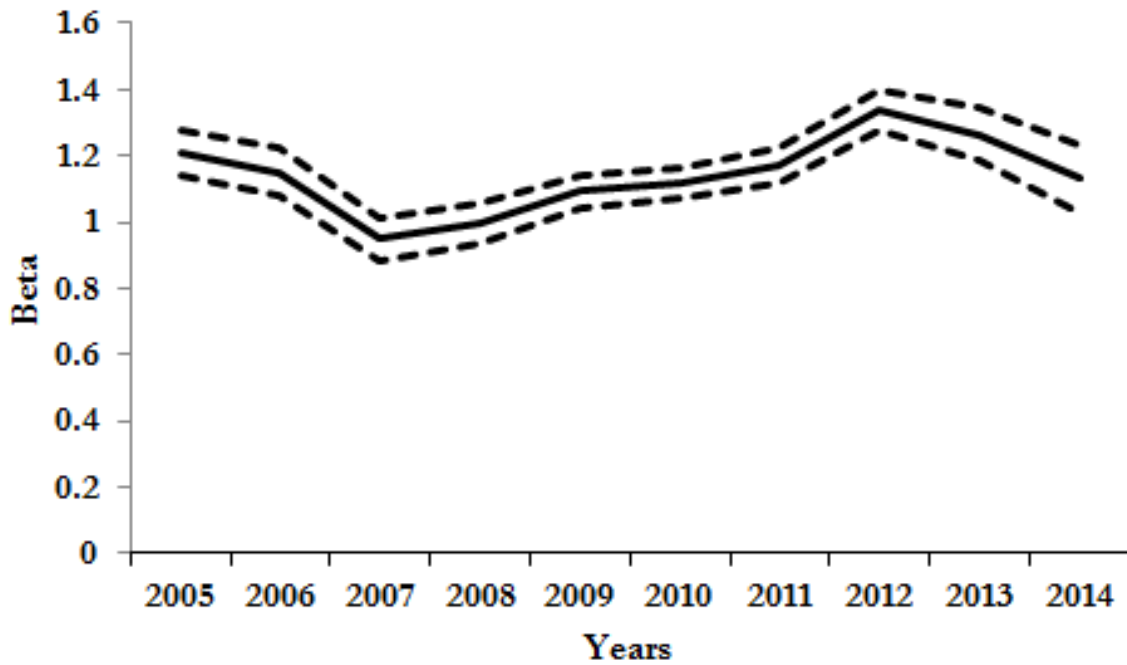


This figure presents the average beta of all landholders from 2005 to 2014. The solid line is the market beta estimation window lasting from -250 to -40 trading days prior to the event. The dashed lines indicate the 95% confidence interval of the estimates using standard errors clustered at the level of industries.

**Table VI** Real Performance Enhancement as a Response to the Title-Granting Scheme

| | Investment | | | | | Finance | Employment | Profitability |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Land×Post | 0.632*** | 0.191 | 0.386 | 0.777* | 0.214 | 0.522** | 0.083* | 0.342*** |
| | (2.69) | (1.07) | (1.59) | (1.83) | (0.74) | (2.24) | (1.80) | (2.72) |
| Land | -0.247 | -0.214* | -0.315* | -0.429** | -0.283* | 0.133 | -0.0943*** | -0.087 |
| | (-1.57) | (-1.67) | (-1.95) | (-2.13) | (-1.85) | (0.79) | (-2.94) | (-1.01) |
| Post | -0.00976 | 0.0843 | -0.0105 | 0.0756 | -0.062 | 0.216* | 0.0057 | 0.05 |
| | (-0.08) | (0.93) | (-0.09) | (0.85) | (-0.56) | (1.68) | (0.23) | (0.78) |
| Year[2010-2011]×Land×Post | | 0.287* | | | | | | |
| | | (1.77) | | | | | | |
| Year[2010-2011] | | -0.0275 | | | | | | |
| | | (-0.28) | | | | | | |
| Tenure×Land×Post | | | -0.247 | | | | | |
| | | | (-0.48) | | | | | |
| Tenure | | | 0.177 | | | | | |
| | | | (0.58) | | | | | |
| SZ connected×Land×Post | | | | -1.088** | | | | |
| | | | | (-2.27) | | | | |
| SZ connected | | | | 0.626** | | | | |
| | | | | (2.49) | | | | |
| CARabove×Land×Post | | | | | 0.554* | | | |
| | | | | | (1.72) | | | |
| CARabove | | | | | 0.0236 | | | |
| | | | | | (0.16) | | | |
| Fixed Effect | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange |
| Control Variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ | 0.07 | 0.101 | 0.066 | 0.134 | 0.082 | 0.083 | 0.131 | 0.084 |
| N | 381 | 378 | 378 | 338 | 375 | 340 | 379 | 389 |

This table presents the real performance enhancement as a response to the title-granting scheme for all Shenzhen's politically connected firms. The *Land* is a dummy variable that is assigned a value 1 if the firm had allocated land when the title scheme was announced and 0 otherwise. The *post* is a dummy variable that is assigned a value 1 for post-event years (20102013) and 0 if otherwise. The *Year [20102011]* is a dummy variable which is assigned a value 1 for year 2010 and 2011 and 0 if otherwise. The *tenure dummy* is a measure of prior-event property right protection. It is assigned a value 1 if the tenure of land has not expired and 0 if it has. The information on land expiration comes from the disclosure reports of landholding firms. The *Shenzhen Connection Dummy* is assigned 1 is the firm is affiliated to the Shenzhen government and 0 if otherwise. The *CARabove* is a dummy variable that is assigned a value 1 for those firms with a higher-than-median residual CAR and 0 if otherwise. Control Variables include: total assets, cash ratio, fixed asset ratio, book leverage ratio and ROA. The industry of the firm and its trading exchange are also controlled. T-statistics are presented in parentheses. *,**,*** indicates significance at the 1%, 5% and 10% level respectively.

**Table VII** Robust Test of Stock Market Reaction

| | Year | | Ownership | | Collateral Channel | | Invest Opportunity | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | All Sample | <2001 | SOE | non SOE | Constrained | Non Constrained | High Tobin's Q | Low Tobin's Q |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Land×Post | 0.632*** | 0.685*** | 0.479 | 0.694** | 0.653* | 0.72** | 0.77*** | 0.327 |
| | (2.69) | (2.60) | (1.24) | (2.46) | (1.90) | (2.36) | (2.78) | (0.89) |
| Land | -0.247 | -0.365* | -0.0436 | -0.264 | -0.313 | -0.151 | -0.073 | -0.482* |
| | (-1.57) | (-1.94) | (-0.17) | (-1.26) | (-1.20) | (-0.71) | (-0.39) | (-1.84) |
| Post | -0.00976 | -0.0606 | 0.115 | -0.0933 | -0.046 | 0.0483 | 0.069 | -0.077 |
| | (-0.08) | (-0.41) | (0.67) | (-0.61) | (-0.29) | (0.29) | (0.47) | (-0.43) |
| Fixed Effect | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange |
| Control Variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ | 0.07 | 0.076 | 0.193 | 0.107 | 0.169 | 0.131 | 0.163 | 0.119 |
| N | 318 | 318 | 242 | 139 | 204 | 177 | 182 | 199 |

This table presents the robust test of the real performance enhancement as responses to the title-granting scheme for all Shenzhen's politically connected firms. The *Land* is a dummy variable that is assigned a value 1 if the firm had allocated land when the title scheme was announced and 0 otherwise. The *post* is a dummy variable that is assigned with a value 1 for post-event years (20102013) and 0 otherwise. *Control Variables* include: total assets, cash ratio, fixed asset ratio, book leverage ratio and ROA. The industry of the firm and its trading exchange are also controlled. T-statistics are presented in parentheses. *, ** indicates significance at the 1%, 5% and 10% level respectively.

**Table VIII** Stock Market Reaction of Non-Landholders

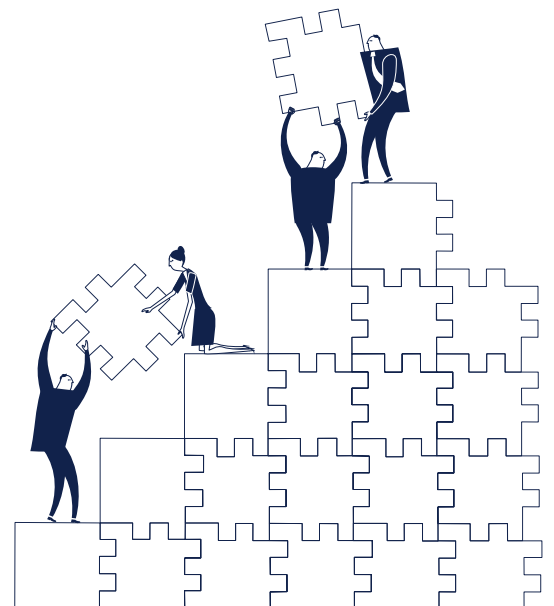| | Residual CAR | Residual CAR | Residual CAR | Residual CAR SOE subsample | Residual CAR Large firm subsample | Residual CAR |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Shenzhen Dummy | 0.0111** | -0.0116 | 0.0345*** | 0.0195*** | 0.0182*** | 0.00565 |
| | (2.25) | (-1.58) | (3.74) | (2.86) | (2.67) | (0.70) |
| Industry Comovement | | 0.242 | | | | |
| | | (1.25) | | | | |
| ×Shenzhen Dummy | | 1.265** | | | | |
| | | (2.17) | | | | |
| Industry Concentration | | | -0.000258** | | | |
| | | | (-2.22) | | | |
| ×Shenzhen Dummy | | | -0.00167*** | | | |
| | | | (-2.80) | | | |
| Shenzhen Exposure | | | | | | 0.0228* |
| | | | | | | (1.87) |
| Fixed Effect | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange | Industry ×Exchange |
| Control Variables | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ | 0.012 | 0.015 | 0.022 | 0.029 | 0.01 | 0.026 |
| N | 1558 | 1540 | 1546 | 782 | 980 | 939 |

This table presents the stock market reactions of non-landholders to the title-granting scheme. *Shenzhen* is a dummy variable that is assigned a value 1 if the firm is headquartered in Shenzhen and 0 otherwise. The *Industry Co-movement* is measured correlations in sales of one firms with its industry-level aggregated sales. The *Industry Concentration* measures the average sales of the top 10 firms of a certain industry as the aggregated industry sales. *Control Variables* include: total assets, cash ratio, fixed asset ratio, book leverage ratio and ROA. The industry of the firm and its trading exchange are also controlled. T-statistics are presented in parentheses. *, **, *** indicates significance at the 1%, 5% and 10% level respectively.

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# Property Rights Protection and Investment: a Natural Experiment from China

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