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MSc Programme in Urban Management and Development

Rotterdam, the Netherlands

September 2016

Thesis

Title: Land Leasing Policy, Industrial Land Price and Industrial Investment in China

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MASTER'S PROGRAMME IN URBAN MANAGEMENT AND DEVELOPMENT

(October 2015 – September 2016)

Land Leasing Policy, Industrial Land Price and Industrial Investment in China

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UMD 12 Report number: 868

Rotterdam, September 2016

Summary

For a long time, the industrial land leasing price is purposely controlled at a very much low level by the local government especially through private one-to-one negotiation with industrial etherises, which acted as a cross subsidies. The phenomenon has been recognized as government competition. After the 2007 new land leasing policy issued by central government, the informal land subsidies were strictly forbidden. The thesis conduct an empirical study on China's industrial land leasing price and its impact on industrial investment since 2007. The research utilized city-level panel data and interviews for analysis. The regression models are run separately by using city data of Eastern China, Middle China and Western China to test the different effect of industrial land. Combined with interviews, the research found out that, in general the lower industrial price and government competition has been obstacles for increase of industrial investment. However, when looking at different regions, we noticed that, due to the different development level, the land prices have different influences on investment. The lower land price impeded the investment in Eastern China as land is becoming less available, while in Middle China the price competition weakened the comparative advantage over the east, and Western China could still use land price as leverage under the relatively poor local investment environment. In the future, the land policies and economic development policies should be made based on the differentiation of the regions to avoid vicious government competition and to improve the land market.

Keywords

Land leasing; Land price; Industrial Land; Industrial investment; Government competition;

Acknowledgements

I would like to express my special thanks of gratitude to my supervisor Paul Rabe who have given me great help and inspiration during the research. His encouragement increase my confidence to carry out my research proposal and I learn a more cautious attitude towards academic research from him.

Secondly, I would also like to thank my friends, classmates, and my parents, they give substantial support both academically and spiritually.

Abbreviations

IHS	Institute for Housing and Urban Development
HHI	Herfindahl-Hirschman Index

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Chapter 1: Introduction

1.1 Introduction

Before 1980s, the land is owned and allocated by the state without any market mechanism (Tian, Sheng, et al., 2016). In 1980s, the state firstly separated land use rights from land ownership so to create land use transfer rights and land market. Land leasing has been primitively formed. Generally, land leasing refers to that the government transfer the land use right of state-owned land to land users for a certain period of time and charges them payments for that. The lump-sum payment is recognized as land price. The Chinese local government is the agent for practicing the public land leasing system. At the first beginning, the land management sector at prefecture-level should make a land leasing planning based on the national and local economic and social development plans, national industrial policies, national strategic land use planning, national annual land use planning, urban planning. After the official approval of local government, the planning is going to be fulfilled. The municipalities can intervene with both allocation of land parcels and land leasing formats[1]. The local governments are empowered to convert rural land, owned by the collective rural groups, into urban land and lease it to private sectors to capture the land value increment from rural to urban land use. Through this way, land rent capitalization through public and private investment increased the land value and accordingly land revenue which in return enabled the local government to continue the urban expansion and public investment. This is recognized as 'land finance' (Tao, Su, et al., 2010) or 'instrumental land use' (Liu, Tao, et al., 2008) to support China's industrialization and urbanization.

1.2 The Changing Land Leasing Policy in China

Before1980s, there was barely no land market, and the land transition was forbidden by the Constitution and only free land allocation was allowed by the state. However, with the shift of economic and social environment, the institution began to show the deficiency which didn't match the demand for land as a commodity. In 1988, the amendment of the Constitution stipulates that the land use right can be transferred in accordance with the law (Land Administration Law of the People's Republic of China (1998 Revision) , 1988). According to the constitution, the government is the only entity who can convert land use from rural to urban for commercial, residential or industrial purpose. Since then, China has established a nationwide land leasing system.

According to Land Administration Law enacted in 1998, the land users must pay land leasing rent, a lump-sum payment, to the local government which is also recognized as the land price of a plot. The payment to the local government is for the land use right of commercial use, residential use and industrial use for respectively 40, 70 and 50 years. The price can be decided through various land leasing process. There are four legal mechanisms for public land leasing, according to the descending degree of

[1] The main four different land leasing processes will be explained in the following section.

marketization, they are bid tendering (zhao biao), auction (pai mai), quotation (gua pai), and private negotiation (xie yi). The first three processes (BAQ) are generalized as public auction and open deal, while the private negotiation is relatively closed. Through the different processes decision, land price also varies. Usually, the negotiated land leasing price is lower than that of the auctioned land. Even though, the higher land revenue seems not to be a stimulus for local government to use public auction process. In 1990s, the land was almost leased by one-to-one private negotiation, which caused severe political corruption and underutilization of urban land. The descriptive statistic shows that, during 1995 to 2002, 137,838 land leases with approximately total amount of 959,670 mu (=666.67 square meters) area were granted annually, but almost 86% of which were through private negotiation (Lin and Ho, 2005).

To reverse the undervalued urban land, the public auction (BAQ) has been legitimized in 2002 to enhance the transparency of land transaction and improve the land market mechanism. In 2002, the Ministry of Land and Resources enacted the 'Regulations on the tender and auction of public land use rights' (Ministry of Land and Resources, 2002). It stipulates that any land use transfer for commercial purpose including commerce, tourism, entertainment and real estate development should be conducted by bid tendering, auction or quotation (BAQ). Although commercial and residential land had been forced to marketized, industrial land was remained unregulated.

Eventually, central government has revised land leasing policy in 2006 called Rules on the Assignment of the State-owned Land Use Right by Means of Bid Tendering, Auction and Quotation and implemented the new land leasing policy in 2007 called Provisions on the Assignment of State-owned Construction Land Use Right through Bid Tendering, Auction and Quotation (2007 revision). According to the new policy, the local government is forced to use public auction (BAQ) process regarding to the industrial land leasing, only minority of industrial land can be leased through private negotiation considering the public and nationally strategic contribution. At the same time, in 2006, the Ministry of Land and Resources (MLR) has made these uniform National Standards for the Minimum Transfer Prices of Land for Industrial Purposes in order to strengthen the control and management of land for industrial use, and promote the use of land in an economical and intensive way. The land for industrial use must be transferred in the manner of bidding, auction or quotation, and the floor price shall be not lower than the minimum transfer price corresponding to the official land quality grades.

The changing land leasing policy is surrounding the marketization which remarkably influences the land price.

1.3 Land Price and Investment

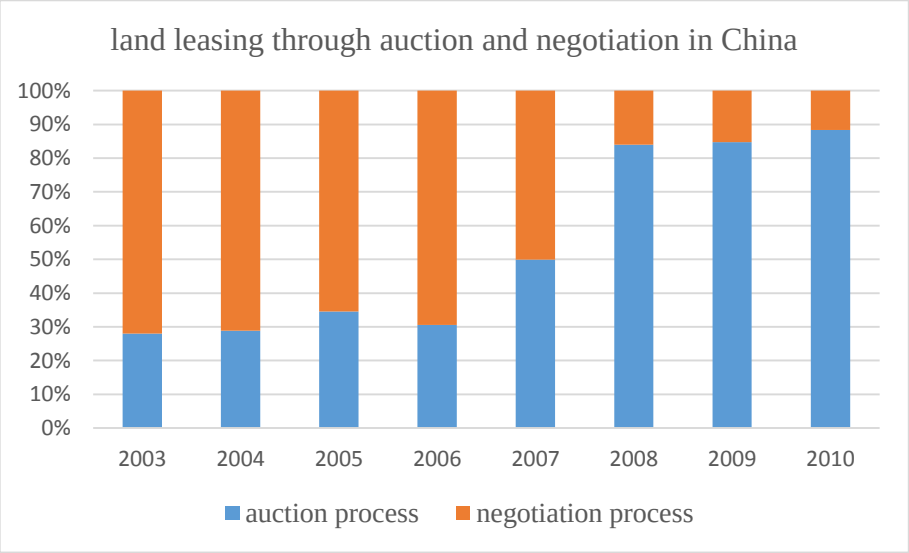
Land price has been playing a key role in the local economic growth. After the implementation of compulsory public auction process for commercial and residential land price has risen dramatically but the industrial land price has still remained low.

From 2003 to 2007, the commercial and residential land rent grew up by 120% and industrial land rent slightly went up by 24% (Lei and Gong, 2014). Even in Beijing, the capital city of China, in 2015, the average industrial land price is only 349 Yuan/m2 on the other hand, the average commercial land price is 7291Yuan/m2 and average residential land price is 6988Yuan/m2 (Ministry of Land and Resources, 2016-6).

The observation implies that the industrial land price was purposively curbed by the local government to attract investment. This strategy once was quite successful and widely adopted. In 1990s, a 'development fever' sparkled in Chinese eastern coastal region and gradually spread all over the country. Local governments were devoted to establishing various industrial development zones with no intention to cover the development cost by industrial land rent. In the development zones, the local government not only built basic public infrastructures including road, water and electricity, but also provided low land rent through negotiation and preferential policies like tax exemptions and rebates to attract industrial investment. For example, at the end of 1990s, in Zhejiang Province, the average cost of land acquisition and basic infrastructures was 100,000 Yuan/mu, but the industrial land price was only 80,000 Yuan/mu and even less than half of the cost in some cities (Tao, Lu, et al., 2009).

The whole mechanism is largely formed by the previous institutional background that local government are powerful enough to lower the industrial land price through private negotiation process. However, after the new land leasing policy in 2007, the negotiation process of land leasing has almost been forbidden, there is a quick shift between auction and negotiation process (see Figure 1).

Figure 1 Land Leasing Through Auction and Negotiation in China



1.4 Problem Statement

The new land leasing policy changed the land leasing system in China by tying the hands of the Chinese local government on industrial land leasing price. It aims at pushing industrial land price back to the market value and intensifying the industrial land use. Though a lot of studies have yielded fruitful knowledge on the evident

contribution of industrial land price dominated by negotiation process to investment and local economy, little is known about the impact of changing industrial price on industrial investment after the limitation of negotiation process in 2007. It is worthwhile to examine the practice of new land leasing policy and its effects comparing to the initial intention. Besides, As China is characterized as an imbalanced economic development, the rising industrial land price began to show a spatial differences (Chart 1.2). Compared to the rest of two regions, the eastern China has experienced a more rapid growth rate of industrial land price. The great differentiation of land price tendency may should be explained in detail to check the whether the effects could be changed in different regions. Thusly, the research question will derive from it ——what is the influence of industrial land price on industrial investment in China after the 2007 new land leasing policy?

Figure 2 Industrial Land Price in Three Chinese Economic Regions



In general, the three regions are defined according to the economic level combined with the consideration of geography. The classification has dated back to 1986, the seventh five-year nation economic and social development planning. The development policies and strategic targets has been deliberated accordingly. The Eastern China has played the main driver of China economic growth and therefore once became the best soil for blossom of industrialization; the Middle China was the base for traditional industries and it has a long history opening for business trading, but gradually experienced a recession due to the shift of state development concentration; The West China has the most mountain areas, plateaus, and arid areas in China which makes it left behind for a very much long time. Therefore to answer the research questions accurately, we should also draw attention to the possible different price mechanisms in three China economic regions. However, it might not be the simple answer that higher land price will be an obstacle to attract industrial firms, because land price mirrors the economic development level of a region, other factors like capital, labour and agglomeration

effect will mitigate the significance of land price. What's more, when it comes to the topic of regional economic or regional development, migration between regions also an essential consideration. Therefore, to better interpret the research question, especially for question 2 (Did the influence of industrial land price differ in different east coastal, middle and western of China based on different economic development level?), the following hypothesis based on the theories and observations naturally emerged.

1.5 Research Question

In the end, the research question and sub-questions are as followed:

What is the influence of industrial land price on industrial investment in China after the 2007 new land leasing policy?

Sub-questions:

- Was industrial land price a significant factor that influence the industrial investment? If so what's the impact on industrial investment?
- Did the influence of industrial land price differ in different east coastal, middle and western of China based on different economic development level?
- What were other factors that also determine the decision of industrial investment?

The hypothesis to better answer the question 2 based theories and observations are:

- H1: in Eastern China, the rising industrial land price will positively influence the industrial investment because of the higher economic development.
- H2: in Middle China, the lower industrial land price relative to the eastern China will significantly increase industrial investment.
- H3: in Western China, the rising industrial land price will impede the industrial investment because of the poor labour, capital and local economic development.

It will be addressed in Chapter 2 in detail.

1.6 Research Objectives

The rapid Chinese economic growth is closely related to the land resources and the land instruments used by local and state governments. In mid-1990s and early 21st century, China has witnessed some remarkable reforms towards marketization in various aspects. Land reform is one of those consistent with institutional transition. The special land leasing strategy has been shaped under the specific historical context, but as the continuous shift of institutional arrangement and emerging new economic features across China, it is important to recognize the advantages and limitation of present land leasing system. The research can make some contribution to shedding light on the recent relationship between land leasing system and local investment and economic growth and become a supplementary work for the previous China's local economy study. Additionally, as land leasing is regarded as a flexible instrument which could be used in various land tenure systems both in developed countries and developing countries, it is meaningful to provide empirical evidence for better understanding of

how land leasing instrument can be devised to stimulate investment. Therefore, the research objectives are as followed:

1. To test the impact of the land leasing price of the government-owned land on industrial investment decision with land leasing instrument.

2. To test if there is a different impact of land price on industrial investment decision in different regions due to different economic development level.

3. To test other determinants which should also influence the industrial investment decision.

4. To use the results above to better understand Chinese land leasing system and its impact on industrial investment.

1.7 The Significance of Research

The rapid Chinese economic growth is closely related to the land resources and the land instruments used by local and state governments. In mid-1990s and early 21st century, China has witnessed some remarkable reforms towards marketization in various aspects. Land reform is one of those consistent with institutional transition. That the Chinese local governments have been empowered to choose land leasing process—negotiation or auction, through which land price could be influenced. The special land leasing strategy has been shaped under the specific historical context, but as the continuous shift of institutional arrangement (especially new land leasing policies in 2007 limit the abuse negotiation process) and emerging new economic features across China, it is important to recognize the advantages and limitation of present land leasing system. Land price is always closely connected to housing price and, thusly, livelihood, however little are mentioned how land price can influence the industrial investment, especially there is a government intervention in market price. It is crucial to know how land instrument, land leasing system, will influence the investment and whether government intervention is effective and efficient or not.

Land leasing in China is a mandatory national land instrument and relative regulations and policies are designed by central government, while the implementation and operation relies on the localities. So it is necessary to look at the impact of land leasing at a broad scale to consequences, providing a whole picture of a national instrument for the state. The research can make some contribution to shedding light on the recent relationship between land leasing system and local investment and economic growth and become a supplementary work for the previous China's local economy study. Additionally, as land leasing is regarded as a flexible instrument which could be used in various land tenure systems both in developed countries and developing countries, it is meaningful to present empirical evidence for better understanding of how land leasing instrument can be devised to stimulate investment.

Chapter 2. Theory Review

The chapter 2 aims at providing a theoretical framework for the analysis by explicating the key concepts and their relationships. Firstly, as public owned land has its unique natures distinguished from private land system, the first thing is to master the mechanism of public land system, and here we focus more on public land market when we talk about land leasing. Thusly, the first and second section provide overall arguments on land supply and price mechanism and its relationship with industrial investment. Then we narrow the topics down to public land leasing system, the subject the research concentrate on among all the public land issues, giving a detailed look at practice of China's public land leasing system, its motives behind it, and how it will shift influence industrial investment. The last part, the core concept is industrial investment, combing the discussion above, what factors including public land leasing and other possible factors can have profound impact. In this way, the theory review provide a comprehensive idea about main issues in industrial investment, public land leasing and its connection.

2.1 Supply of Government-Developed Industrial Land

There is a general idea that industrial land is an important factor for industrial firms. But the impact is more significant when the industrial land is insufficient because industrial firms prefer bigger land parcels for their expansion. Since the evidence implies that the publicly developed industrial land tend be oversupplied because the government agents want to make sure there is no land scarcity, the land supply may have limited influences.

2.1.1 The Influence on Industrial Investment

Land supply that provides the space of industrial activities and labour dwelling has an important impact on urban growth (LONG and GUO, 2009). Either in developed or developing countries industrial land, accommodating activities, has profound influence on tax and local employment, for a long time, has positive spill overs on services and people's life, and ultimately benefits the economic growth. In the developed countries, studies are concentrated on the adequate industrial land supply and its positive relation to industry development. Studies on Columbia reported that industrial land use, only 5% of the total urban areas, was evidently insufficient and suggested that future planning should reserve more sufficient industrial land use for the long-term development consideration (Phillips Preiss Shapiro Association, Inc. Mt. Auburn Association, et al., 2009). Ploegmakers (2013) tried to analyze local governments' industrial land supply in Netherland by behavioral economics theory through structure interviews and questionnaires. The conclusion is that it is the motivation to stimulate or channel the industrial development that affects the localities' decision. Needham (2013) looked at the substitution of land and other production factors in industrial location decision at micro level and discovered that for manufacturing factories land is hard to be substituted because that they prefer large spaces which accommodate their current production and potentials for expansion. It is economically efficient to reserve part of land to provide flexibility for long term operation. He collected 334 firms

location respectively in 1998, 2000, 2004 and 2007, and proved that firms will choose to relocate when there is no adequate industrial land reserve and expansion is costly. Yang and Zhuo (2014) use industrial land leasing penal date from 2007 to 2011 to conduct an empirical study, and the econometric model revealed that industrial land supply can significantly increase the local capital investment, industrial output and local GDP, but the land supply through negotiation impede the positive impact. By penal data from 2003 to 2008, Liang and Han (2011) argued the ambiguous impact of industrial land leasing on investment: leasing industrial land could probably cause net cost for the government and the incentives for investment could be lagged effect, besides, the industrial land supply of adjoining jurisdictions which measures the price competition level presents a significantly negative force.

Land has also been markedly contributive to China's economic growth as a whole, Ding (2011) tested the statement by using econometric model and panel data from 1996-2003 and proved that land supply has created substantial value especially in coastal China, where land availability is associated with large proportional of urban output comparing to labour supply, government spending, and capital investment. He also zoomed into different regions- coastal, middle and western China, and noticed that pressure of land availability only existed in the coastal but neither in middle or western China. Long and Guo (2009) used 200 cities' data from 2000 to 2006 to draw the conclusion that quantity and structure of urban land supply have the different impact on labour, productivity and economic growth. He claimed that industrial land supply is the most remarkable land use associated with urban economic growth, but the contribution declined when the technology and human capital increases quickly. Another study conducted by China Land and Mineral Legal Services Center and China Land Index Research Institute (2014) showed that industrial land supply is positively correlated with industrial investment in the same period and the elasticity varies in three regions (coastal, middle and western), the middle China yield the highest elasticity (0.42) followed by coastal (0.29) and western (0.27) level, which means the industrial investment is more sensitive to land supply while eastern and western china are relatively not.

2.1.2 The Oversupply of Government-Owned Industrial Land

The public industrial land supply by the government usually exceed the optimal scale. In the Dutch case, the municipalities have a tendency to oversupply the industrial land on the purpose to ensure sufficient amount to accommodate future economic growth (Ploegmakers, van der Krabben, et al., 2013). The softer the fiscal budget is, the more aggressive supply behaviour there will be because the government may expect fiscal transfer and financial support from other institutions. Besides, considering the industry firm prefer large site with lower density, to appeal to the demand, the government is encouraged to develop and sell larger industrial parcels. Lin and Ben (2009) also observe an oversupply of public industrial land and larger size of public industrial parcels than private ones, pointing out that the oversupply lead to a decreased land value. In the study in the perspective of behavioural economics, the author concludes that though the decision of how much additional stock will be is partially dependent on the forecasting future demand, it is overestimated by using extra reserves to buffer the uncertainty and forecast errors. This process makes the municipalities' decision less

reliable on forecast. Besides, the municipalities follow a certain decision-making procedures including several forecasting methods. Adam, Dunse and White (2005) add to the arguments that those habit persistence based procedures will increase the volatility because the government will continue the new development even when there is a downturn market signal. All this arguments indicate a positive role of public land supply in the increasing risk in land and property market (Adams, Dunse, et al., 2005).

China's industrial land supply accounting for the total urban supply is much higher than most of the countries and regions. Comparing to the phenomenon in western countries of lower value and lower supply with respect to residential land, land supply in China is characterized as higher supply and lower price (Xu and Liu, 2014, Sun and Gou, 2014). Cai and et al. (2011) analysed the scale of residential land supply and industrial land supply structure in recent two decades in China. The result implied that the ratio of residential to industrial land supply increased first and the dropped back, shaping as inverted 'U' shape. The argument behind it is that the reforms on land leasing strategy, political performance evaluation system and current tax system since 2002 have changed government's supply preference, tending to oversupply industrial land with cheap price and undersupply of residential land with expensive price.

2.2 Price of Publicly Owned Industrial Land

The price of industrial land which is publicly owned has different pricing mechanisms from competitive private land market. The land price is usually between the maximum marketable value which is determined by the residual land value and minimum cost-recovery value which is decided by the acquisition cost and cost of land serving. The communities should also consider both the land subsidies to facilitate new development and other municipalities' proposal price. The industrial land price reflect both the completion and quality of land services which makes its relationship with investment more complicated.

2.2.1 Price Formation

In private land market, landowners and developers make decisions based on the maximization of their profits or utilities. Ideally, a free land market can reveal the adequate information that participants need through market mechanism. However, when the government hold the supply of industrial land, the maximum and minimum prices are determined by the political choices.

The general assumption is that municipalities always want to attract new development, even if in specific sector. According to Needham and Barrie (1992), publicly owned land price is determined mainly by three aspects: "a) the existing-use value, which means if the government acquire the land from the agricultural use then the price must higher than the present value; b) the disposing price of other local government in the region, the more footloose the sector is the more pressure to lower the price; c) the residual value of land for marketable uses." The three aspects determine the cost-recovering price, marketable price and maximum price of the public land. It explains why the industrial land price is relatively low.

There are two general reasons. One is that the local government offers lower price than that the industrial firms are willing to pay. For public land asking price, the government prefers to use cost-recovery price or prevailing price of similar neighbouring industrial plots which is usually above average incurred costs (Ploegmakers, van der Krabben, et al., 2013, Lin and Ben, 2009). The survey on Dutch municipalities reveals that only few governments try to regard selling industrial plots as a financial instrument to cross-subsidize non-marketable land use, and most of them ensure no gain and no loss. The other one is competition between jurisdictions. Game theory provides a valid explanation on cheap industrial price competition. Qin (2005) established a game theory model to analyse the city competition in industrial land in Yangzi River Delta, and found out that even through rational strategy, the Nash Equilibrium deviated from the original intention of the decision makers. The competition for investment justify the choice of lowering industrial land leasing price for each cities. Wu (2007) emphasized that cheap land price competition is individually rational, but will cause collectively irrational, insisted that local government should pay for the corresponding loss of social welfare. Zhang (2015) uses game theory to explain the mechanism of government competition under political pressure and bid for business and investment. He found out that, under the circumstances of full discretion on industrial land prices making, the government competition will fall into 'Prisoner's Dilemma'. Wang, Zong and Tao (2013) also used land price competition theory to model the industrial pricing strategy by local government. The study came to a conclusion that the local authorities take a 'race to the bottom' strategy to chase the economic goal, and though the social welfare has been weaken, no motivation for them to change the strategy, as a result, it is consistent with the phenomenon that China's industrial land price has long been at a level relatively lower than fair market value.

Needham and Barrie (1992) also used Netherland as a case to discuss the low price of publicly owned land. They claimed that public owned land does not have to be low, but good signal for money, because there is no direct reap of development gain. Also the development gains captured by the government are reflected in provision of better-quality land serving.

However, this is the case when there is no land subsidies, next part we will discuss the land subsidies and its impact on investment.

2.2.2 Land Subsidies

Though land subsidies can be provided both to land users and previous land owners from whom government acquire the land, here we focus on the land users. Most commonly, land subsidies happens when the maximum realizable land price is lower than the minimum cost of land development and acquisition so it is not financial feasibility which need land subsidies to cover the cost. Another kind of land subsidies is that the municipalities charge less than maximum realizable land price to provide an incentives for land users. This is the case in China when intergovernmental compete for mobile industrial investment. While manufacturing is more mobile than the commercial and residual sector, it is possible to charge higher land price for non-industrial land use to earn the development gains and subsidize industrial land. Needham and Barrie (1992)

argue that when the cost-recovery goal is not achieved, either government have to seek for another finance source or change the mixture of land uses or reduce the land serving cost which could be the implication of less quality. Zhang (2006) adds 'investment environment signal' to the game theory model and reckoned that lower price could have bring investment benefit, however, the too much cheap price could also release a negative 'investment environment signal', the firm will consider the local public services and infrastructure may be weakened because of land subsidies.

Additionally, a kind of subsidies is rather invisible. The local government can also provide higher level of land services than the minimum level. This can be hardly observed in land price if there is a similar price level in a region. But since the cost of land serving is higher it means the higher public investment and expenditures.

Therefore the effectiveness of land subsidies to attract investment or other specific sectors is largely dependent on the sufficient financial source to support. The next part provide some empirical evidence for the arguments above.

2.2.3 Industrial land price and industrial investment

Yan and et al. (2014) measured the degree of government competition by using ratio of negotiated land price to auction price. The formation of negotiated price is largely dependent on the local authorities, while the auction price is relatively independent. So the higher the ratio is, the more fierce competition there will be. And the findings turned out to be that the competition effect on firms' location is only significant in the middle China, while not significant in the coastal and western China. Lei and Gong used industrial land price and residential land price to measure the path of industrialization and urbanization and their impact on investment. Their discovery is very interesting, the industrial land price turned out to be less significant than non-residential land price which is the main source for the land subsidies, and the industrial land price in neighbouring cities is greatly significant. But the city-level data also shows that the effect declines as urban agglomeration and urban development level improve, the price war could even become obstacles for the industrial development in more developed regions. Other studies also try to identify the contribution industrial land price to industrial capital investment by using national penal data and econometric model, and the correlation is not very significant but still shown as nonlinear, inverted 'U' shape specifically. It means, the rising of industrial land price will be beneficial to the industrial investment to first then become a constraint for it (China Land and Mineral Legal Services Center and China Land Index Research Institute, 2014).This could imply that the quality of land serving is not as good as it implies for industrial investment. Du and Huang (2015) use the panel data from 1999-2013 to test the hypothesis of economic path: industrial land leasing – capital investment – industrialization –economic growth. Their result indicates that industrial land price and supply scale has no significant impact on capital investment and the possible explanation is that the undervalued land price has not increased the total investment but only the distribution. On the contrary, they measured regional competition through FDI per capita and asserted that competition, labour and government spending have positive effect on capital investment.

2.3 Land Leasing

As Hong says public land leasehold significantly rely on institutional arrangement. The priority of the government's objective is largely shaped by institutions (Hong and Bourassa, 2003). Land leasing process is part of the institutional arrangements. Here we discuss the private negotiation and public auction process adopted in many countries. Negotiation process is seen as an opaque way while auction is much more market-oriented. The weakness seems apparent that negotiation will exacerbate the collusion and corruption in land market due to the lack of open information and public supervision, yet it indeed has its historical and institutional rationality.

2.3.1 Auction Process and Fiscal Revenue

Land leasing instrument increases the local fiscal capacity to increase the public expenditure in many areas such Hong Kong and China mainland (Hong and Bourassa, 2003). Piles of works have been done to prove the ability of land leasing to finance local development. To increase balance the financial budget, local government can choose to lease land for commercial and residential purpose through auction through auction. Land leasing revenue and land related mortgage have been the main source of financing public infrastructure and public services (Anderson and Wassmer, 2000). Likewise, property tax and land financing functions the similar way in America which is also distinguished as a fundamental source of public expenditure and local economic growth (Adams, Dunse, et al., 2005). Choosing auction process, limit the proportion of nonindustrial land use, and thriving real estate industry aggregately benefit local fiscal revenue (Jiang, Liu, et al., 2010), which makes it possible for government to cross-subsidize low industrial land leasing price.

2.3.2 Negotiation Process and Local Development

Before the regulation that limits the negotiation power, the local governments could exploit negotiation as a strong instrument to achieve objectives shaped by Chinese institution. There are two main institutional explanations for preference on negotiation rather than auction.

Firstly, it is because of the fiscal pressure. Though commercial and residential land prices are usually higher than industrial, in a long run, the industrial firms can contribute perpetual value added tax to public finance. The study from Tao and Su (2009) find out that industrial land sale by negotiation without market mechanism in China has a significant contribution to total fiscal revenue, corporate income tax, value added tax and business tax and these impacts lag for 2 to 3 years. The premium revenue from public land sale is relatively unstable and is only earned in short term, but enough to cover the loss in industrial land development and sales. For a long period, China has comparative advantage of low- and mid-tech manufacturing. This kind of industry is characterized as location non-specificity and its products are usually tradable good which no targets at local consumers but those abroad (Tao, Lu, et al., 2009). Therefore, comparing to locational factors like accessibility to local market, it is cheap land rent and preferential policies that matters much when firms choose their location.

Consequently, land leasing through negotiation could have provided a channel that absorbed investment to enhance long-term tax base.

Secondly, apart from fiscal motivation, local officials are also motivated by political promotion. In a centralized regime, local economic development is treated as the most important indicator for officials' political performance so that localities have a political incentives to pursue a remarkable economic development. This mechanism is recognized as 'political promotion incentives' by most of the scholars (Tsui and Wang, 2004, Li and Zhou, 2005, Edin, 2003). Hence, negotiation method could also be exploited to achieve this objective. In the preliminary state of industrialization, the capital factor is relatively rare to land factor, which makes it possible for local government to provide cheap industrial land to attract business and investment. By decreasing the production cost, the mobile private investment inflow can occur to increase capital stock and finally economic growth (Lin and Jin, 2014). The negotiation process enable localities to make the price, but it also depends on the low cost of requiring rural land and convert it into urban construction land. However, after the preliminary capital accumulation, when land become gradually scarcer, the diminishing marginal returns of industrial land input will drive a preference shift from industrial land supply to commercial and residential land supply which will have higher marginal return of land input through real estate development. Additionally, the auction can capture the land value to a large degree for commercial and residential land, the premium can be used to as public expenditure to improve the investment environment, thus also contribute to stimulating investment and increasing capital stock (Lin and Jin, 2014).

The empirical study shows that the lower the local economic level is, the more inclined the negotiation method is to be adopted to attract investment; meanwhile, the higher the local economic level and larger population is, the more likely the auction method to be used. Besides fiscal pressure will also increase the quantity and proportion of auctioned land (Lin and Jin, 2014). However, others comes to the different conclusion with local economic level. Yang and Peng (2015) used more precise panel data from 2007 to 2011 which including total areas and total parcels of industrial land leasing, and proportion of negotiated industrial land leasing. They hardly found any correlation between industrial land supply, negotiated industrial land supply and lagged one year GDP. On the contrary, the spatial econometric model shows that the closer economic level the two cities are, the more fierce competition there will be and local authorities would supply more industrial land and negotiated land will account for more of the total areas and parcels.

When faced with a great deal of investment opportunity, negotiation becomes a loophole for open competition. It has become the leverage for the government so that they tailor the land leasing contracts for each industrial firms. In some area, land leasing revenue has been returned privately back to firms (Xu and Liu, 2014) which violates the land leasing regulation and create vast wasted land. Secondly, the dark process could create distrust of business firms for the local government and they will hesitate

for location or ask for unreasonable preferential and supportive policies (Xu and Liu, 2014).

The forbidden regulation that strongly limits the free discretion on land leasing through negotiation may have both short term and long term outcomes.

2.4 Industrial Location

The determinants of industrial location is relatively fixed while their impact is dynamic. The land price as a production cost will be less significant when agglomeration effect and access to market outweigh the drawback of it. However, the comparative advantages may occur in periphery regions where land price is relatively low so to provide less expensive accommodation for industrial firms and living cost. The land subsidies and other fiscal incentives provided to industrial firms is little successful in industrial location while it may draw more problematic results by wasting the public resources.

2.4.1 Land Price and Industrial Location

Land as a production factor, land prices are production cost which industrial firms care about. Just like other factor cost, the impact is mixed considering other determinants of industrial location. It is self-explained in the theory that higher factor cost will drive industry away from the local while the total cost may not the key answer but the marginal product of land. Therefore it largely depends on the different sectors.

Another force the land price could have is the relocation or also regarded as dispersion forces. Large cities though have better access to market, infrastructure, but the factor cost also proportionately increases. The high price of land and wage rate could be the pressure to push industry out to outskirts or other regions. Those firms sensitive to wage and land price but less to agglomeration benefit will not locate in metropolitan areas. This studies in China provide evidence to the argument. There is a remarkable relocation of labour-intensive and land-intensive industries from coastal area to inland for lower land and labour cost (Anderson and Wassmer, 2000). This two factors are tightly related to different types of land price. The industrial land price refers to the land cost for industries while the non-residential land prices such as commercial and residential is related to living cost for residents which drives the demand for wages high.

2.4.2 Subsidies, Incentives and Industrial Location

As land subsidies is a one of the incentives that government provide to attract industrial location, tax and other subsidies are included to discuss the common features. Generally speaking, though incentives are widely used, it is more from the point of political view rather than economic view. There is a divergence on the effectiveness of incentives, some works found negative or irrelevant impact while others confirmed the positive meanings. Business considerations like transportation cost, location of suppliers and customers, proximity to production resources matters more than incentives in a regional scale. Therefore, the limited fiscal subsidies may have limited impact on the location decision of firms (Vaughan, 1979, Eisinger, 1988). Meanwhile, others contend that

firms will choose a metropolitan or national location based on general factors while concerns with investment incentives when labour market and economic environment are relatively the same between adjacent communities (Ladd, 1994, Dewar, 1998). Consequently, there may different results when different scopes are applied.

In the global context, especially compare the effectiveness of developed countries and developing countries, the studies yielded quite different conclusion. An OECD research (1996) in East Asia found the evidence that the overall economic and institutional environment has far more significant influence on industries while tax incentive packages are obscured. Moreover, the lack of tax system cause more problems than benefit, which means not cost effective. The listed concerns by respondents include inadequate "depreciation regimes, inappropriate treatment of expense and restricted loss carryovers". In this area, studies usually focus on the Foreign Direct Investment (FDI), by using time serial data(Shah and Slemrod, 1991), cross-sectional data (Altshuler, Grubert, et al., 1998) and panel data (Wei, 2000), the overall conclusion drawn by studies is that the FDI is sensitive to its tax treatment, which might indicate that competition will be arisen in provision of incentives (Zee, Stotsky, et al., 2002).

In interregional studies/national studies like nationwide scope, most studies show a positive relations between tax incentives and investment (Wasylenko, 1999). Moreover, the findings are more positive when using the macro data than micro data. In Buss's (2001) review, the aggregate economic activities including "manufacturing employment or investment, gross state product, or other output measures" is significantly affected by tax incentives (23 of 38 studies). However, the micro data reveals less significance. One explanation on the inconsistency of the findings is that regional governments are faced with tax competition. When tax reduction happens across the state and its neighbours, the tax consideration will diminish or vanish. Papke (1995) made an empirical test in six Great Lakes states and the results showed that "the after-tax returns on investment were so close that one state could not outstand from others".

In intraregional studies, the variables related to geography are of little importance because production factors including labour, services, transportation, and markets are more similar. Therefore, within the area, the firm investment is more likely to be influenced by economic development incentives. The findings are more negative than across metropolitans. Fisher and Peter (1997) found only extremely high tax rate and low tax rate could have a significant impact on both local and regional areas. Other evidence also shows that outcome differs from city to city and from one incentive tool to another. Wassmer (1994) examined the tax incentives in Michigan cities and found that tax incentives have little effect on economic growth, nevertheless, the same research field in Michigan's Renaissance Zones confirmed a positive conclusion by producing substantial tangible results and stimulating investment and jobs in distressed areas.

The conclusion is that the overall result may be less successful considering the limit amount for the total firm cost and interregional competition that makes no difference to industrial location. Besides, the zero-sum game or even negative-sum game plus the

inefficient subsidies standard become an obstacle for efficient use of public good which in turn make the investment less interested in the local.

2.4.3 Industrial Location and Agglomeration

Agglomeration or clustering is the most studied determinant of industrial location (Anderson and Wassmer, 2000). Weber (1909) firstly suggested in his least cost approach that there were three principal factors: transportation costs, labour costs and agglomeration or deglomeration economies. As the industrial location theory develops, there arises another consensus that technological progress will mitigate the weight of transportation costs and material factors when firms face with location decision. Therefore, agglomeration is increasingly important while the other two factors is fading out. Hoover (1948) defined agglomeration at three levels: at firm-level, scale economies is achieved; at location-level, localization economies is achieved so that same industry or upstream and downstream supply chain is formed; at urban level, urbanization economies is shaped by comprehensive infrastructures, services, suppliers, skillful labour and consumers. In general, it is a concept 'firms choose to focus on certain spaces and establish external economies owing to different regional environmental characteristics' (Hoover, 1948).

Instead of explaining why there is an agglomeration and its benefit, the thesis focuses on how the agglomeration will make other factors less significant. Both the theory and empirical studies indicate that agglomeration will benefit industrial firms by knowledge spill overs, thicker labour market and proximity to other firms in their own or related sectors (Anderson and Wassmer, 2000). This happens usually in large cities where agglomeration outweigh costs of congestion, higher wages and land prices. Besides, this advantage also works for the subsidies and other fiscal incentives.

Forslid (2005) argued that, when the two regions both without agglomeration compete for investment and firms have no certain predilection, the location decision is sensitive to the tax incentives; on the contrary, when one region achieve agglomeration and the other does not, the positive effect will 'lock up' the mobility of investment, the elasticity decreases and firms are less sensitive to lower tax rate. Kind, Knarvik and Schjelderup (2000) also noticed that the countries with agglomeration have privilege to set higher tax rate than the countries without; but if no agglomeration among the competitors, the government will both lower the tax rate to increase the local welfare. Yan, He and Liu (2014) used this analytical framework to test the lower industrial land price acting as land subsidies and the influence of agglomeration. They drew a similar conclusion that, in more developed coastal cities, industrial location is more determined by agglomeration economies; and in the places agglomeration is still weak, the land price becomes the key determinant for industrial location decisions.

However, even though agglomeration has a substitute impact of labour and resource factor, the trend of decentralization is noticed by studies. The main argument is posed that since manufacturers are site-sensitive, the limited plots will cause contraction and closures (Isaac, Balchin, et al., 2000), which makes firms unwilling to pay the relatively high land rent that does not match their utilities.

2.4.4 Other Factors Influence Industrial Location

The review on industrial location theory found that the determinants almost remain

unaltered since the early contributions of 1980s while the data and modeling had higher quality to reveal the truth (Anderson and Wassmer, 2000). Apart from the factor costs and agglomeration addressed above, here are several other determinants:

Market access and international trade market access is often measured as distance or proximity to large cities or metropolitan areas while international trade is regarded as port. Firms prefer shorter distance to the ports as well as the advantages of business centers. Studies on India found that private investment prefer industrial clusters and metropolitan areas as well as the access to the coast (Lall and Chakravorty, 2005). Head and Ries (Head and Ries, 1996) conducted a research in China by econometric model and found out that FDI preferred east coastal China where export hubs locates there while fiscal incentives and infrastructure are also the significant determinants.

Infrastructure it is another determinant that widely discussed considering its connection to government policy and public decision. An investigation in Indonesia indicates that transport improvement could influence the relocation of industry especially in less developed area (2008).

2.5 Conclusion

Comparing to the ambiguous effect of economic development incentives in developed countries, China's 'land subsidies' through negotiation with industrial enterprises has been considered to play a profound role in attracting investment. One superficial answer could be that, in developed countries, tax only consists little fraction of total firm cost comparing to workers wage and transportation cost, any minor change of labour cost and transport accessibility will mitigate greatly tax reduction; however, land as an indispensable production factor can make a remarkable difference when its price fluctuates. Moreover, arguments like the total investment is relatively fixed and incentives at best attract people and investment from one place to another is fragile in China's context. As the world is experiencing a globalization trend, the multinationals target at places where lower production cost can be provided. The entry of WTO opens the door of Chinese market and foreign direct investment (FDI) flooded into China, as a result, the lower price increased the total amount of investment rather than only investment transfer.

In general, there is a consensus that China's economic growth has driven by land capitalization. On one hand, rural land is acquired with little compensation by the local government and converted into urban land. On the other hand, urban land is allocated for commercial, residential and industrial use by the empowered localities; commercial and residential land use is charged relatively high to cover the loss of industrial land development and sale as well as to support the public infrastructure. The specific path of industrialization and urbanization is proved to be efficient and effective in the setting of China's institutional background by many studies (Yan, Tao, et al., 2013, Liu, Tao, et al., 2008, Tao, Su, et al., 2010).

Nevertheless, when researches are concentrated on more micro-scale rather than macro-scale view, the effectiveness of land subsidies varies. Yan, Liu and Man (2013) prefecture-level penal data from 2004-2009 tested the price of negotiated land to GDP and concludes that the lower negotiated land price is effective in the middle area of

China but insignificant in the eastern and western areas. Lei and Gong (2014) used land sale price and the number of industrial workers to test the hypothesis in three different level of cities (cities in nation-level metropolitans, cities in region-level metropolitans and the rest of the cities in China). The result indicates that the effectiveness of lower industrial land price declines as the level of city lowers. The general reason they delineated is that:

In the more developed areas like cities in the eastern China, after the preliminary period of capital accumulation and economic development, the better production environment (legality, technology, knowledge, services and physical infrastructures) outweighs the significance of land price(Lei and Gong, 2014). Secondly, as the city's industry matures, the firms are transforming from land-sensitive and labour-intensive to technology-sensitive and capital-intensive. Besides, as land is no more a rich resource after the quick urban expansion, the cost of redevelopment and compensation of urban land is much more heavier than the requisition cost of rural land, therefore, the land competition may not available. As a result, the government may change the strategy to provide better services and policy to attract high-tech industry and high-quality workers (Yan, Tao, et al., 2013).

In the very least developed areas like the western China, their production environment is too poor to attract industrial investment even though they lower the land price. Specifically, the western area possess little portion of Chines population, so the labour market is not attractive; plus the less accessibility to China's major consumption markets and weak fiscal capability to cover the possible loss and cost of industrial land development, the lower industrial land price seems unfeasible.

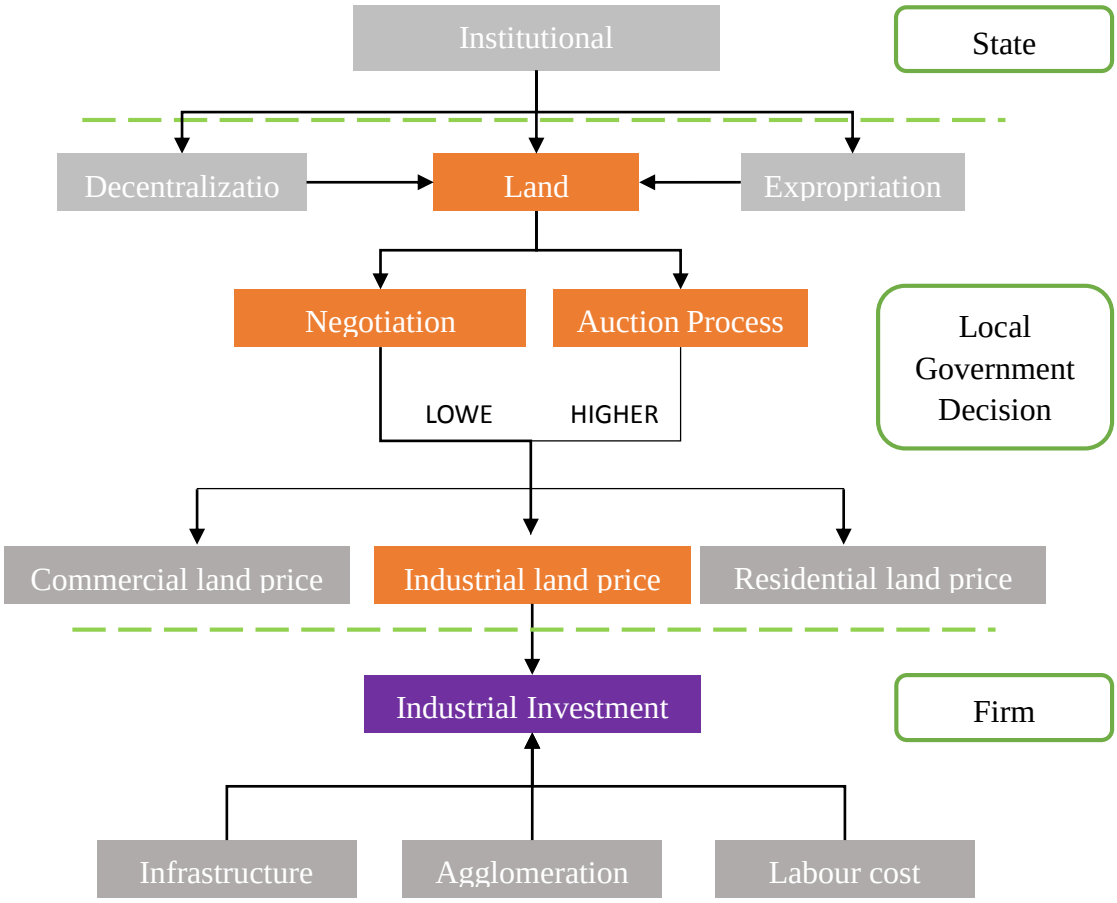
However, in the middle China where they are under a quick development period, it has great advantages over other areas to attract industrial investment by lower land price. First of all, the cities in this area have location advantage as they are closer to China's costal industrial market and further international market. Additionally, these cities have large population and educational resources which makes labour resource abundant. The preliminary capital accumulation provide proper production environment and fiscal capability to implement the 'land subsidies'. Consequently, the local government will compete

To sum up, the investment is not affected only by the absolute lower industrial land price of a city, but also by the relative price its competitors (jurisdiction with similar production environment) can offer. The urban development level including labour market, public infrastructure, industry structure, and endowment like accessibility to big markets are the fundamental variables that could determine whether the lower land price is useful. In addition, the local fiscal budget is limitation to the implementation of lower industry land price.

2.6 Conceptual framework

From the theory review, we can draw a concept framework to illustrate the main issue in our topic:

Figure 3 Conceptual Framework



Chapter 3 Operationalization

In Chapter 3, the concepts in conceptual framework are defined to limit the research scope. Based on that, abstract concepts are visualized by using concrete variables and indicators. Along with the characteristics of the variables, the research strategy and data collection method are designed to make the research objectives fall to the ground. The last part is the validity and reliability of this research proposal as well as the limitation due to both the research methodology and accessibility to data acquisition.

3.1 The Revised Research Question

What is the influence of industrial land price on industrial investment in China after the 2007 new land leasing policy?

Sub-questions:

- Was industrial land price a significant factor that influence the industrial investment? If so what's the impact on industrial investment?
- Did the influence of industrial land price differ in different east coastal, middle and western of China based on different economic development level?
- What were other factors that also determine the decision of industrial investment?

3.2 Operationalization

3.2.1 Definition of Key Concepts

Industrial investment:

The industrial investment in the thesis refers to the increase of hired workers and established firms in mining, manufacturing and energy (electrical, heating, gas and water) industries caused by investment from firms for production and expanded reproduction in a city.

The industrial locational decisions of private capital are expected to be profit-maximizing or efficiency-oriented, and directed towards leading industrial regions, coasts and metropolises, and away from socialist governments. The industrial locational decisions of private capital are expected to be profit-maximizing or efficiency-oriented, and directed towards leading industrial regions, coasts and metropolises, and away from socialist governments.

The industrial locational decision of private capital are expected to be profit-maximizing or efficient-oriented, and directed towards leasing industrial regions, coasts and metropolises, and away from socialist governments (Chakravorty, 2003)

Industrial investment demand will depend positively on the increase in output and the wage/user cost ratio. An important role is also attributed to regional efficiency, influenced by the availability of infrastructure, skilled labour and agglomeration economies (Anderson and Wassmer, 2000).

Land leasing:

Land leasing in the thesis refers to that the Chinese local governments lease the government-owned urban land for specific (industrial, commercial and residential) use for a statutory period through negotiation or auction process according to the full/partial discretion empowered by Land Administration Law of China.

Public leasehold the system allows the state to remain as the landowner and lease the development and use rights of land to private individuals (Hong and Bourassa, 2003).

Land leasing in China involves the up-front sale of long-term occupancy and development rights (Zee, Stotsky, et al., 2002).

The primary allocation of land is controlled by government entities operating within a centralized bureaucratic structure. Urban land is under the control of municipal officials. Rural land is controlled by village officials (Lichtenberg and Ding, 2009).

Land leasing price:

The lump-sum money that the Chinese local government charges the land users through negotiation or public auction process of land leasing.

3.2.2 Variables and Indicators

KEY INDEPENDENT VARIABLES

DEPENDENT VARIABLES

Table 1 Operationalization: variables and indicators

Sub-question/model	concept	variable	Indicator	Description
Was industrial land price a significant factor that influence the industrial investment? If so what's the impact on industrial investment?	industrial investment	industrial employment	The annual total number of employed workers in manufacturing, mining and energy industry over designated size	The industrial firms choose to produce and reproduce in a city by hiring more workers.
		Scale of industrial firms	Employment in industry ÷number of establishments in industry	It measures the average expansion investment decision by industrial firms
		Industrial capital investment	The change of annual investment amount in fixed asset of manufacturing, mining and energy industrial sector	The capital input into industrial sector for construction and production
	Land leasing price	price incentives	The annual average land leasing price for industrial land use	To measure the cost of the industrial firms to acquire land
			The annual average land leasing price for commercial land use	To measures the comparative land cost for commercials

			The annual average land leasing price for residential land use	To measure the pressure for employees to live in the city
			The annual average price of industrial land ÷ the annual average price of commercial & residential land	To measure the degree of incentives, the higher the ratio is, the less difference of price between different land uses
		Price competition	the annual average price of industrial land of surrounding cities	To measure the comparative attractiveness over the competitive regions. The lower the price is, the higher degree of attractiveness
What are other factors that also determine the industrial investment decision?	Agglomeration	Localization economies	Herfindahl-Hirschman Index	To measure the industrial concentration level, the higher the index, the more comparative advantages
			Number of industrial firms	The larger number of industrial firms the higher level of industrialization
		Urbanization Economies	Number of employed staff and workers	
			population	The total population in the city
			productivity	Gross regional product ÷ population Urban growth rate
	Labour	Labour cost	average salary of industrial employees	It measures the cost of labour for production
		Labour Quality	Percentage population with bachelor's degree	It measures the education level of the city
	Capital	Capital stock	Capital stock per capita: accumulated capital stock ÷ city population	It measures the capital level available for production.
	Public infrastructure	Road density	The total area of the road ÷ total areas	It measures the level of public infrastructure level

3.3 Research Strategy

Based on the research objective, research question and research operationalization, the research focus on a breath instead of depth, trying to reveal the general impact of land leasing price on industrial investment and its possible geographical differentiation in China's different regions divided according to the different level of economic development.

Firstly, the objective is to test whether the independent variable (land leasing price) is of significance for dependent variable (industrial investment) and how much it affects the decision. The number of dependent and independent variables are small and the objective is mainly to test including some explanation. From the theory review, there

are several relatively clear assertions about the correlation between dependent and independent variables. The general idea is that manufacturing industry investment could be sensitive to the average cost of land, depending on the degree of substitution of land factor compared to other industrial location factors. Secondly, since land leasing operation is local-level, in order to generalize the aggregate impact, each city will be a unit for research. Therefore the research units are large, the research domain is substantial and it needs extensive data generation. The scattered cities make it impossible to get a close look at each unit and the samples are relatively random as we do not intend to limit the context in a particular city but general context in across China. Besides, the control group and baseline is hardly selected by researchers and other variables will also determine the industrial investment.

To sum up, the research focuses on small number of variables and their causal relation between independent variable and dependent variable. Considering the little control of research situation, and lack of baseline, the research strategy will be quasi-experiment. It includes regression by using secondary data to draw the preliminary conclusion and interview by using primary data to confirm findings and provide supplementary information.

3.4 Data Collection Method

Based on my research strategy, secondary quantitative data will be utilized as data collection method.

3.4.1 Data Criteria

- CREDIBILITY: The data measuring the dependent variables (industrial investment) and key independent variables (land price) should be included as complete as possible. However, the secondary data should also be convincing and correct. Therefore, we choose China statistical yearbooks are the main sources which are published by government authorities and checked by the State Statistics Bureau. These sources are also the most accepted and used in Chinese academic researches. Also there are other sources from commercial databases (CHINA REAL ESTATE INDEX SYSTEM, CREIS) which also provide land leasing data, it can be used as a comparison to the original result.
- COMPLETENESS: ensuring to include all the observations required, if only little observations are missing then use other yearbooks containing the same indicators to fill the blank and check the logical coherence of the number. If a great deal of the observations are missing, then it should be reconsider to use other data as proxy instrument to replace the incomplete data.
- CONSISTENCY: Check the official classification and calculation method to make sure the data refers to the same meaning. If there is a mismatch, for example the price is usually the nominal price and does not consider the inflation, then it is necessary to recalculate the real price level relative to a base period. If there is a big change of classification criteria (e.g. administrative boundary) then it is

necessary to delete the changed data, either the sample or a period of time, to meet the consistency.

3.4.2 Data Collection

Based on the scope and research units, in order to draw a reliable conclusion, comparing to cross-section secondary data set, panel data is employed to generate larger observed value. Considering the available data set, the data will be city-level from 2009 to 2013.

The needed data and sources are listed below. It includes all the crucial variables and other factors which data is available.

Table 2 Collected Data and Sources

Secondary Data	
Data description	**sources**
Industrial Land Price	*China land and resources statistical yearbook 2010-2014*
Commercial Land Price	
Residential Land Price	
Population	*China city statistical yearbook 2010-2014*
Persons Employed in Various Units by Sector in Detail	
Total Land Area of Administrative region	
Gross Regional Product	
Number of Industrial Enterprises above Designated Size	
Investment in Fixed Assets	
Number and Wages of Staff and Workers	
Area of Paved Roads	
Public Finance Expenditure	
Primary Data (interviews)	
Interviewees	Numbers
Government officials	3-4
Industry enterprises	3-4
Scholars	3

3.4.3 Sampling

According to the strategic urban planning and local economic level, China is officially divided into three economic regions by National Bureau of Statistic of China. The three economic regions are eastern China, middle China and western China. The regions are classified as economic development level, which there are an identifiable heterogeneous features between the regions and homogeneous features within the regions. This can control part of the controlled variables.

The sampling method is purposive sampling to represent the population. The city samples come from the database of China Land Surveying and Planning Institute and China Urban Land Price Dynamic Monitor as major cities to represent the land price level across the country. Therefore, the sample is representative for the whole

population. And it is also limited by the accessibility of the data. The number of observations meet the requirement for panel data analysis.

Table 3 Classification of Three Economic Regions in China

Region	Eastern China	Middle China	Western China
Province	Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong and Hainan	Shanxi, Anhui, Jiangxi, Henan, Hubei, Hunan, Heilongjiang and Jilin	Neimenggu, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Shanxi, Gansu, Xizang, Qinghai, Ningxia and Xinjiang
City Samples	54	36	17

3.4.4 Data Preparation and Description

Secondary data: the secondary data are collected according to the operationalization. The selected data are: total number of worker in manufacturing industry, average wage of employed staff and workers, students enrolment of vocational secondary schools per 10 000 persons, area of city paved roads, total land area of administrative region, persons employed in various units and persons employed in 14 official sectoral categories to calculate Herfindahl-Hirschman Index and industrial land leasing price from 2009 to 2013.

$$\mathrm{HHI} = \sum_{i=1}^{N} \left(X_i/X\right)^2$$

N: the number of sectoral categories;
X: the total number of employees in N industries;
X_i: the number of employees in i industry sector
The industrial land leasing price is collected from *China land and resources statistical yearbook 2010-2014*, the rest of the data is collected from *China city statistical yearbook 2010-2014*. Besides, the price and salary are deflated based on 2009 national CPI level.

The number of industrial enterprises above designated size indicator is deleted because since 2011 it has referred as industrial enterprises which has over 20 million annual sales not 5 million annual sales before that. The industrial fixed asset investment variable at city level is also unavailable, but only total investment in fixed asset which cover large part of public investment is provided in yearbook. Therefore, the number of workers in manufacturing industry is used as the only dependent variable. The city Lasa in Xizang Province is usually removed by the researchers due to both the availability of data and specialty of its administration system. In this research, Lasa city sample is also eliminated. In the end, the included city samples are 104. The statistical scope in each city sample is districts under city referring to the administrative districts

which is consist of the main body of urban area in a city and is the core of city development. As industrial land price is the price of leased land for industrial use in districts under city, to make all the statistical scopes congruent, all the data refers to the amount or value in districts under city.

After all the adjustment of indicators, the descriptive statistics is listed in Table 4 below:

Table 4 Statistic Description of secondary data

	description	Mean	Median	Maximum	Minimum	Standard Deviation
WORKER	The total number of worker in manufacturing industry (10,000)	20.22874	9.800000	255.8800	0.140000	29.62056
INPRI	Industrial land price (yuan)	474.8054	407.0000	2363.022	42.34632	271.3146
SALARY	Average Wage of Employed Staff and Workers (yuan)	42267.88	41025.84	95029.65	14777.00	11559.35
LQUALITY	Students Enrollment of Vocational Secondary Schools Per 10 000 persons	516.2348	383.6200	2312.460	17.14000	423.9782
ROADDEN	Area of City Paved Roads / Total land area of administrative region	2.309701	1.722433	25.59538	0.039761	2.555062
EMPLOY	Persons Employed in Various Units at year end (10,000)	65.45848	31.34000	923.3000	6.790000	101.8965
HHI	Herfindahl-Hirschman Index	0.191485	0.166419	0.948176	0.076055	0.095159
COMPETITION	City Industrial land price /	0.986880	0.886759	4.460019	0.081880	0.520196

	average region industrial land price

The primary data is the interview conducted during field work period to verify the regression results and furthermore confirm the hypothesis. The interviews are made up of two Chinese professors experienced in this field, one PhD student who has worked with several related national projects and one government official who is the director in charge of one economic development zone in YC city, a city in the middle of China. Unfortunately, the industrial firms I approached to were not very much willing to take the interview2, hence the information related to industrial enterprises are disclosed by the government officials and the study by scholars.

3.5 Data Analysis Method

1. Secondary data

The research will use panel analysis. The panel data will be divided into five sets to run four models to compare the result: a) the aggregate city samples across the country;

b) The data set consist of city samples in east coastal China;

c) The data set consist of city samples in middle China;

d) The data set consist of city samples in western China.

The basic model will be $Inv_{i,t} = a_0 + Prc_{i,t} + A_{i,t} + L_{i,t} + K_{i,t} + G_{i,t} + S_{i,t}$, which: Notation i, t represent for the attribute of variables at t year in i city, and Inv, Prc, A, L, K, G, S respectively stands for the investment industrial, land leasing price, agglomeration, labour, capital, public infrastructure and spatial differences.

To test the spatial differences, the model will be divided into three sub-models, using only panel data in each region:

$$Inv_{i,t} = a_0 + Prc_{i,t} + A_{i,t} + L_{i,t} + K_{i,t} + G_{i,t}$$

Which i is the city in each region and others remain the same meaning as in the basic model.

As independent variables and dependent variables are ratio scales and data is panel data, fixed effect model and random effect model will be used and tested.

2. Primary data

The interviews are recorded, transcribed, coded and summarized along with the findings of secondary quantitative analysis. Then compare the opinions, facts and findings extracted from the interviews to the regression results and provide more solid information to explain the result.

[2] The investment decisions are usually made by the senior team of enterprises not only based on the cost-benefit analysis but also on the personal judgement, therefore, it is less possible for me student to successfully contact them to take the interview.

3.6 Validity and Reliability

The most important limitation of the research is the possible missing important factors which influence the industrial investment correlate to land price. This will create endogenous problems, in another word, the land price is not totally independent but also determined by the equation. This will weaken the robustness of the result. The solutions are several: a) to use Hausman test to examine the random effect and fixed effect, if the test does not reject fixed effect, then it means the explanatory variables have correlation with city-specific fixed effects b) to use lagged land price to reduce the problem, as the land price in t year is relatively related to the land price in last several years, but the lagged land price will less influenced by the future industrial investment; c) to use instrument variables which are closely related to land price but rarely to industrial investment, thusly, to other explanatory factors; d) to put land price in the left side of equation, means exogenous variables, and use rest of the variables as explanatory variables to test the correlation.

Another limitation is that the model only measures the linear impact of land price, it may not precisely depict the relationship. One solution may be that, use not only linear equation but adding quadratic term to test the possible influence and see whether the land price impact will change the direction. But after all, there is a theoretical assertion of the land price impact, so we are trying to test instead of explore the impact.

Apart from these two model issue, the data also have constraints. Because that there are two different land leasing process (private one-to-one negotiation with firms or public auction), there should be different price type formed by the two process. However, the data is not available so that we cannot measure how different types of land leasing process can influence the industrial investment. This limitation cannot be solved unless the research goes deep enough to a single case to find out the price in each deal. Since the concentration is breadth instead of depth and considering the time limit the research will leave this part as future study.

Chapter 4: Research Findings

In this chapters, firstly, the empirical regression model is built, then the research results and findings are addressed in three main parts to answer the three sub-questions: 1.What is the general impact of industrial land leasing price on industrial price? 2. Test the three hypothesis to answer whether there is a differentiation between Eastern, Middle and Western China; 3. What are other variables based on the location theories also influence the industrial investment in China.

4.1 The Empirical Model

4.1.1 Building up the Models

The industrial investment could be interpreted as setting up new enterprises or expanding scale of existing production by hiring more workers and constructing new plants (Lei and Gong, 2014). Therefore, the model uses total number of manufacturing workers in a city to measure the aggregate industry scale and local industrial development level. As the lag effect of land price is considered in the model, the industrial land price and lag-one-period industrial land price are adopted. Considering the observation numbers, here we only use industrial land price over the same period of dependent variable and lag-one period data.

Price competition is the variable that measures the competiveness of the industrial price comparing to other competing cities in the same region. In reality, the industrial investment decision is a top-down process. They will conduct a comprehensive analysis considering land price, labour cost, industrial structure, transport system, subsidies policies and so on, then narrow it down to the certain region, certain province and the specific city location (Lei and Gong, 2014). The last choice usually occurs among several target cities in the same region which have similar economic development level, salary, transport system and policies. Land leasing price could play an important role in affecting the firms' choices while others factors are similar. Therefore, the industrial investment may not be determined by the absolute price level, but also by the price level relative to the price in the competing cities in the same geographical region. The lower the relative industrial price in a city, the more likely it is to win the investment in the region. Price competition variable is defined as the absolute industrial price in a city divided by the average industrial land price of the region in which the city is.

Other controlled variables are involved in the model, including salary (*Salary*), education level (*Lquality*), employment size (*Employ*), road density (*Roadden*) and Herfindahl-Hirschman Index (*HHI*) to respectively reflect the labour cost, human capital, infrastructure, urbanization economies and localization economies both of which are variables for agglomeration indicator. HHI is an index that measures the industry agglomeration, the higher the HHI of a city the more specialized the city is in several industries other than diversification. Besides, it is likely that the increase of investment may also in turn increases the salary, education, employment. To avoid the feedback loops problem, the model uses the lag one year data of these variables to the

worker variable. And by testing several other way of building models, it is the best to match the observation and explain the theories.

Based on the analysis and previous empirical studies, the basic model is adjusted to be the following two equations:

$$Worker_{i,t} = \beta_0 + InPrc_{i,t} + InPrc_{i,t-1} + Salary_{i,t-1} + Lquality_{i,t-1} + Employ_{i,t-1} + HHI_{i,t} + Roadden_{i,t} + u_{i,t}$$

$$Worker_{i,t} = \alpha_0 + Competition_{i,t} + Competition_{i,t-1_{i,t}} + Salary_{i,t-1} + Lquality_{i,t-1} + Employ_{i,t-1} + HHI_{i,t} + Roadden_{i,t} + u_{i,t}$$

$$u_{i,t} = v_i + \varphi_t + e_{i,t}$$

In which:

i and t refers to the variable in i city and t year, t-1 means variable lag one year from t. Here v_i denotes unobserved factors that influences the number of industrial workers in city I over the entire period, φ_t denotes unobserved factors influencing all cities in year t, and $e_{i,t}$ is a white noise error. The Hausman tests reject the hypothesis that there is no correlations between unobservable city-specific and period-specific factors v_i and φ_t and independent variables in the equation. Thusly, the equations use time-specific and city-specific fixed effects.

4.1.2 Tests for the regression model

The regression is run by Eviews 8.0, and all the tests are done by build-in function of Eviews 8.0.

(1) R-squared Statistic

The R-squared and Adjusted R-squared are employed to depict the success of regression in explaining the dependent variable. The statistic values in Table 5 are all around 0.9, close to 1, illustrating that the model can explain most fraction of dependent variable.

Table 5 R-squared Statistics of all Models

	National level		**East China**		**Middle China**		**West China**	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
R-squared	0.92	0.92	0.95	0.95	0.94	0.94	0.95	0.92
Adjusted R-squared	0.89	0.90	0.93	0.92	0.91	0.91	0.89	0.84

(2) F-statistic

The F-statistic is used to test significance of the whole equation. The null hypothesis is that all the slopes of explanatory variables are zero. We can learn from the table below

(see Table 6) that the F-statistic and p-value (Probability of F-statistic) reject the null and that estimated equations are highly significant.

Table 6 Joint tests of all Models

	National level		**East China**		**Middle China**		**West China**	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
F-statistic	30.74	31.27	45.29	41.99	33.40	32.05	16.38	11.11
Prob(F-statistic)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

(3) Autocorrelation Test

Durbin-Watson (DW) statistic is represented (see Table 7) to test the serial correlation. It falls between 0 and 4. If there is no correlation, the DW statistic will be around 2.

Table 7 Durbin-Watson statistics of all models

	National level		**East China**		**Middle China**		**West China**	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
DW statistic	1.45	1.45	2.01	2.00	1.52	1.50	1.40	1.35

(4) Correlated Random Effects Testing

To compare the fixed and random effects estimates of coefficients, the Hausman test is employed to test the assumption that the random effects are not correlated with independent variables (Hausman, 1978).

The Hausman test rejected the random effects (see Table 8), so the fixed effects model is chosen, which means each city and each year has its own characteristics affecting the industrial investment that beyond the model.

Table 8 Hausman Tests of All Models

	National level		**East China**		**Middle China**		**West China**	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Chi-Sq. Statistic	71.48	91.25	86.82	105.43	88.67	80.78	27.52	82.48
Prob.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0000

(5) Fixed Effects Testing

The Redundant fixed effects tests – likelihood ratio shows the joint significance of the fixed effects estimates. The table below displays the results of the test: the first set including two cross-section statistic test make a null that the cross-section effects are redundant; the next set of two tests (Period F and Period Chi-square) evaluate the joint significance of period dummies to see whether there is only cross-section effects; and the last two (Cross-Section/Period F and Cross-Section Chi-square) test all the fixed effects to see whether there is one single intercept only. The statistic values strongly reject the null, which means the fixed effects model is suitable.

Table 9 Redundant Fixed Effects tests of All Models

	National level		**East China**		**Middle China**		**West China**	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Cross-section F	11.55 (0.00)	11.97 (0.00)	16.14 (0.00)	13.65 (0.00)	15.01 (0.00)	13.27 (0.00)	13.64 (0.00)	18.29 (0.00)
Cross-section Chi-square	652.76 (0.00)	664.36 (0.00)	383.56 (0.00)	355.37 (0.00)	299.74 (0.00)	283.24 (0.00)	89.90 (0.00)	100.94 (0.00)
Period F	10.08 (0.00)	9.78 (0.00)	7.70 (0.00)	5.51 (0.00)	2.46 (0.06)	1.89 (0.13)	2.96 (0.05)	6.48 (0.00)
Period Chi-square	40.04 (0.00)	38.90 (0.00)	30.76 (0.00)	22.47 (0.00)	10.50 (0.01)	8.15 (0.04)	15.44 (0.00)	28.54 (0.00)
Cross-Section/Period F	11.89 (0.00)	12.42 (0.00)	16.53 (0.00)	14.24 (0.00)	15.37 (0.00)	13.99 (0.00)	11.11 (0.00)	15.25 (0.00)
Cross-Section/Period Chi-square	671.47 (0.00)	685.71 (0.00)	397.74 (0.00)	372.23 (0.00)	312.82 (0.00)	299.97 (0.00)	91.23 (0.00)	103.23 (0.00)

4.2 The Impact of Industrial Land Leasing Price on Industrial Investment in China

From the estimate coefficients of four land leasing price variables in 8 models (see Table 10), along with the results of the interviews, it is generally confirmed that the land leasing price has a significant influence on China's industrial investment, yet the direction and degree of the impacts cannot be generalized as a single one. Additionally, comparing the two indicators, the price competition (relative price) has a more consistent and significant impact than absolute land leasing price level.

Table 10 Estimate Coefficients of 4 Selected Land Leasing Price Variables

	National level	*East China*	*Middle China*	*West China*
	Model1/ Model2	Model3/ Model4	Model5/ Model6	Model7/ Model8

Industrial land price	0.063824***	0.173299***	-0.002048	-0.496212**
	(4.78)	(7.97)	(-0.44)	(-2.60)
Lag industrial land price	0.002765	-0.001994	0.012381**	-0.029871
	(0.64)	(-0.37)	(2.23)	(-1.20)
Price competition	23.54259***	31.72843**	-1.582238	-158.2794**
	(3.46)	(1.88)	(-0.63)	(-1.96)
Lag price competition	24.2226***	58.13161***	-1.903999	-296.4154***
	(3.46)	(3.20)	(-0.75)	(-3.42)

***Denotes significantly different from zero at a 1 percent significance level.

*** Denotes significantly different from zero at a 5 percent significance level.

* Denotes significantly different from zero at a 10 percent significance level.

Asymptotic standard errors in parentheses.

To test the reliability of the model, the variables that are not statistically significant (high p-value) are removed, and regression has been done again. The results shows that there is no much difference in other variables, the sign of the coefficients are consistent, and little change in the p-value. Here, only the results of key variables are displayed below, and the complete results are shown in the Annex 11-17. The results also increases the certainty of the regression model.

Table 11 Estimate Coefficients of 4 Selected Land Leasing Price Variables after the remove of insignificant variables

	National level	*East China*	*Middle China*	*West China*
	Model1/ Model2	Model3/ Model4	Model5/ Model6	Model7/ Model8
Industrial land price	0.066641***	0.019638***		-0.511944***
	(5.16)	(3.35)		(-3.08)
Lag industrial land price			0.017747***	
			(4.36)	
Price competition	20.07253***	15.60584		-161.4048**
	(2.20)	(0.62)		(-2.06)
Lag price competition	24.79330***	64.68568***		-320.5151***
	(2.66)	(2.51)		(-4.73)

In the national models (Model 1 and Model 2), the land leasing price and price competition variables are significant at 1% significance level and but only the later one are still significant when using the lagged data. Both their coefficients are positive, which reveals the information that the increasing land leasing price played a positive role in enlarging industrial employment while relatively lower land price in a city than the neighbouring cities played an inversely negative role. Furthermore, while other factors remain the same, when the industrial land price of a city increases by one Chinese Yuan, the manufacturing workers in the city will increase by 638 in the same year. Meanwhile, while other factors stay unchanged, if the ratio of the industrial land price of a city to the average price of its neighbouring cities decrease by 1 percentage point, the manufacturing workers will decrease by 2354 in the same year.

But while more samples are selected from eastern area, the finding may not representative for the average level across the country, but more for situations in the eastern China.

4.2.1 The Significant Impact of Land Leasing Price

The results can match the theories on land leasing issues. In theory, the land rent level reflects the profits each involved interest parties can obtain (Hu, 2008). Relating it to public owned land, it is about profit distribution between the government and investors. As land leasing can be used as an instrument to capture land value, as the case in Hong Kong, it is also treated as an instrument to trade the land rent benefit for private investment and further local development. As a result, the function of the price on investment incentives is through government's operation in land leasing system. According to the response from scholars of interviewees, "Under the specific Chinese political and economic system, land leasing at prefectural level, though is limited by the local endowment (i.e. local development level, economic scale, industrial base and so on), is primarily influenced or even decided by the local government leaders." Before the deal, there is a series of procedures[3] to well inform the government officials of the quality and size of potential investment. After that, the government can make a choice whether to preserve the parcel for better investment opportunities or close the deal now and which kind of way (private negotiation, auction, tendering or quotation) to use. Unlike the prevailing using nearly cost-recovery price for public land asking price (Ploegmakers, van der Krabben, et al., 2013), Chinese government even provided informal "land subsidies" as an investment incentive and the industrial land price , at one time, went extremely low beyond control under the pressure of government competition (Tao, Liub, et al., , Wang, Zong, et al., 2013, YAN, HE, et al., 2014). In another words, the impact of the land price largely results from the land leasing arrangement of the local government.

4.2.2 The Comparison of Two Indicators: Absolute Price and Relative Price

Given the understanding of importance of governments' role in land price decision to attract investment, the finding that price competition rather than absolute land price is more influential can be well explained.

The previous researches found out that, in Netherlands, the municipalities prefer similar land prices for industrial use to other municipalities around (Ploegmakers, van der Krabben, et al., 2013), and even fruitful findings have been yield in China's situation that there has been a fierce and vicious government competition leading to larger leasing areas, lower prices and poorer investment quality (Yang, Zhuo, et al., 2014).

[3] Usually, the procedures are as followed: 1) the announcement of land use right transfer (including the requirement for land planning and investment qualifications); 2) investors submit application documents including industry, technology, products, size, and intensity and so on; 3) multiple government sectors have meetings to discuss the vestments projects; 4) approval of Foreign Trade and Economic Bureau or Municipal Investment Promotion and Cooperation Bureau; 5) registration with Trade and Industry Bureau 6) open account with Internal Revenue Service (IRS), Local Tax Bureau and bank; 6) capital preparation and verification; 7) prepay the margin 7)land leasing process (negotiation or BAQ); 8)the further discussion on land leasing contract including (refund of land leasing payment agreement); 9) investment and construction of factories.

Among the three, the lower prices and poorer investment quality come from the land leasing processes — private negotiation process (Kong, 1993, Liu, 2010). The stronger local fiscal strength, higher development level, and more potential investment opportunities, the lower absolute negotiated price it tended to be (Xue, 2011).

However, with the issuance of 2007 new land leasing policy, it regulated the minimum industrial land price standard based on the land development cost and the location of the land,[4] and forbade the municipalities leasing industrial land at the price lower than the standard minimum price. It means, by law, the government could not break the price floor and all they can offer is the standard minimum price set by the national government[5], yet not all the parcels were sold within this legal framework. Moreover, the land leasing process regulation has also been altered towards more public methods to avoid ridiculous low price. Yet not all the parcels were leased out under the legal framework. On one hand, when the 'official price' is limited by the law and watched by the higher-level government, the municipalities go into the underground to refund part of the land leasing payment to the land users. On the other hand, while negotiation process can be operated under very strict conditions[6], the manipulation of the public land leasing process has occurred frequently by setting up complicated and strict standard for bidding in order to make sure their adorable candidate can win in the end.

Box 1 The Cases reported by the government and media[7]:

In 2014 June, PD, a county in YQ city, Shanxi province, was exposed by Audit Department of Shanxi Province that it has illegally leased 3 parcels for industrial use. PD government created industrial incentives by discount of land leasing payment and refund, which caused 47.26 million Yuan loss for the 3 parcels.
In 2012, July, WZ, a city in ZJ province and Eastern China, announced a land leasing quotation for a parcel with listed price of 830 million Yuan and total area of 150 mu. However, in the announcement, there is a strict condition: the controlling shareholders and its associated parties should be in the position of 2012 Fortune 500, and have already completed construction of large urban complex project over 200,000 square meters. Among all the registered bidding companies, only one company HR qualifies for that. And there was no doubt in the end, the company HR

[4] In order to strengthen the control and management of land for industrial use, and promote the use of land in an economical and intensive way, based on the land grading, regional land use policies and so on, the Ministry of Land and Resources (MLR) has made these uniform National Standards for the Minimum Transfer Prices of Land for Industrial Purposes. These Standards shall be the minimum control standards that must be executed by the people's government of the municipalities and counties in transferring the land for industrial use and determining the transfer prices of land use rights.

[5] *Notice on the Issuance and Implementation of the National Standards for the Minimum Transfer Prices of Land for Industrial Purposes:* "The land for industrial use must be transferred in the manner of bidding, auction or quotation, and neither the floor price nor the settlement price of transfer shall be lower than the minimum transfer price corresponding to the land grade (for details, see Annex II) at the place where the land is located."

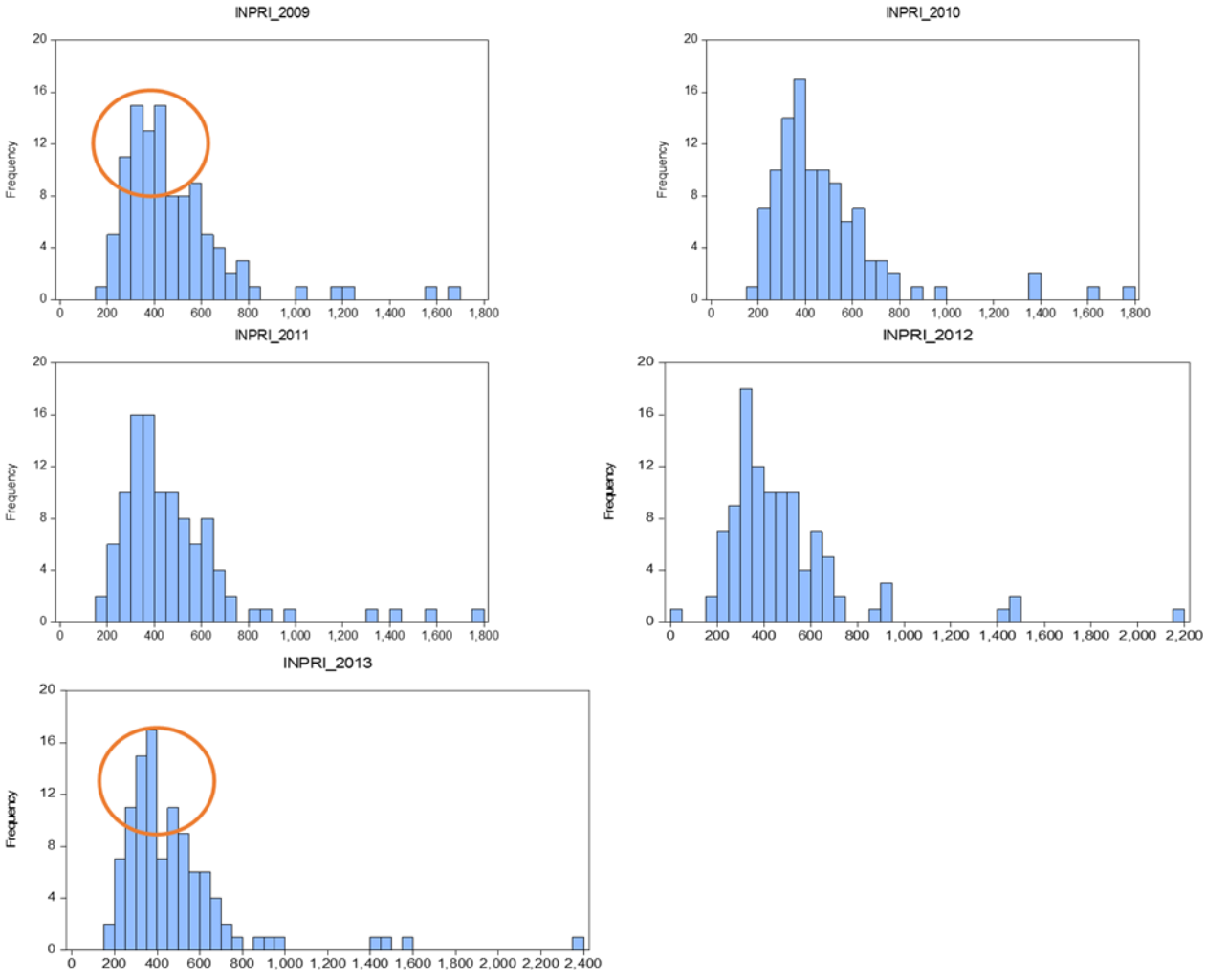
[6] (1) relocation of industrial firms due to the old town redevelopment, and consistent with the supportive industrial policies; (2) land used for mining, quarrying, and salt pan

[7] Audit Department of Shanxi Province: http://www.sxsj.gov.cn/news/world/2015-07-14/623.html
House China: http://house.china.com.cn/apple/fullview_658126.htm

get the parcel in the end. This kind of case also happened in other cities across the country.

Though there is a limitation of the implementing the 2007 new land leasing policy, there is still a trend that industrial land price is generally and gradually back and above the minimum price standard. The distribution chart below (see Chart 4) illustrates the changing path of industrial land prices in 104 cities from 2009 to 2013, and we can see that there is little change of the mode and the most price level fall between 200 Yuan and 800 Yuan. The evident change is that the price level is more convergent while the upper bond went higher from around 1800 Yuan to 2400 Yuan. This implies that absolute land price range especially the lowest bound has been limited, which weakened effect of absolute land price as land cost on attracting investment. On the contrary, price competition (relative price level) depicts the competition degree and its impact among municipalities, and as mentioned at the beginning, to some extent, the investment level is the reflection of the local government's active participation and subjective decision, therefore, it is more influential in the investors' activities.

Figure 4 the Distribution of Industrial Land Prices in 104 Chinese Cities From 2009 to 2013



4.2.3 The Positive Impact of Increasing Absolute Land Price

The interesting result from the regression is that the two coefficient signs of land leasing price variable are positive. It means not the relatively low industrial land price contributes to increase of industrial investment but the higher price level.

There are three explanations supported by theories and interviews:

Firstly, it proves the argument that, the price of publicly owned land does not have to be low, conversely, the development gains captured by the government could provide proportionate land serving (Needham and Barrie, 1992). In order to attract investment, the municipalities have no intention to reap extra development gains from investors, plus the price floor is limited based on the development cost and land grading estimation, hence the higher industrial price indicates better land location, quality and land servings which could yield more productivity. The interviews with a government official and an intended investor also responded similarly. "It is true that industrial land price is a very important and large part of the investment cost, but enterprises will choose the place where they will have promising comprehensive benefit in the future even the price is higher" said the government official and "the cheaper land does look appealing for us because of the nature of capital, but I will definitely not choose place where the facilities on land is inferior even the land price is extremely low" said the investor when asked about the investment decision in eastern areas rather than in the middle or the west.

Secondly, since 2007 land leasing law has been issued, the driving forces of the rising land price has included gradual changing land leasing processes from private negotiation to more public and market-oriented processes (tendering, auction and quotation). The more transparent and regulated processes improved the investment environment which in turn reduce the investment risk for investors. From the table shown below (see Table 12), in 2006, the proportion of leased industrial land through negotiation is around 96%, this number dropped down remarkably to 60% in 2007 and approximately 20% in 2008. The theoretical proof is that the private one-to-one negotiation process often hide a lot of transaction information from the recorded prices and often related to illegal transactions (Liang and Han, 2011). It created negative signal of investment environment and create distrust from investors (Xu and Liu, 2014).

Table 12 2006-2011 Percentage of Land Leasing Parcels and Area for Industrial Use through Negotiation Process

	2006	*2007*	*2008*	*2009*	*2010*	*2011*
Percentage of leased parcels through negotiation process	0.963	0.611	0.237	0.201	0.160	0.115
Percentage of leased area through negotiation process	0.968	0.587	0.192	0.152	0.106	0.079

Besides, the interviews disclose more complementary information to support the opinion. The new land leasing policy made it clear that, the negotiation process should and can be adopted only on the circumstances that there is one and only one potential users for a parcel.[8] On one hand, if more time-consuming and complexed auction process is adopted, it implies that the governments are aware of the existence of several active potential users or almost sure that their most wanted users will win the auction in the end. On the other hand, if the negotiation is chosen, the investors interpret it as that the local government could only find single one truly intended investor, and the application for using the parcel is accepted by the government even though it has an alternative option to postpone the land leasing process. Namely, the more leased land through negotiation means worse industrial investment quality (low technology, primitive equipment and unpromising industries), so, for investors who are looking for investment in upstream or downstream industries, they prefer where land market is better developed.

Thirdly, the enlarged size of industrial employment can not only be interpreted as increase of new investment (number), but also as more intensive investment (volume). According to the interviews and national government industrial policies, industrial land price should work as a leverage to 'crowd out' industries which require large spaces and are land-sensitive, and to upgrade the local industries for intensive land use especially in cities in the east where land scarcity has becomes a problem. But its function is more the relocation and distribution of industrial investment, the impact will be discussed in comparison of China's three different economic regions. Another opinion is that, when the land price is much lower than the market value (the price investors are willing to pay), it dampens their motivation to use land intensively (Wan, 2016; Xu, Liu, 2014). Problems are observed, for example, some enterprises occupied large amount of land and constructed little densified factories and other illegal development zones with remote location and bleak investment environment failed to bring in creditworthy and strong investment and did not last long.

4.2.4 The Impact of Price Competition

The regression result draws a conclusion that the price competition plays a negative role in industrial investment as the coefficients of the indicator are both positive. The previous studies have already shed some light on it, that is, in the preliminary stage of industrialization, the price competition could be efficient for low-end manufacturing, but as urbanization deepens, the upgrading industries demand more skills, knowledge, technology and agglomeration and when the spaces are increasingly unavailable, the very much cheap price impede the efficient resources allocation through in a more market-oriented way (Lei and Gong, 2014).

Another angle to look at it is the motivation of local government. When the local government still use land price as an informal incentives to achieve their goal, it

[8] According to *Rules on the Assignment of the State-owned Land Use Right by Means of Bid Tendering, Auction and Quotation (for Trial Implementation)* and *Rules on the Agreement-based Assignment of State-owned Land use Right (For Trial Implementation)* issued by Ministry of Land & Resources

intimates that they continue to keep the outdated inefficient land leasing arrangement. The counterpart who has higher land prices (related to biding, auction and quotation) is "initiative to incubate industrial market with comparative advantages and high agglomeration", said a local government officials of the eastern China. An example in Fujian Province, helps to understand the contribution of relative higher land price. Fujian emphasized the "industry plan first, then attract investment" and made a regulation that "if the new investment is less than five million Yuan or its demand for land is less than 0.65 hectare, the individual land use examination and approval is not permitted." As public land leasing processes need more complicated and time-consuming preparation, to prevent loss of investment, the local government has to make comprehensive land supply planning to nurture the competitive market.

4.3 The Differentiation in Three Economic Region: Eastern, Middle and Western China

4.3.1 Hypothesis 1: in Eastern China, the rising industrial land price will positively influence the industrial investment because of the higher economic development.

The hypothesis 1 is proved through model 3 and model 4 (See Table 13) to be right and supported by the qualitative interview results. The land leasing price variables have similar mechanism with national level data yet the coefficients are even larger which means the more considerable effects than the national level.

Table 13 Regression Result of Eastern China

		Model 3	Model 4
indicator	variable	Using absolute price level	Using price competition
Land leasing price	industrial land price	0.173299***	
		(7.97)	
	lag industrial land price	-0.001994	
		(-0.37)	
	Price competition		31.72843**
			(1.88)
	Lag price competition		58.13161***
			(3.20)
Labour	salary	0.0000568	0.00000547
		(0.39)	(0.04)
	education	0.008041*	0.008738*
		(1.80)	(1.89)
Urbanization economies	employment	0.000298	-0.000956

		(0.01)	(-0.05)
Localization economies	HHI	-53.07244***	-53.91854***
		(-2.47)	(-2.43)
public infrastructure	road density	0.895544	0.661954
		(0.85)	(0.61)
R-squared		0.951338	0.947717
Adjusted R-squared		0.930332	0.925149

***Denotes significantly different from zero at a 1 percent significance level.

*** Denotes significantly different from zero at a 5 percent significance level.

* Denotes significantly different from zero at a 10 percent significance level.

Asymptotic standard errors in parentheses.

The Eastern China is the most and earliest developed area in China, correspondingly, t has the highest average industrial price level and GDP per capita (See Table 14). By taking full advantage of geography and policies, it has experienced rapid industrialization and urbanization (Gao, 2002). By 2010, the industrial land has occupied 26% of total area of urban built-up land, in some eastern cities where manufacturing is fully developed, the percentage could reach up over 40% (NDRC cities and small towns Reform and Development Centre research group, 2014). In these developed areas, there is a transformation from manufacturing industries to service business and agglomeration of service lines outweigh its benefit of industrial production (Li, Liu, et al., 2014). The high density of population in urbanized area improve the frequency of meeting and communication such as employees, entrepreneurs and bankers, which can boost innovation and productivity (Black and Henderson, 1999, Lucas Jr, 1993, Rosenthal and Strange, 2003). The high costs of production and limited space push out industries from core to periphery, from metropolitan to middle-size and small-size cities which have comparative advantages. The agglomeration indicator (HHI) also shows that there exist a crow-out effect for industries as there are less and less spaces that can accommodate the investment demand.

Table 14 2009-2013 Average Industrial Land Price and GDP Per Capita Level in Three Economic Regions

	Industrial land price	GDP per capita
Eastern China	554.8	76127.87
Middle China	377.8	61117.64
Western China	488.1	47931.47

On one hand, to satisfy industries' demand for production, local government converted a great amount of rural land which caused inefficient land use. Now the deposited industrial land and rural land available for industrial use is becoming increasingly scarce, which forces the local government to initiatively drive the price back to market value so to let market mechanism allocate the scarce land resources publicly and

efficiently. On the other hand, the land capitalization process increased the land value and fiscal income, so in return the local government has the ability to enhance local investment environment and carrying capacity, and facilities. The urgent demand in this area for the local government is to actively deepen the implementation of 2007 new land leasing policy and replace the low-end industries with high value-added industries in order to squeeze more spaces for development (Wang and Hui, 2015). The price competition, that is, purposely dampening the increasing trend of industrial land price (either by private negotiation or manipulation in public leasing process) will definitely hurt the health of industrial upgrading.

Box 2 following case[9] in Eastern China can illustrate the discussion above:

DX village is a village of TZ city, located in Southeast of Zhejiang Province (Eastern China), and it has strategic importance for industrial development in TZ city. The gross output value of industry in 2012 is 30 billion Yuan, and fiscal contribution is one billion Yuan. However, as the market demand for industrial land is more than 1000 mu[10], the incremental construction land quota is less than 100 mu for the next year and only 20% of it is for industrial use. The short supply of land drives land price from 1.6 million Yuan per mu to 3 million Yuan per mu.

LBX Pump Manufacturing Co., Ltd is one the industrial enterprises desperately need expansion of production. In the past, it occupied 1000 m2 land and owned a two-floor factory with insufficient space for storage of raw materials and semi-manufactures. The production processes is not mechanized and most of them are operated by workers. Therefore, the productivity decreases as less and less space for workers. As the land price is much higher than before but still unavailable, it is forced to densify, bring in high-tech machines and progressive processes, and integrate upstream and downstream services to adapt to new situation.

After the upgrading and expansion, the LBX build a 5-floor factory to replace the old factory building. Besides it renewed its equipment and machines, integrated research and development sector and marketing sector together to achieve the internal scale economies. As a result, its output value increased from 8 million Yuan to more than 10 million and the employees inclined from 100 to 150.

4.3.2 Hypothesis 2: in Middle China, the lower industrial land price relative to the eastern China will significantly increase industrial investment

The regression model 5 and model 6 (See Table 15) does not test the hypothesis 2 directly, therefore, interviews and other statistical analysis are adopted. The findings confirmed the hypothesis and even reveal the existence of price competition. However, the regression model also yields a similar conclusion to the theories that, as price

[9] Source: http://www.ccud.org.cn/2014-01-17/113833435.html, reported by NDRC cities and small towns Reform and Development Centre research group.

[10] Area Unit: 1 mu = 666.67 m²

competition is more of a zero-sum or negative-sum game ((Peters and Fisher, 2004)), the price consideration among the region will declined or be neutralized.

Table 15 the regression result of Middle China

		model5	model6
indicator	variable	Using absolute price level	Using price competition
Land leasing price	industrial land price	-0.002048	
		(-0.44)	
	lag industrial land price	0.012381**	
		(2.23)	
	Price competition		-1.582238
			(-0.63)
	Lag price competition		-1.903999
			(-0.75)
Labour	salary	-0.000105**	-0.000100**
		(-2.10)	(-1.93)
	education	-0.001433	-0.001581
		(-1.46)	(-1.57)
Urbanization economies	employment	0.023194	0.050351***
		(1.23)	(3.53)
Localization economies	HHI	29.75672**	30.31192**
		(2.18)	(2.17)
public infrastructure	road density	0.472211*	0.356949
		(1.76)	(1.31)
R-squared		0.938745	0.936314
Adjusted R-squared		0.910646	0.907100

***Denotes significantly different from zero at a 1 percent significance level.

*** Denotes significantly different from zero at a 5 percent significance level.

* Denotes significantly different from zero at a 10 percent significance level.

Asymptotic standard errors in parentheses.

During the interview, three interviewees have agreed with the statement that Middle China had faced with a good opportunity of investment flow from Coastal area to the inland.

Box 3 Report about Economic Development of Middle China

The statistics (Chen, X., 2015) shows that:

The six provinces in Middle China (Hebei, Shanxi, Hubei, Anhui, Hunan, and

Jiangxi) has witnessed an increase of Funds From Outside Provinces from 1,200 billion Yuan in 2009 to 3,320 billion Yuan in 2013, with compound growth rate 22.5%. Particularly, the 60% of the Funds From Outside Provinces comes from the developed eastern areas.
Since 2004 Eastern China reached the highest proportion of national gross industrial added value (60.36%), the figure has continued to drop, from 55.05% in 2009 to 50.20% in 2013.

The interviewed scholars, government officials as well as the industrial enterprise consented that the high land cost caused by progressive land regulations and land scarcity had shifted the investment preferences. However, though the lower land price is the comparative advantage over the coastal east, the regression result shows that, the negative coefficient of industrial land price (-0.002) is small and not significant even at 10% significance level. On the contrary, the positive coefficient of lagged industrial land price (0.01) is significant at 5%. This means after firms targeting at Middle China region, when they narrow it down to the particular city, land cost is not the most important determinant, rather they prefer higher facilities and infrastructures even this means higher land prices. For instance, development zones are traditional and mostly used way to accommodate new industries, nevertheless, the cheap land in the newly developed zones is acquired at the sacrifice of good location. Consequently, the cheap parcels are miles away from major city centre, the poor living and business environment cannot compensated by the less land cost.

Besides, As Middle China is a very broad concept, in reality, the relocation often happened in cities which are closer to coastal cities and which have better city endowments. In Middle China, cities which are settled along the Yangtze River are more welcome because of the cheap and convenient transportation and better accessibility to sufficient water supply, especially Anhui or Jiangxi where their location is near the eastern area so they have similar local culture (Chang, Jiang, et al., 2013).

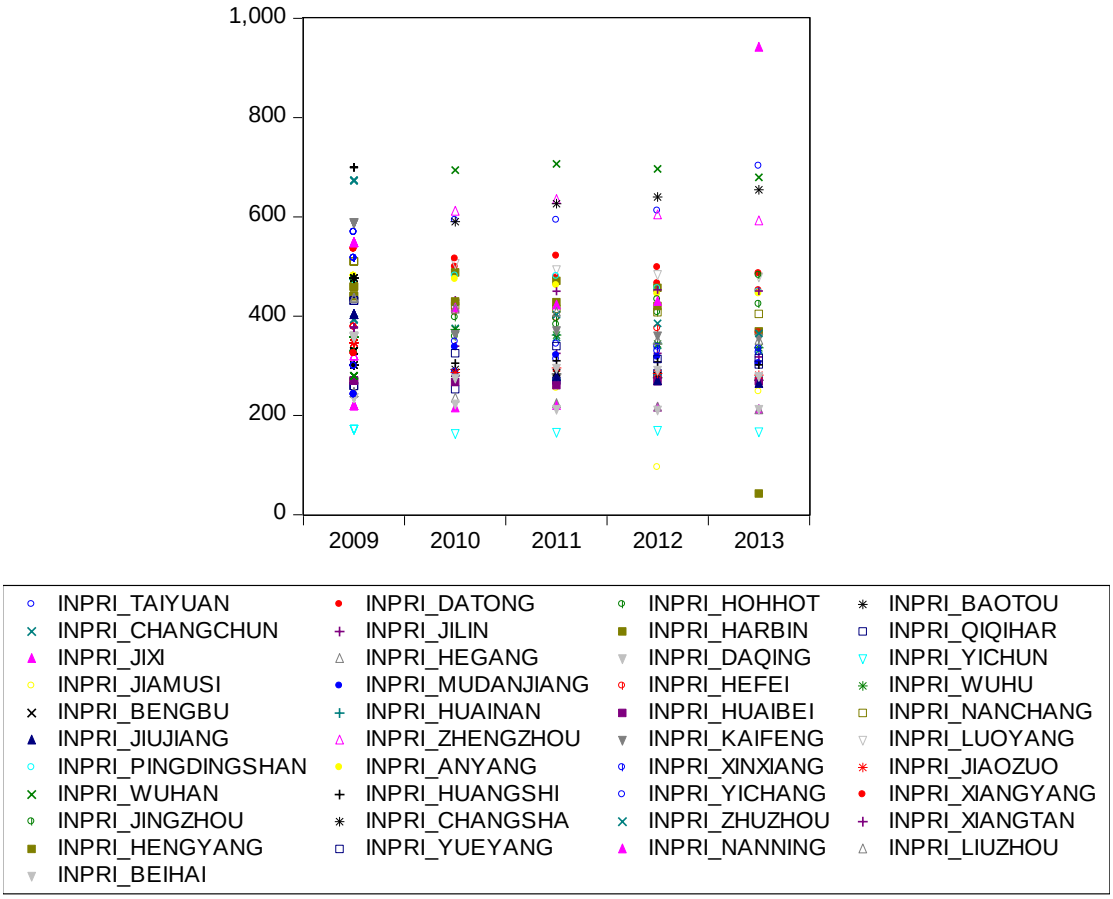
Moreover, the price appeal has been weakened by the price competition. Confronted with great opportunities of industrial migration, local governments all want to win more investment. The price competition has reached to the bottom, making the land prices rather low. As we can see in Table 14 and Table 16, the industrial land price level in the middle is the least (377.8 Yuan) even less than the west (488.1 Yuan), and its average price level went even down from 390 Yuan in 2009 to 373 Yuan in 2013.

Table 16 2009-2013 industrial land price in Middle China

	Mean	Median	Minimum	Maximum
2009	390	359	172	699
2010	378	363	163	694
2011	378	361	166	706
2012	369	343	95	696
2013	373	334	42	941

Like tax competition in other countries (Wassmer, 1994, Peters and Fisher, 2004, Papke, 1995), the 'race to the bottom' phenomenon leads to a government's mimicking behaviour (Allers and Elhorst, 2005), the price is becoming closer that makes the price advantage gradually vanish. The chart below displays the aggregate industrial land price changes of city samples in Middle China. The price variance decreased from 2009 and 2013 and the values have gathered at lower and lower level. The coefficient of price competition variable is tested to be insignificant, which also support the arguments above.

Figure 5 2009-2013 industrial land price of cities in Middle China



4.3.3 Hypothesis 3: in Western China, the rising industrial land price will impede the industrial investment because of the poor labour, capital and local economic development.

The regression result, combined with interviews has positively confirmed the hypothesis. The Table 17 involves the model 7 and model 8 to test the situation in Western China. Though the sample is not as many as Eastern China, the result is explicit.

Table 17 the regression result of Western China

	Model 7	Model 8

indicator	variable	Using absolute price level	Using price competition
Land leasing price	industrial land price	-0.496212**	
		(-2.60)	
	lag industrial land price	-0.029871	
		(-1.20)	
	Price competition		-158.2794**
			(-1.96)
	Lag price competition		-296.4154***
			(-3.42)
Labour	salary	-0.001054*	-0.001652***
		(-1.81)	(-3.63)
	education	0.017765	0.033165**
		(0.99)	(2.34)
Urbanization economies	employment	0.039302*	0.015277
		(1.76)	(0.76)
Localization economies	HHI	-604.7630**	-527.5777**
		(-2.32)	(-2.43)
public infrastructure	road density	3.086881	-0.246430
		(1.18)	(0.11)
R-squared		0.945075	0.921049
Adjusted R-squared		0.887403	0.838151

***Denotes significantly different from zero at a 1 percent significance level.

*** Denotes significantly different from zero at a 5 percent significance level.

* Denotes significantly different from zero at a 10 percent significance level.

Asymptotic standard errors in parentheses.

The estimate coefficients of industrial land price and price competition are significant and negative, the same as the expected sign. It means, in Western China, both lower price cost and government price competition are, to some extent, useful and effective to attract industrial investment. Additionally, the absolute value of coefficients (-0.5 and 158.28) are much higher than in the Eastern China (0.012 and 1.58) and Western China models (0.17 and 31.72843). From the results, it can be found out that the industries in western areas are very cost-sensitive as most of the cities have limited endowments and less urbanization scale.

Western cities have less attractive investment environment than either the east or the middle. According to the statistics, the Western China has the lowest urbanization rate, with the rate 44.9%, while the urbanization rates of Eastern China, Middle China and whole nation are respectively 56.4%, 53.4%, 52.57%. Plus, the less sufficiency of water resources than Middle China, preliminary logistics industry and service industries, and

incomplete industrial chains have become constraints for investments. These are also reflected from the coefficients of control variables in the model. The coefficient of HHI (-604.7630 in Model 7 and -527.5777 in Model 8) is very significant while it is still negative. Unlike the positive sign in Middle China model (29.75672 in Model 5 and 30.31192 in Model 6), the concentration of several industries is the great obstacle. Contrarily, the diversification of industries benefits cities by forming more complete upstream supply chains and downstream terminal consumer production.

Box 4 A Case in Western China

A case in BH city and DG Technology Co., Ltd. :[11]

BH is a city locates in Guangxi Province in Western China region. The development zone is the major way to bring in new investment for it. According to the director of BH development zone, the location is 7 kilometers away from the city center, moreover, there is little equipment of living facilities, which makes it tough for settled enterprise to hire workers. "There are no commercials, entertainments, medical resources or bank, workers even have to go to the city center to cut hair", said the director. Some industrial firms have to build themselves library, entertainment rooms, open courts and other living facilities to keep the employees to stay.

Additionally, Manufacturing industries usually needs raw material supplier, spare parts seller, and provision of related industry processes. Lack of relatively complete industry chains, BH has difficulty in attracting not only leading enterprises but also those small-size industries that are heavily dependent on upstream and downstream industries.

DG Technology Co., Ltd is an enterprise chose to locate in BH city in 2006. It chose BH because that the city can provide large land space for its quick expansion strategy. Moreover, it produces power adapter which is characterized as small size and that production processes can be completed internally.

Under such circumstances, the price competition can still work to achieve the goal. The path is: the relative lower industrial land price than the competitors works as investment incentives → the entry of industrial enterprises activates local production market and labour market → the increase of tax revenue strengthens the fiscal ability to invest public infrastructure → contribute to local economic development and urbanization → lay the foundation for a better investment environment.

4.4 Other Factors That Influence the Industrial Investment

According to the theory review, the factors that have great impacts on industrial investment and their indicators are various. In summary, there are labor market

[11] The case is from magazine *Chinese national conditions and strength,* 2009 February.

including labor cost and labor skill, land cost, access to market, international trade, political environment, infrastructure, agglomeration at location level and urban level. Here, we ignore international trade considering the research scope is national and regional instead of global level, as well as access to market because it is an opaque factor for now that the previous study did not provide an ideal indicator. Besides, the access to market also depends on different kinds of industries. The political environment is a complicated issue but the research only choose government competition where it is our focus instead of broad and general political environment. Therefore, we adopted the following variables to stand for labor market, agglomeration, and infrastructure except for our two key variables (land leasing price and price competition).

Looking at controlled variables in model 1 and model 2, they both generally match the location of industrial investment theory, though it also shows the limitation of the indicators. (See Table 18)

Table 18 the estimated coefficients of controlled variables

	Controlled variables				
	Salary	Education	Employment	HHI	Road Density
Model 1	-0.000252***	0.00331	0.037214***	-41.98473**	0.962007*
	(-2.59)	(1.27)	(3.22)	(-2.21)	(1.67)
	-0.000268***	0.003215	0.040653***	-38.94316**	0.851509
Model 2	(-2.80)	(1.24)	(3.72)	(-2.07)	(1.48)

***Denotes significantly different from zero at a 1 percent significance level.

*** Denotes significantly different from zero at a 5 percent significance level.

* Denotes significantly different from zero at a 10 percent significance level.

Asymptotic standard errors in parentheses.

1. **Labour market:** the salary standing for labour cost has a negative coefficient and it is significant at 0.01 significance level. This is logically evident that if the cost of hiring workers rises, the industrial investment will decrease while all the other factor stay the same. Nevertheless, the education standing for labour skill is less positive to draw a conclusion. First all, the education level may not be a good indicator for those industries which need special skills not only intelligence or general knowledge. For example, in electric manufacture and mechanical manufacture, the professional knowledge is much more vital than the degree of the employees. Another explanation could be, for the less developed industrial stage, human capital is not the key factor comparing to the other capital input such as fixed asset and number of workers.

2. **Agglomeration:** The total employment size of a city measures the urbanization level, one kind of scale economy for a city. The estimate coefficient is significant and positive. This indicates industrial investment is very sensitive to urbanization level of city. The higher level, the more attractiveness for industrial firms. The main reasons are that firstly firms can easily find supporting business services in the market which facilitate their operation and secondly the thicker labour pool mitigates their staff turnover risk which means they can find desirable employees

for the unexpected change of business. Another interesting result is that the coefficient of localization economies variable HHI is significantly negative which means industry agglomeration has a crowd-out effect. As industry structure became more concentrated and specialized, the competition for limited spaces and resources making industrial firms harder and harder to expand their reproduction and negative externalities such as crowed transport system and higher cost of services make cities fail to attract new industrial enterprises. To addition, the higher HHI figure also means some certain industries have already occupied the large proportion of the local market, raising the entrance cost of new firms in the same industry.

3. **Infrastructure:** the road density seems a less successful variable for the infrastructure, and the estimate coefficient is positive and less significant compared to other controlled variables. Generally, in theory, the better infrastructure could cast a positive impact on investment and it should be more influential than the result. But while infrastructure for industries should also include airport, railway as well as highway, the internal road grid is less sufficient to show the whole picture.

Chapter 5: The Conclusion

5.1 Summary of research findings

The research studies the different impacts of industrial land prices in China, either as land cost or as a tool of government competition, on industrial investment, at national level and regional level. By adopting panel data and interview to conduct empirical study, the author can make a relatively solid conclusion on research question.

First of all, in the classic literatures, land cost could be a major determinant for investment, and with the increasing scale of industries, the marginal cost of land rises and industrial firms will turn to improved technology as substitute for land input, which as a result weaken the impact of land cost. In our research, the influence of the land cost do have been weakened not mainly because of the technological breakthrough, but because of the government intervention. As said by the literature, government plays an extremely crucial role in public land arrangement in order to achieve specific goals. Especially for local industrial development, there is little motive for the local government to create an upward industrial land price which would intimidate investors. Chinese municipalities held the same consideration. But unlike the cost-recovery price level, the industrial land price went even down below that, which is explained by the game theory applied in the Chinese institutional arrangement. In 1990s, China's fiscal centralization and economic decentralization has created intense government competition in several aspects such as public infrastructure, fiscal expenditure and etc., among them, as an essential resources for social and economic development, land is an indispensable leverage for competition. In another word, the overpowered local governments preferred private negotiation rather than public auction way to sell the land so that the price making mechanism could be strictly controlled by them. Consequently, the 'race to the bottom' effect explained by game theory has happened, and industrial land price stayed at an extremely low level that even lower than the land development cost to create an informal subsidies in the loophole of land leasing regulations. According to the previous research on the failure of economic incentives in most of the countries and regions, the 'mimicking' behaviour narrow the differentiation of prices in competitive cities, eventually making no differences for industrial enterprises.

What's worse, the underground negotiation is a negative factor for investors with little connection to the government officials, which is treated as a political risk for them. That's why the government intervention with land price could bring out chaos and makes the price less influential as land cost. The research found out that on the contrary to the decreasing land price, the increasing land price driven by both more regulated land market and intensive input will increase the investment. After the accumulation of capital and decrease of land deposit for industries, the land value goes up, which demands urgently for correspondingly higher land prices for more intensive land use and efficient resource allocation. The low industrial land prices controlled by the government, usually through the negotiation process, are what impede the initiative of entrepreneurs for changing towards that. However, the price competition among local

governments has a more significant impact compared to the absolute land price, yet the impact is negative by releasing negative investment environment signal. The result also proved the explanation above. As the price competition is highly related to private negotiation process, which can be easily manipulated under the table, the competition behaviour could terrify the investment intention, considering more intangible investment risks. Besides, the price competition also weakens the innovation of land development, and local government pays more attention to prices rather than tailoring the planning and strategy for local conditions. However, it should be addressed carefully that the price is the officially announced price to close the deal excluding the invisible benefit (i.e. secret agreement on refund, tax discount and other administrative help).

Secondly, when looking at three Chinese economic regions with different development level, the land price impacts begin to vary. The three hypothesis have been proved that in the more developed areas, the increased land cost has become a force for industries to upgrade by eliminating low-end manufacture for high-end and cutting-edge ones and evolving from manufacturing to more value-added business service industries; the land-intensive factories then will be relocated to cheaper areas, which makes cheaper land still attractive for them. The geographical advantage has also been considered in location decision so the migration could firstly be in the area near to the developed area. While the land price and price competition is the main factor we focus on, though other limitation like short of water supply is also important for migration, we don't give further discussion here.

In the developed area, the scarcity and relatively high productivity drives the land value high, but the outdated controlled land price caused by price competition could deteriorate the industrial land market as land cannot be used as highest and best use. The research shows that lowering industrial land price and governments' price competition are harmful for industrial investment in the city. The Eastern China with best economic development level has been experiencing an 'insufficiency' of industrial land supply. The overloaded land demands for industry upgrading towards high added value, such as finance, commercial, IT and so on. The traditional inefficient and wasteful land uses have to be eliminated through densification and better land planning. The rising price is a market hand that helps to filter out land-intensive industries and replace them with high-end ones. Moreover, it encourages the existent factories to augment input and reduce unused land.

While within the homogeneous region, land price could optimize the land resource allocation to increase investment amount, between the different regions, land price differentiation also act as the key factor to change the pattern of industrial investment. Crowd-out effect in developed areas triggered the mobility of the industrial investment to seek for cheaper and larger space for factories. Middle China has faced with great opportunities for industry transfer from Eastern China. Relatively lower land price than the east and closer access to coastal market than the west, the middle area has a comparative advantage to appeal to the new industrial investment. Though land is the major consideration at interregional level, decision of a target city is more determined

by the local endowments and price effect falls in obscurity. The investment opportunities triggered a fierce price competition among cities and industrial prices in cities is becoming closer and closer, making prices less important within the region. Also, the cheap price is often at the sacrifice of good location and complete facilities and infrastructures.

In the place where underdevelopment has limited the stage of industrialization, the industrial firms will target at their cheap factors of production, for example land. Compared to the above two regions, the Western China has encountered more difficulty in attracting investment with limited development level. The urbanization, public infrastructure, labour productivity and industrialization degree are constraints than the other two. The land-intensive industries and firms expected for rapid growth and expansion become the main land users. Hence, the price and price competition are effective to lead investment preference.

Thirdly, other industrial location determinants including labour cost, education, public infrastructure, agglomeration at urbanization level and industrialization level are tested to be significant also to some extent. The agglomeration is quite important according to the research result. In manufacturing, the agglomeration reduces the external cost due to the less transportation cost, technology and knowledge spill over, easier communication and accumulation of labour market. However, the agglomeration is more a neutral effect than a positively beneficial one. It is reflected on the disparity of three regions. The overcrowded concentration drives the operation cost and living cost high, like in Eastern China, while at preliminary stage of local industrialization, the real good will be done only if there is enough diversified industries to shape a healthy 'ecosystem'. The investment is also sensitive to labour cost and infrastructure shown as average salary and road density. The education level turned out to be little significance for manufacturing investment for the reason that it is the particular special skill rather than general knowledge that matters more. Nevertheless, due to the weakness of the indicator, the conclusion is weakened than price factor.

All in all, the research shed a light on the impact of prices on industrial investment and found out that the price is a double-edged sword especially when the local government is a powerful player in the game. Land can be used in different ways as different instruments to benefit the local development.

5.2 Recommendation

According the findings of the research, the recommendation on policy makers and government's strategic planning are as followed:

Firstly, appropriately increase the industrial land price back to market value. On one hand, it activates the role of land price in efficiently allocating limited resources, which optimizes the industry structure especially in the eastern area. By reasonably rising prices, the 'push out ' force will successfully fulfil the industry transfer of low-end and less developed industries, the 'pull in' force will encourage the use of idle land, increase of floor area ratio and settlement of high-end industries. On the other hand, the local

government should make a scientific planning of land supply to make sure that the land price will not go too fast in Eastern China, which will result in an unhealthy quick shift of industrial structure, not suitable for existent labour skill and structure.

Secondly, it is necessary to improve the minimum industrial land price standard system and adopt a progressive price standard to fit the different economic development. The price competition strategy and provision of prefectural policies of local governments in Middle China to attract investment project will narrow the price differentiation and fail the comparative price advantage. To avoid such phenomenon, it is better for central government to make and strictly practice specific industrial price standard according to unique nature and endowments of cities rather than a general region as a whole. This also should be accompanied by related economic incentives and supportive policies issued by central government targeting at specific areas and industries.

Thirdly, Western China should be devoted in improving labour productivity, enhancing the local infrastructure and facilities, developing logistics industries to break trade barriers, stimulate local market demand, increasing working efficiency of land leasing procedures and promoting exchange of production factors. What's more, change the indifferent and discrete development strategy and concentrate limited funds and resources on several core cities to create an integrated blueprint.

Last but not least, continuously enforce the implementation of 2007 land leasing policy, initiate systematic and scientific land regulation so to establish a healthy and transparent land market. It will be of great significance to build a more friendly soft investment environment with less illegal land use behaviour, less time-consuming administrative procedures and less corruption and conspiracy.

5.3 Limitation and Future Study

Though the research yield a lot of solid conclusion, it has some limitation which can be improved for future study.

The dependent variables: the author was intended to use industrial fixed asset investment, industrial firms and industrial workers to build up an index. Due to the change of statistic scope and data availability at city level, I have to remove the first two, which could reduce the confidence of the regression result. The weakness, to some extent, is modified with collection of primary data through interviews. The model and regression result is generally confirmed by the interviewees.

The chosen period: the research period is from 2009 to 2013, this is also because of the availability of data. The data of 2013 is in the 2014 statistics yearbook by the National Bureau of Statistics which is the latest one accessible online. The situation after 2013 are not included in the model. However, the price effects and investment trend is a long-term relationship, though, some specific industries or cities may be affected by time specific factors, the long-term and broad pattern will remain the same considering the large research scope.

The indicators for industrial price: the reliability of land price information is heavily dependent on the transparency of land leasing procedures, technology of monitoring

the price change, and adequate work on data collection and processing. The price used in the research is the average price in the districts of the city. Though it reveals the general relation to the investment, more detailed characteristics are ignored and mitigated. If the study want to focus on regional or city level, the land sale information of each parcel can be accessible freely online.

The interviews: land issues in China is closely related to local and central governments. It is difficult to contact government officials and big investors with little connection to government sectors. Therefore, the interviewees are not as many as expected.

To sum up, the research can answer the main question formulated at the beginning in a general way at national level and interregional level. But it brings out other questions needed to be answer at micro level. At micro level, the investment is influenced by more factors, like connection to the government and the specific category of industries, and the land price data can be collected combined with location by GIS. All this detailed information can fill in the gap in this research and dig up more precious findings for exact impact of land price on investment.

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Annex 1: Original Regression Result of Model 1

Dependent Variable: WORKER?

Method: Pooled Least Squares
Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 104
Total pool (unbalanced) observations: 402
Cross sections without valid observations dropped

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.581319	8.481373	0.186446	0.8522
INPRI?	0.063824	0.013349	4.781301	0
INPRI?(-1)	0.002765	0.004338	0.637322	0.5244
EMPLOY?(-1)	0.037214	0.011571	3.216277	0.0014
ROADDEN?	0.962007	0.577123	1.666901	0.0966
SALARY?(-1)	-0.00025	9.73E-05	-2.59187	0.01
LQUALITY?	0.00331	0.002614	1.26655	0.2063
HHI?	-41.9847	18.98801	-2.21112	0.0278
Fixed Effects (Cross)				
_BEIJING--C	1.921583			
_TIANJIN--C	70.50106			
_SHIJIAZHUANG--C	-35.9344			
_TANGSHAN--C	-0.56324			
_QINHUANGDAO--C	-7.53259			
_HANDAN--C	-26.7819			
_BAODING--C	-15.2736			
_ZHANGJIAKOU--C	-11.5338			
_LANGFANG--C	-1.32219			
_TAIYUAN--C	-12.3311			
_DATONG--C	-13.4871			
_HOHHOT--C	-15.2584			
_BAOTOU--C	11.84719			
_SHENYANG--C	1.012967			
_DALIAN--C	8.300789			
_ANSHAN--C	4.672949			
_FUSHUN--C	-4.2352			
_BENXI--C	-4.31092			
_DANDONG--C	-9.67033			
_JINZHOU--C	-3.25618			
_FUXIN--C	-8.35105			

_LIAOYANG--C	-8.91619
_CHANGCHUN--C	15.03623
_JILIN--C	1.869267
_HARBIN--C	2.637778
_QIQIHAR--C	1.216834
_JIXI--C	3.914542
_HEGANG--C	8.727286
_DAQING--C	6.091092
_YICHUN--C	6.699964
_JIAMUSI--C	-5.2055
_MUDANJIANG--C	-9.93005
_SHANGHAI--C	106.546
_NANJING--C	-9.68126
_WUXI--C	11.15122
_XUZHOU--C	3.634692
_CHANGZHOU--C	11.91274
_SUZHOU--C	48.58368
_NANTONG--C	-4.92111
_YANGZHOU--C	2.005543
_HANGZHOU--C	40.78508
_NINGBO--C	11.70435
_WENZHOU--C	-79.1906
_JIAXING--C	9.352843
_HUZHOU--C	-1.00936
_HEFEI--C	-0.74549
_WUHU--C	-0.3359
_BENGBU--C	-5.59721
_HUAINAN--C	0.104613
_HUAIBEI--C	9.636868
_FUZHOU--C	-7.5644
_XIAMEN--C	20.83471
_QUANZHOU--C	0.127186
_NANCHANG--C	-5.35996
_JIUJIANG--C	-8.66647
_JINAN--C	-15.9097
_QINGDAO--C	2.832492
_ZIBO--C	10.92012
_ZAOZHUANG--C	-3.7795
_YANTAI--C	27.19813
_WEIFANG--C	0.062766
_JINING--C	-11.9963
_TAIAN--C	-4.53514
_LINYI--C	1.712039
_ZHENGZHOU--C	-4.39926

_KAIFENG--C	-17.1511
_LUOYANG--C	-12.5584
_PINGDINGSHAN--C	-13.5995
_ANYANG--C	-14.5863
_XINXIANG--C	-5.0329
_JIAOZUO--C	-8.23351
_WUHAN--C	-0.67274
_HUANGSHI--C	-0.49396
_YICHANG--C	-4.86024
_XIANGYANG--C	-11.2953
_JINGZHOU--C	-13.2614
_CHANGSHA--C	-25.4002
_ZHUZHOU--C	-3.66948
_XIANGTAN--C	-12.3152
_HENGYANG--C	-8.77147
_YUEYANG--C	-3.76417
_GUANGZHOU--C	68.42847
_SHENZHEN--C	46.03405
_ZHUHAI--C	24.31221
_SHANTOU--C	-19.0345
_FOSHAN--C	39.87349
_ZHANJIANG--C	-13.1095
_ZHONGSHAN--C	16.06117
_NANNING--C	-20.1625
_LIUZHOU--C	-2.45285
_BEIHAI--C	-6.28735
_HAIKOU--C	-20.203
_CHENGDU--C	16.26369
_NANCHONG--C	-18.6598
_YIBIN--C	11.36257
_GUIYANG--C	-8.61832
_KUNMING--C	-18.5108
_LASA--C	-54.3221
_CHONGQING--C	93.87054
_XIAN--C	-4.44225
_LANZHOU--C	-30.7837
_XINING--C	-14.6318
_YINCHUAN--C	-4.72446
_URUMQI--C	-11.5591
Fixed Effects (Period)	
2010--C	-4.01806
2011--C	-2.1927
2012--C	-0.05124
2013--C	6.262

Effects Specification			
Cross-section fixed (dummy variables)			
Period fixed (dummy variables)			
R-squared	0.923444	Mean dependent var	21.30002
Adjusted R-squared	0.893406	S.D. dependent var	32.00975
S.E. of regression	10.45077	Akaike info criterion	7.764901
Sum squared resid	31454.97	Schwarz criterion	8.898224
Log likelihood	-1446.75	Hannan-Quinn criter.	8.213623
F-statistic	30.74285	Durbin-Watson stat	1.442171
Prob(F-statistic)	0		

Annex 2: Original Regression Result of Model 2

Dependent Variable: WORKER?

Method: Pooled Least Squares
Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 104
Total pool (unbalanced) observations: 402
Cross sections without valid observations dropped

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-13.9998	10.08183	-1.38862	0.166
COMPETITION?	23.54259	6.799598	3.462349	0.0006
COMPETITION?(-1)	24.2226	6.997003	3.461854	0.0006
EMPLOY?(-1)	0.040653	0.010923	3.721645	0.0002
ROADDEN?	0.851509	0.57393	1.483645	0.139
SALARY?(-1)	-0.00027	9.56E-05	-2.80752	0.0053
LQUALITY?	0.003215	0.002594	1.239387	0.2162
HHI?	-38.9432	18.80738	-2.07063	0.0393
Fixed Effects (Cross)				
_BEIJING--C	-12.1211			
_TIANJIN--C	69.73413			
_SHIJIAZHUANG--C	-32.7577			
_TANGSHAN--C	5.185463			
_QINHUANGDAO--C	1.023574			
_HANDAN--C	-22.9319			
_BAODING--C	-9.79284			
_ZHANGJIAKOU--C	-3.5631			

_LANGFANG--C	6.641534
_TAIYUAN--C	-8.76525
_DATONG--C	-9.07951
_HOHHOT--C	-6.61935
_BAOTOU--C	21.01052
_SHENYANG--C	-26.1372
_DALIAN--C	-22.4095
_ANSHAN--C	-8.67604
_FUSHUN--C	-16.0005
_BENXI--C	-17.0184
_DANDONG--C	-18.5679
_JINZHOU--C	-5.32399
_FUXIN--C	-16.3448
_LIAOYANG--C	-23.7991
_CHANGCHUN--C	3.537092
_JILIN--C	-7.40031
_HARBIN--C	-16.5613
_QIQIHAR--C	-3.21824
_JIXI--C	2.978159
_HEGANG--C	6.548058
_DAQING--C	5.639944
_YICHUN--C	9.073771
_JIAMUSI--C	-8.67639
_MUDANJIANG--C	-17.1834
_SHANGHAI--C	80.80197
_NANJING--C	-18.641
_WUXI--C	9.943551
_XUZHOU--C	13.6328
_CHANGZHOU--C	18.91138
_SUZHOU--C	49.01031
_NANTONG--C	-2.83187
_YANGZHOU--C	9.990636
_HANGZHOU--C	44.03679
_NINGBO--C	2.015481
_WENZHOU--C	-104.152
_JIAXING--C	15.64927
_HUZHOU--C	4.539963
_HEFEI--C	5.909815
_WUHU--C	6.479119
_BENGBU--C	2.955341
_HUAINAN--C	8.571874
_HUAIBEI--C	17.77584
_FUZHOU--C	-5.42564
_XIAMEN--C	16.01831

_QUANZHOU--C	1.974549
_NANCHANG--C	0.08662
_JIUJIANG--C	0.430496
_JINAN--C	-16.1193
_QINGDAO--C	0.179594
_ZIBO--C	16.56729
_ZAOZHUANG--C	3.7827
_YANTAI--C	33.86403
_WEIFANG--C	5.391313
_JINING--C	-7.22611
_TAIAN--C	3.793161
_LINYI--C	9.103647
_ZHENGZHOU--C	-4.99098
_KAIFENG--C	-10.8616
_LUOYANG--C	-9.82895
_PINGDINGSHAN--C	-10.561
_ANYANG--C	-11.6269
_XINXIANG--C	1.446231
_JIAOZUO--C	0.135256
_WUHAN--C	-4.03493
_HUANGSHI--C	7.170436
_YICHANG--C	1.827425
_XIANGYANG--C	-9.3047
_JINGZHOU--C	-10.2767
_CHANGSHA--C	-27.4158
_ZHUZHOU--C	2.019328
_XIANGTAN--C	-8.91729
_HENGYANG--C	-1.59557
_YUEYANG--C	3.248246
_GUANGZHOU--C	70.07795
_SHENZHEN--C	1.717513
_ZHUHAI--C	26.60459
_SHANTOU--C	-23.5194
_FOSHAN--C	40.34987
_ZHANJIANG--C	-7.14072
_ZHONGSHAN--C	16.54683
_NANNING--C	-19.6649
_LIUZHOU--C	3.681029
_BEIHAI--C	1.568088
_HAIKOU--C	-17.64
_CHENGDU--C	15.04804
_NANCHONG--C	-14.6806
_YIBIN--C	21.93883
_GUIYANG--C	-3.82722

_KUNMING--C	-17.586
_LASA--C	-61.5789
_CHONGQING--C	97.13745
_XIAN--C	-10.3547
_LANZHOU--C	-38.437
_XINING--C	-12.5818
_YINCHUAN--C	3.693009
_URUMQI--C	-11.8952
Fixed Effects (Period)	
2010--C	-3.73239
2011--C	-2.14234
2012--C	-0.36538
2013--C	6.240119

Effects Specification

Cross-section fixed (dummy variables)
Period fixed (dummy variables)

R-squared	0.924652	Mean dependent var	21.30002
Adjusted R-squared	0.895088	S.D. dependent var	32.00975
S.E. of regression	10.36799	Akaike info criterion	7.748996
Sum squared resid	30958.64	Schwarz criterion	8.882319
Log likelihood	-1443.55	Hannan-Quinn criter.	8.197719
F-statistic	31.27658	Durbin-Watson stat	1.446078
Prob(F-statistic)	0		

Annex 3: Original Regression Result of Model 3

Dependent Variable: WORKER?
Method: Pooled Least Squares

Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 41
Total pool (unbalanced) observations: 160

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.783205	4.279503	0.884029	0.3786
INPRI?	-0.002048	0.004633	-0.441931	0.6594
INPRI?(-1)	0.012381	0.005563	2.225678	0.0281
EMPLOY?(-1)	0.023194	0.018895	1.227522	0.2223
ROADDEN?	0.472211	0.268656	1.757679	0.0816
SALARY?(-1)	-0.000105	5.02E-05	-2.095468	0.0384

LQUALITY?	-0.001433	0.000982	-1.459197	0.1474
HHI?	29.75672	13.62226	2.184420	0.0311
Fixed Effects (Cross)				
_TAIYUAN--C	11.61251			
_DATONG--C	-6.806517			
_HOHHOT--C	-2.595989			
_BAOTOU--C	5.459859			
_CHANGCHUN--C	20.21004			
_JILIN--C	0.457707			
_HARBIN--C	16.46985			
_QIQIHAR--C	-0.726592			
_JIXI--C	-9.966612			
_HEGANG--C	-14.32256			
_DAQING--C	1.510296			
_YICHUN--C	-10.85099			
_JIAMUSI--C	-3.825953			
_MUDANJIANG--C	-5.196811			
_HEFEI--C	11.90576			
_WUHU--C	0.333692			
_BENGBU--C	-4.566744			
_HUAINAN--C	-4.900412			
_HUAIBEI--C	-11.76516			
_NANCHANG--C	9.937635			
_JIUJIANG--C	-5.157599			
_ZHENGZHOU--C	21.28882			
_KAIFENG--C	-6.105925			
_LUOYANG--C	0.472844			
_PINGDINGSHAN--C	-5.525827			
_ANYANG--C	-4.900415			
_XINXIANG--C	-4.212674			
_JIAOZUO--C	-4.683082			
_WUHAN--C	30.10712			
_HUANGSHI--C	-5.247759			
_YICHANG--C	0.352428			
_XIANGYANG--C	-1.197108			
_JINGZHOU--C	-4.560099			
_CHANGSHA--C	3.345380			
_ZHUZHOU--C	-1.837835			
_XIANGTAN--C	-2.865057			
_HENGYANG--C	-3.574654			
_YUEYANG--C	-2.401458			
_NANNING--C	2.648225			
_LIUZHOU--C	2.479608			
_BEIHAI--C	-5.928927			

Fixed Effects (Period)				
2010--C	-1.133719			
2011--C	-0.286897			
2012--C	0.215426			
2013--C	1.205190			

Effects Specification
Cross-section fixed (dummy variables)
Period fixed (dummy variables)

R-squared	0.938745	Mean dependent var	10.14519
Adjusted R-squared	0.910646	S.D. dependent var	9.242555
S.E. of regression	2.762798	Akaike info criterion	5.124039
Sum squared resid	832.0027	Schwarz criterion	6.104251
Log likelihood	-358.9231	Hannan-Quinn criter.	5.522069
F-statistic	33.40877	Durbin-Watson stat	1.524786
Prob(F-statistic)	0.000000		

Annex 4: Original Regression Result of Model 4

Dependent Variable: WORKER?
Method: Pooled Least Squares

Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 51
Total pool (unbalanced) observations: 200
Cross sections without valid observations dropped

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-67.84682	15.85191	-4.280040	0.0000
COMPETITION?	31.72843	16.86840	1.880939	0.0621
COMPETITION?(-1)	58.13161	18.18734	3.196267	0.0017
SALARY?(-1)	5.47E-06	0.000152	0.035927	0.9714
LQUALITY?	0.008738	0.004618	1.891867	0.0606
HHI?	-53.91854	22.22341	-2.426204	0.0165
ROADDEN?	0.661954	1.081336	0.612163	0.5414
EMPLOY?(-1)	-0.000956	0.019918	-0.048000	0.9618
Fixed Effects (Cross)				
_BEIJING--C	-57.06615			
_TIANJIN--C	66.40056			
_SHIJIAZHUANG--C	-36.81354			

_TANGSHAN--C	14.70135
_QINHUANGDAO--C	18.22131
_HANDAN--C	-21.14608
_BAODING--C	-2.253678
_ZHANGJIAKOU--C	12.96804
_LANGFANG--C	22.40315
_SHENYANG--C	-51.59070
_DALIAN--C	-54.90902
_ANSHAN--C	-8.178134
_FUSHUN--C	-15.07394
_BENXI--C	-17.13532
_DANDONG--C	-11.24472
_JINZHOU--C	8.660122
_FUXIN--C	-9.307610
_LIAOYANG--C	-28.14165
_SHANGHAI--C	19.60945
_NANJING--C	-54.25396
_WUXI--C	3.783219
_XUZHOU--C	36.55543
_CHANGZHOU--C	35.32470
_SUZHOU--C	48.47611
_NANTONG--C	-1.013916
_YANGZHOU--C	27.34594
_HANGZHOU--C	51.70305
_NINGBO--C	-21.14306
_WENZHOU--C	-190.9315
_JIAXING--C	31.11666
_HUZHOU--C	20.05768
_FUZHOU--C	-6.570100
_XIAMEN--C	1.634802
_QUANZHOU--C	6.246684
_JINAN--C	-29.90801
_QINGDAO--C	-14.19672
_ZIBO--C	31.58337
_ZAOZHUANG--C	26.04347
_YANTAI--C	53.95929
_WEIFANG--C	18.92949
_JINING--C	2.402200
_TAIAN--C	25.30945
_LINYI--C	30.04049
_GUANGZHOU--C	75.06878
_SHENZHEN--C	-100.4143
_ZHUHAI--C	34.14525
_SHANTOU--C	-31.99851

_FOSHAN--C	44.14561
_ZHANJIANG--C	6.027629
_ZHONGSHAN--C	23.74694
_HAIKOU--C	-13.52142
Fixed Effects (Period)	
2010--C	-4.239290
2011--C	-1.914589
2012--C	-0.695569
2013--C	6.849448

Effects Specification
Cross-section fixed (dummy variables)
Period fixed (dummy variables)

R-squared	0.947717	Mean dependent var	30.64940
Adjusted R-squared	0.925149	S.D. dependent var	39.96192
S.E. of regression	10.93313	Akaike info criterion	7.867629
Sum squared resid	16615.14	Schwarz criterion	8.873616
Log likelihood	-725.7629	Hannan-Quinn criter.	8.274737
F-statistic	41.99371	Durbin-Watson stat	1.995859
Prob(F-statistic)	0.000000		

Annex 5: Original Regression Result of Model 5

Dependent Variable: WORKER?
Method: Pooled Least Squares

Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 41
Total pool (unbalanced) observations: 160

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.783205	4.279503	0.884029	0.3786
INPRI?	-0.002048	0.004633	-0.441931	0.6594
INPRI?(-1)	0.012381	0.005563	2.225678	0.0281
EMPLOY?(-1)	0.023194	0.018895	1.227522	0.2223
ROADDEN?	0.472211	0.268656	1.757679	0.0816
SALARY?(-1)	-0.000105	5.02E-05	-2.095468	0.0384
LQUALITY?	-0.001433	0.000982	-1.459197	0.1474
HHI?	29.75672	13.62226	2.184420	0.0311
Fixed Effects (Cross)				

_TAIYUAN--C	11.61251
_DATONG--C	-6.806517
_HOHHOT--C	-2.595989
_BAOTOU--C	5.459859
_CHANGCHUN--C	20.21004
_JILIN--C	0.457707
_HARBIN--C	16.46985
_QIQIHAR--C	-0.726592
_JIXI--C	-9.966612
_HEGANG--C	-14.32256
_DAQING--C	1.510296
_YICHUN--C	-10.85099
_JIAMUSI--C	-3.825953
_MUDANJIANG--C	-5.196811
_HEFEI--C	11.90576
_WUHU--C	0.333692
_BENGBU--C	-4.566744
_HUAINAN--C	-4.900412
_HUAIBEI--C	-11.76516
_NANCHANG--C	9.937635
_JIUJIANG--C	-5.157599
_ZHENGZHOU--C	21.28882
_KAIFENG--C	-6.105925
_LUOYANG--C	0.472844
_PINGDINGSHAN--C	-5.525827
_ANYANG--C	-4.900415
_XINXIANG--C	-4.212674
_JIAOZUO--C	-4.683082
_WUHAN--C	30.10712
_HUANGSHI--C	-5.247759
_YICHANG--C	0.352428
_XIANGYANG--C	-1.197108
_JINGZHOU--C	-4.560099
_CHANGSHA--C	3.345380
_ZHUZHOU--C	-1.837835
_XIANGTAN--C	-2.865057
_HENGYANG--C	-3.574654
_YUEYANG--C	-2.401458
_NANNING--C	2.648225
_LIUZHOU--C	2.479608
_BEIHAI--C	-5.928927
Fixed Effects (Period)	
2010--C	-1.133719
2011--C	-0.286897

2012--C	0.215426
2013--C	1.205190

Effects Specification
Cross-section fixed (dummy variables)
Period fixed (dummy variables)

R-squared	0.938745	Mean dependent var	10.14519
Adjusted R-squared	0.910646	S.D. dependent var	9.242555
S.E. of regression	2.762798	Akaike info criterion	5.124039
Sum squared resid	832.0027	Schwarz criterion	6.104251
Log likelihood	-358.9231	Hannan-Quinn criter.	5.522069
F-statistic	33.40877	Durbin-Watson stat	1.524786
Prob(F-statistic)	0.000000		

Dependent Variable: WORKER?
Method: Pooled Least Squares

Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 41
Total pool (unbalanced) observations: 160

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.540680	4.818574	1.979980	0.0502
COMPETITION?	-1.582238	2.526370	-0.626289	0.5324
COMPETITION?(-1)	-1.903999	2.541157	-0.749265	0.4553
SALARY?(-1)	-0.000100	5.19E-05	-1.932697	0.0559
EMPLOY?(-1)	0.050351	0.014254	3.532469	0.0006
LQUALITY?	-0.001581	0.001004	-1.574096	0.1184
HHI?	30.31192	13.92475	2.176837	0.0317
ROADDEN?	0.356949	0.272454	1.310125	0.1929
Fixed Effects (Cross)				
_TAIYUAN--C	13.64548			
_DATONG--C	-5.425708			
_HOHHOT--C	-2.800582			
_BAOTOU--C	3.489537			
_CHANGCHUN--C	19.77190			
_JILIN--C	0.752925			
_HARBIN--C	17.23405			

_QIQIHAR--C	-1.753260
_JIXI--C	-11.88385
_HEGANG--C	-16.05420
_DAQING--C	-1.204432
_YICHUN--C	-13.80196
_JIAMUSI--C	-4.545910
_MUDANJIANG--C	-4.847377
_HEFEI--C	11.91080
_WUHU--C	-0.409836
_BENGBU--C	-5.669780
_HUAINAN--C	-6.757945
_HUAIBEI--C	-13.78818
_NANCHANG--C	10.49545
_JIUJIANG--C	-6.431488
_ZHENGZHOU--C	23.53907
_KAIFENG--C	-5.870619
_LUOYANG--C	2.153460
_PINGDINGSHAN--C	-3.999885
_ANYANG--C	-3.233178
_XINXIANG--C	-4.167708
_JIAOZUO--C	-5.479126
_WUHAN--C	32.07360
_HUANGSHI--C	-5.703727
_YICHANG--C	-0.475280
_XIANGYANG--C	0.352005
_JINGZHOU--C	-3.516030
_CHANGSHA--C	6.574502
_ZHUZHOU--C	-0.919124
_XIANGTAN--C	-1.589363
_HENGYANG--C	-2.778392
_YUEYANG--C	-2.918996
_NANNING--C	3.419236
_LIUZHOU--C	2.439618
_BEIHAI--C	-6.987714
Fixed Effects (Period)	
2010--C	-1.086911
2011--C	-0.170874
2012--C	0.280653
2013--C	0.977133

Effects Specification
Cross-section fixed (dummy variables)
Period fixed (dummy variables)

R-squared	0.936314	Mean dependent var	10.14519
Adjusted R-squared	0.907100	S.D. dependent var	9.242555
S.E. of regression	2.817079	Akaike info criterion	5.162952
Sum squared resid	865.0169	Schwarz criterion	6.143164
Log likelihood	-362.0362	Hannan-Quinn criter.	5.560982
F-statistic	32.05049	Durbin-Watson stat	1.499915
Prob(F-statistic)	0.000000		

Annex 6: Original Regression Result of Model 6

Dependent Variable: WORKER?
Method: Pooled Least Squares

Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 41
Total pool (unbalanced) observations: 160

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.540680	4.818574	1.979980	0.0502
COMPETITION?	-1.582238	2.526370	-0.626289	0.5324
COMPETITION?(-1)	-1.903999	2.541157	-0.749265	0.4553
SALARY?(-1)	-0.000100	5.19E-05	-1.932697	0.0559
EMPLOY?(-1)	0.050351	0.014254	3.532469	0.0006
LQUALITY?	-0.001581	0.001004	-1.574096	0.1184
HHI?	30.31192	13.92475	2.176837	0.0317
ROADDEN?	0.356949	0.272454	1.310125	0.1929
Fixed Effects (Cross)				
_TAIYUAN--C	13.64548			
_DATONG--C	-5.425708			
_HOHHOT--C	-2.800582			
_BAOTOU--C	3.489537			
_CHANGCHUN--C	19.77190			
_JILIN--C	0.752925			
_HARBIN--C	17.23405			
_QIQIHAR--C	-1.753260			
_JIXI--C	-11.88385			
_HEGANG--C	-16.05420			
_DAQING--C	-1.204432			
_YICHUN--C	-13.80196			
_JIAMUSI--C	-4.545910			
_MUDANJIANG--C	-4.847377			

_HEFEI--C	11.91080
_WUHU--C	-0.409836
_BENGBU--C	-5.669780
_HUAINAN--C	-6.757945
_HUAIBEI--C	-13.78818
_NANCHANG--C	10.49545
_JIUJIANG--C	-6.431488
_ZHENGZHOU--C	23.53907
_KAIFENG--C	-5.870619
_LUOYANG--C	2.153460
_PINGDINGSHAN--C	-3.999885
_ANYANG--C	-3.233178
_XINXIANG--C	-4.167708
_JIAOZUO--C	-5.479126
_WUHAN--C	32.07360
_HUANGSHI--C	-5.703727
_YICHANG--C	-0.475280
_XIANGYANG--C	0.352005
_JINGZHOU--C	-3.516030
_CHANGSHA--C	6.574502
_ZHUZHOU--C	-0.919124
_XIANGTAN--C	-1.589363
_HENGYANG--C	-2.778392
_YUEYANG--C	-2.918996
_NANNING--C	3.419236
_LIUZHOU--C	2.439618
_BEIHAI--C	-6.987714
Fixed Effects (Period)	
2010--C	-1.086911
2011--C	-0.170874
2012--C	0.280653
2013--C	0.977133

Effects Specification
Cross-section fixed (dummy variables)
Period fixed (dummy variables)

R-squared	0.936314	Mean dependent var	10.14519
Adjusted R-squared	0.907100	S.D. dependent var	9.242555
S.E. of regression	2.817079	Akaike info criterion	5.162952
Sum squared resid	865.0169	Schwarz criterion	6.143164
Log likelihood	-362.0362	Hannan-Quinn criter.	5.560982
F-statistic	32.05049	Durbin-Watson stat	1.499915
Prob(F-statistic)	0.000000		

Annex 7: Original Regression Result of Model 7

Dependent Variable: WORKER?
Method: Pooled Least Squares

Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 12
Total pool (unbalanced) observations: 42

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	371.8987	93.10393	3.994447	0.0007
INPRI?	-0.496212	0.190866	-2.599796	0.0171
INPRI?(-1)	-0.029871	0.024973	-1.196126	0.2456
SALARY?(-1)	-0.001054	0.000580	-1.815973	0.0844
EMPLOY?(-1)	0.039302	0.022293	1.763008	0.0932
HHI?	-604.7630	260.9438	-2.317599	0.0312
ROADDEN?	3.086881	2.609954	1.182734	0.2508
LQUALITY?	0.017765	0.017882	0.993443	0.3324
Fixed Effects (Cross)				
_CHENGDU--C	129.4328			
_NANCHONG--C	-47.46090			
_YIBIN--C	-57.34253			
_GUIYANG--C	-37.48079			
_KUNMING--C	27.89172			
_LASA--C	176.7296			
_CHONGQING--C	148.4836			
_XIAN--C	58.36280			
_LANZHOU--C	81.49725			
_XINING--C	-68.65373			
_YINCHUAN--C	-158.9778			
_URUMQI--C	-40.02092			
Fixed Effects (Period)				
2010--C	-5.028594			
2011--C	-8.659551			
2012--C	-2.333602			
2013--C	16.02175			

Effects Specification

Cross-section fixed (dummy variables)
Period fixed (dummy variables)

R-squared	0.921049	Mean dependent var	19.27381
Adjusted R-squared	0.838151	S.D. dependent var	31.98096
S.E. of regression	12.86609	Akaike info criterion	8.252750
Sum squared resid	3310.727	Schwarz criterion	9.162958
Log likelihood	-151.3077	Hannan-Quinn criter.	8.586377
F-statistic	11.11059	Durbin-Watson stat	1.353068
Prob(F-statistic)	0.000001		

Annex 8: Original Regression Result of Model 8

Dependent Variable: WORKER?
Method: Pooled Least Squares

Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 12
Total pool (unbalanced) observations: 42

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	570.2069	91.40255	6.238414	0.0000
COMPETITION?	-158.2794	80.88497	-1.956846	0.0645
COMPETITION?(-1)	-296.4154	86.59296	-3.423089	0.0027
EMPLOY?(-1)	0.015277	0.020084	0.760653	0.4557
ROADDEN?	-0.246430	2.262364	-0.108926	0.9143
SALARY?(-1)	-0.001652	0.000455	-3.634274	0.0017
LQUALITY?	0.033165	0.014164	2.341466	0.0297
HHI?	-527.5777	217.1537	-2.429513	0.0247
Fixed Effects (Cross)				
_CHENGDU--C	181.3104			
_NANCHONG--C	-79.81047			
_YIBIN--C	-188.7114			
_GUIYANG--C	-82.42720			
_KUNMING--C	43.41176			
_LASA--C	282.9435			
_CHONGQING--C	147.0075			
_XIAN--C	140.9010			
_LANZHOU--C	187.5864			
_XINING--C	-75.28421			
_YINCHUAN--C	-234.3110			
_URUMQI--C	-17.10379			
Fixed Effects (Period)				
2010--C	11.56432			

2011--C	-18.80765		
2012--C	-8.419157		
2013--C	15.66248		
Effects Specification			
Cross-section fixed (dummy variables)			
Period fixed (dummy variables)			
R-squared	0.945075	Mean dependent var	19.27381
Adjusted R-squared	0.887403	S.D. dependent var	31.98096
S.E. of regression	10.73136	Akaike info criterion	7.889899
Sum squared resid	2303.241	Schwarz criterion	8.800107
Log likelihood	-143.6879	Hannan-Quinn criter.	8.223526
F-statistic	16.38719	Durbin-Watson stat	1.396177
Prob(F-statistic)	0.000000		

Annex 9 Modified regression Result of Model 1

Dependent Variable: WORKER?
Method: Pooled Least Squares
Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 103
Total pool (unbalanced) observations: 403
Cross sections without valid observations dropped

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.621264	8.179724	0.442712	0.6583
INPRI?	0.066641	0.012927	5.155265	0.0000
SALARY?(-1)	-0.000254	9.46E-05	-2.684124	0.0077
EMPLOY?(-1)	0.040593	0.010903	3.723077	0.0002
HHI?	-42.56353	18.84678	-2.258398	0.0247
ROADDEN?	0.947990	0.572655	1.655430	0.0989

Annex 10 Modified regression Result of Model 2

Dependent Variable: WORKER?
Method: Pooled Least Squares
Date: 08/17/16 Time: 21:21
Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 103

Total pool (unbalanced) observations: 401
Cross sections without valid observations dropped

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-13.86183	10.06692	-1.376968	0.1696
COMPETITION?	23.54259	6.799598	3.462349	0.0006
COMPETITION?(-1)	24.22260	6.997003	3.461854	0.0006
EMPLOY?(-1)	0.040653	0.010923	3.721645	0.0002
ROADDEN?	0.851509	0.573930	1.483645	0.1390
SALARY?(-1)	-0.000268	9.56E-05	-2.807520	0.0053
LQUALITY?	0.003215	0.002594	1.239387	0.2162
HHI?	-38.94316	18.80738	-2.070632	0.0393
Fixed Effects (Cross)				

Annex 11 Modified regression Result of Model 3

Dependent Variable: WORKER?
Method: Pooled Least Squares
Date: 09/08/16 Time: 16:00
Sample: 2009 2013
Included observations: 5
Cross-sections included: 52
Total pool (unbalanced) observations: 258

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12.70035	5.435960	2.336359	0.0205
INPRI?	0.019638	0.005869	3.346249	0.0010
LQUALITY?	0.010189	0.004706	2.165254	0.0316
HHI?	7.129548	17.75170	0.401626	0.6884

Annex 12 Modified regression Result of Model 4

Dependent Variable: WORKER?
Method: Pooled Least Squares
Date: 09/08/16 Time: 16:07
Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 52
Total pool (unbalanced) observations: 206

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	-58.62632	21.30097	-2.752284	0.0067
COMPETITION?	15.60584	25.00821	0.624029	0.5336
COMPETITION?(-1)	64.68568	25.80858	2.506363	0.0133
LQUALITY?	0.017830	0.006928	2.573802	0.0110
HHI?	-55.53434	33.51073	-1.657211	0.0996

Annex 13 Modified regression Result of Model 5

Dependent Variable: WORKER?
Method: Pooled Least Squares
Date: 09/08/16 Time: 16:09
Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 41
Total pool (unbalanced) observations: 161

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.891666	3.083223	-0.613535	0.5408
INPRI?(-1)	0.017747	0.004066	4.364663	0.0000
ROADDEN?	0.501670	0.265264	1.891206	0.0612
SALARY?(-1)	-6.75E-05	4.42E-05	-1.527763	0.1294
HHI?	37.24224	12.96885	2.871669	0.0049

Annex 14 Modified regression Result of Model 6

Dependent Variable: WORKER?
Method: Pooled Least Squares
Date: 09/08/16 Time: 16:10
Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 41
Total pool (unbalanced) observations: 160

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.039887	4.466707	1.576080	0.1179
COMPETITION?	-1.690078	2.529191	-0.668228	0.5054
COMPETITION?(-1)	-1.985843	2.564943	-0.774225	0.4404
SALARY?(-1)	-7.22E-05	5.02E-05	-1.437791	0.1533
EMPLOY?(-1)	0.049917	0.014157	3.526017	0.0006

HHI?	37.87333	13.41888	2.822392	0.0057

Annex 15 Modified regression Result of Model 7

Dependent Variable: WORKER?
Method: Pooled Least Squares
Date: 09/08/16 Time: 16:12
Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 12
Total pool (unbalanced) observations: 42

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	392.3241	88.23091	4.446561	0.0002
INPRI?	-0.511944	0.166000	-3.084006	0.0052
SALARY?(-1)	-0.001382	0.000465	-2.971360	0.0068
EMPLOY?(-1)	0.050333	0.022020	2.285792	0.0318
HHI?	-578.1281	246.6840	-2.343598	0.0281

Annex 16 Modified regression Result of Model 8

Dependent Variable: WORKER?
Method: Pooled Least Squares
Date: 09/08/16 Time: 16:13
Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 12
Total pool (unbalanced) observations: 42

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	588.1935	77.53735	7.585938	0.0000
COMPETITION?	-161.4048	78.18675	-2.064349	0.0510
COMPETITION?(-1)	-320.5151	67.69909	-4.734408	0.0001
SALARY?(-1)	-0.001667	0.000359	-4.647876	0.0001
LQUALITY?	0.036534	0.012626	2.893497	0.0084
HHI?	-476.4602	177.0094	-2.691723	0.0133

Annex 17: Hausman test result of Model 1

Correlated Random Effects - Hausman Test
Pool: MODEL1
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	71.488125	7	0.0000

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
INPRI?	0.065943	0.074626	0.000151	0.4796
INPRI?(-1)	0.002721	-0.002071	0.000001	0.0000
SALARY?(-1)	-0.000252	-0.000134	0.000000	0.0000
LQUALITY?	-0.005661	-0.005598	0.000001	0.9425
EMPLOY?(-1)	0.033533	0.052996	0.000024	0.0001
HHI?	-59.254232	-1.745887	182.772065	0.0000
ROADDEN?	0.261319	-0.341578	0.094520	0.0499

Cross-section random effects test equation:
Dependent Variable: WORKER?
Method: Panel Least Squares
Date: 08/08/16 Time: 10:17
Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 103
Total pool (unbalanced) observations: 401

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.71437	8.145399	1.315390	0.1894
INPRI?	0.065943	0.013922	4.736644	0.0000
INPRI?(-1)	0.002721	0.004478	0.607572	0.5439
SALARY?(-1)	-0.000252	8.44E-05	-2.991860	0.0030
LQUALITY?	-0.005661	0.002130	-2.658100	0.0083
EMPLOY?(-1)	0.033533	0.012025	2.788520	0.0056
HHI?	-59.25423	19.28538	-3.072495	0.0023
ROADDEN?	0.261319	0.569013	0.459250	0.6464

Effects Specification

Cross-section fixed (dummy variables)			
R-squared	0.915324	Mean dependent var	21.34930
Adjusted R-squared	0.883606	S.D. dependent var	32.03446
S.E. of regression	10.92905	Akaike info criterion	7.848716
Sum squared resid	34758.23	Schwarz criterion	8.944316
Log likelihood	-1463.667	Hannan-Quinn criter.	8.282545
F-statistic	28.85881	Durbin-Watson stat	1.398450
Prob(F-statistic)	0.000000		

Annex 18: Hausman test result of Model 2

Correlated Random Effects - Hausman Test
Pool: MODEL2
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	91.253276	7	0.0000

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
COMPETITION?	24.202309	21.882487	18.417579	0.5888
COMPETITION?(-1)	25.801537	15.623546	17.863119	0.0160
EMPLOY?(-1)	0.036894	0.053828	0.000020	0.0002
ROADDEN?	0.188636	-0.156263	0.096015	0.2657
SALARY?(-1)	-0.000262	-0.000128	0.000000	0.0000
LQUALITY?	-0.005598	-0.004728	0.000001	0.3208
HHI?	-55.157472	4.875297	182.912041	0.0000

Cross-section random effects test equation:
Dependent Variable: WORKER?
Method: Panel Least Squares
Date: 08/08/16 Time: 10:18
Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 103
Total pool (unbalanced) observations: 401

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	-6.742989	10.10095	-0.667560	0.5049
COMPETITION?	24.20231	7.098577	3.409459	0.0007
COMPETITION?(-1)	25.80154	7.288402	3.540082	0.0005
EMPLOY?(-1)	0.036894	0.011271	3.273444	0.0012
ROADDEN?	0.188636	0.564381	0.334235	0.7384
SALARY?(-1)	-0.000262	8.34E-05	-3.135705	0.0019
LQUALITY?	-0.005598	0.002109	-2.654131	0.0084
HHI?	-55.15747	19.09247	-2.888964	0.0042

Effects Specification
Cross-section fixed (dummy variables)

R-squared	0.916896	Mean dependent var	21.34930
Adjusted R-squared	0.885768	S.D. dependent var	32.03446
S.E. of regression	10.82709	Akaike info criterion	7.829971
Sum squared resid	34112.75	Schwarz criterion	8.925571
Log likelihood	-1459.909	Hannan-Quinn criter.	8.263800
F-statistic	29.45539	Durbin-Watson stat	1.408507
Prob(F-statistic)	0.000000		

Annex 19: Hausman test result of Model 3

Correlated Random Effects - Hausman Test
Pool: MODEL3_EAST
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	86.828009	7	0.0000

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
INPRI?	0.181307	0.088783	0.000457	0.0000
INPRI?(-1)	-0.000362	-0.004498	0.000004	0.0283
EMPLOY?(-1)	-0.007358	0.043849	0.000115	0.0000
ROADDEN?	0.467839	0.035695	0.576558	0.5693
SALARY?(-1)	0.000001	-0.000050	0.000000	0.2288
LQUALITY?	-0.004774	-0.005434	0.000003	0.6829
HHI?	-70.983674	-11.107167	180.347515	0.0000

Cross-section random effects test equation:
Dependent Variable: WORKER?
Method: Panel Least Squares
Date: 08/08/16 Time: 10:26
Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 51
Total pool (unbalanced) observations: 200

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-53.58695	13.95813	-3.839120	0.0002
INPRI?	0.181307	0.023019	7.876557	0.0000
INPRI?(-1)	-0.000362	0.005630	-0.064364	0.9488
EMPLOY?(-1)	-0.007358	0.022279	-0.330266	0.7417
ROADDEN?	0.467839	1.099601	0.425462	0.6711
SALARY?(-1)	9.27E-07	0.000132	0.007000	0.9944
LQUALITY?	-0.004774	0.003769	-1.266733	0.2073
HHI?	-70.98367	22.09372	-3.212843	0.0016

Effects Specification
Cross-section fixed (dummy variables)

R-squared	0.943246	Mean dependent var	30.64940
Adjusted R-squared	0.920464	S.D. dependent var	39.96192
S.E. of regression	11.27012	Akaike info criterion	7.919697
Sum squared resid	18036.21	Schwarz criterion	8.876209
Log likelihood	-733.9697	Hannan-Quinn criter.	8.306782
F-statistic	41.40366	Durbin-Watson stat	1.917682
Prob(F-statistic)	0.000000		

Annex 20: Hausman test result of Model 4

Correlated Random Effects - Hausman Test
Pool: MODEL4_EAST
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	105.430781	7	0.0000

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
COMPETITION?	34.349051	42.689925	63.189271	0.2941
COMPETITION?(-1)	64.322365	-4.365660	71.749776	0.0000
SALARY?(-1)	0.000005	-0.000038	0.000000	0.3441
LQUALITY?	-0.002306	-0.003572	0.000003	0.4624
HHI?	-66.285823	2.066273	207.136631	0.0000
ROADDEN?	0.318702	0.237375	0.647785	0.9195
EMPLOY?(-1)	-0.008575	0.053669	0.000108	0.0000

Cross-section random effects test equation:
Dependent Variable: WORKER?
Method: Panel Least Squares
Date: 08/08/16 Time: 10:28
Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 51
Total pool (unbalanced) observations: 200

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-68.71998	16.12629	-4.261363	0.0000
COMPETITION?	34.34905	17.59151	1.952592	0.0528
COMPETITION?(-1)	64.32237	18.85950	3.410608	0.0008
SALARY?(-1)	4.84E-06	0.000134	0.036055	0.9713
LQUALITY?	-0.002306	0.003824	-0.602976	0.5475
HHI?	-66.28582	22.40515	-2.958508	0.0036
ROADDEN?	0.318702	1.110753	0.286924	0.7746
EMPLOY?(-1)	-0.008575	0.020484	-0.418608	0.6761

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.941500	Mean dependent var	30.64940
Adjusted R-squared	0.918017	S.D. dependent var	39.96192
S.E. of regression	11.44215	Akaike info criterion	7.949994
Sum squared resid	18591.04	Schwarz criterion	8.906507
Log likelihood	-736.9994	Hannan-Quinn criter.	8.337080
F-statistic	40.09368	Durbin-Watson stat	1.912987
Prob(F-statistic)	0.000000		

Annex 21: Hausman test result of Model 5

Correlated Random Effects - Hausman Test
Pool: MODEL5_MIDDLE
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	88.672295	7	0.0000

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
INPRI?	-0.002792	0.011770	0.000007	0.0000
INPRI?(-1)	0.011488	0.009188	0.000008	0.4077
EMPLOY?(-1)	0.017701	0.064653	0.000075	0.0000
ROADDEN?	0.184621	0.387125	0.012506	0.0702
SALARY?(-1)	-0.000101	-0.000151	0.000000	0.0134
LQUALITY?	-0.003010	-0.002055	0.000000	0.0001
HHI?	22.660153	-5.104135	112.205138	0.0088

Cross-section random effects test equation:
Dependent Variable: WORKER?
Method: Panel Least Squares
Date: 08/08/16 Time: 10:31
Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 41
Total pool (unbalanced) observations: 160

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.294166	4.054679	1.798950	0.0747
INPRI?	-0.002792	0.004711	-0.592671	0.5546
INPRI?(-1)	0.011488	0.005631	2.039976	0.0437
EMPLOY?(-1)	0.017701	0.019108	0.926337	0.3563
ROADDEN?	0.184621	0.249836	0.738972	0.4615
SALARY?(-1)	-0.000101	4.48E-05	-2.246258	0.0266
LQUALITY?	-0.003010	0.000743	-4.049323	0.0001
HHI?	22.66015	13.46426	1.682986	0.0952

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.934588	Mean dependent var	10.14519
Adjusted R-squared	0.907139	S.D. dependent var	9.242555
S.E. of regression	2.816495	Akaike info criterion	5.152188
Sum squared resid	888.4560	Schwarz criterion	6.074740
Log likelihood	-364.1751	Hannan-Quinn criter.	5.526805
F-statistic	34.04755	Durbin-Watson stat	1.542080
Prob(F-statistic)	0.000000		

Annex 22: Hausman test result of Model 6

Correlated Random Effects - Hausman Test
Pool: MODEL6_MIDDLE
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	80.787478	7	0.0000

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
COMPETITION?	-2.540964	5.521018	2.045429	0.0000
COMPETITION?(-1)	-2.574521	6.128582	2.282606	0.0000
SALARY?(-1)	-0.000099	-0.000163	0.000000	0.0039
EMPLOY?(-1)	0.043626	0.083533	0.000032	0.0000
LQUALITY?	-0.002889	-0.002049	0.000000	0.0012
HHI?	23.942763	-1.171985	113.013983	0.0182
ROADDEN?	0.089403	0.438799	0.011637	0.0012

Cross-section random effects test equation:
Dependent Variable: WORKER?
Method: Panel Least Squares
Date: 08/08/16 Time: 10:32
Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 41
Total pool (unbalanced) observations: 160

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.57692	4.475181	3.033827	0.0030
COMPETITION?	-2.540964	2.509565	-1.012512	0.3135
COMPETITION?(-1)	-2.574521	2.546975	-1.010815	0.3143
SALARY?(-1)	-9.93E-05	4.56E-05	-2.177694	0.0315
EMPLOY?(-1)	0.043626	0.013912	3.135810	0.0022
LQUALITY?	-0.002889	0.000754	-3.829461	0.0002
HHI?	23.94276	13.62018	1.757889	0.0815
ROADDEN?	0.089403	0.250242	0.357265	0.7216

Effects Specification			
Cross-section fixed (dummy variables)			
R-squared	0.932986	Mean dependent var	10.14519
Adjusted R-squared	0.904864	S.D. dependent var	9.242555
S.E. of regression	2.850789	Akaike info criterion	5.176394
Sum squared resid	910.2236	Schwarz criterion	6.098946
Log likelihood	-366.1115	Hannan-Quinn criter.	5.551010
F-statistic	33.17633	Durbin-Watson stat	1.527613
Prob(F-statistic)	0.000000		

Annex 23: Hausman test result of Model 7

Correlated Random Effects - Hausman Test
Pool: MODEL7_WEST
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	27.524817	7	0.0003

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
INPRI?	-0.452994	0.087467	0.024699	0.0006
INPRI?(-1)	-0.047644	-0.039084	0.000026	0.0951
SALARY?(-1)	-0.000880	-0.000570	0.000000	0.0011
EMPLOY?(-1)	0.039441	0.058306	0.000120	0.0855
HHI?	-443.103410	-134.762991	41637.267965	0.1308
ROADDEN?	1.643521	-0.582522	0.417238	0.0006
LQUALITY?	-0.014446	-0.025136	0.000045	0.1091

Cross-section random effects test equation:
Dependent Variable: WORKER?
Method: Panel Least Squares
Date: 08/08/16 Time: 10:33
Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 12
Total pool (unbalanced) observations: 42

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	355.1979	85.10115	4.173832	0.0004
INPRI?	-0.452994	0.165478	-2.737482	0.0117
INPRI?(-1)	-0.047644	0.025067	-1.900689	0.0699
SALARY?(-1)	-0.000880	0.000306	-2.874376	0.0086
EMPLOY?(-1)	0.039441	0.023551	1.674697	0.1075
HHI?	-443.1034	241.1752	-1.837268	0.0791
ROADDEN?	1.643521	1.662259	0.988728	0.3331
LQUALITY?	-0.014446	0.012038	-1.200027	0.2423

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.885957	Mean dependent var	19.27381
Adjusted R-squared	0.796706	S.D. dependent var	31.98096
S.E. of regression	14.41963	Akaike info criterion	8.477645
Sum squared resid	4782.294	Schwarz criterion	9.263734
Log likelihood	-159.0305	Hannan-Quinn criter.	8.765777
F-statistic	9.926556	Durbin-Watson stat	1.278840
Prob(F-statistic)	0.000001		

Annex 24: Hausman test result of Model 8

Correlated Random Effects - Hausman Test
Pool: MODEL8_WEST
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	82.484999	7	0.0000

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
COMPETITION?	-171.322415	-174.297598	5893.821272	0.9691
COMPETITION?(-1)	-198.379046	209.135169	4259.290858	0.0000
EMPLOY?(-1)	0.025096	0.072144	0.000254	0.0031
ROADDEN?	1.069267	-2.147888	0.562125	0.0000
SALARY?(-1)	-0.000893	-0.000156	0.000000	0.0000
LQUALITY?	-0.007469	-0.029248	0.000095	0.0256
HHI?	-505.539219	-27.698797	50285.927142	0.0331

Cross-section random effects test equation:
Dependent Variable: WORKER?
Method: Panel Least Squares
Date: 08/08/16 Time: 10:39
Sample (adjusted): 2010 2013
Included observations: 4 after adjustments
Cross-sections included: 12
Total pool (unbalanced) observations: 42

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	478.7648	99.16162	4.828126	0.0001
COMPETITION?	-171.3224	105.1122	-1.629901	0.1167
COMPETITION?(-1)	-198.3790	95.92038	-2.068164	0.0501
EMPLOY?(-1)	0.025096	0.024456	1.026174	0.3155
ROADDEN?	1.069267	1.576194	0.678385	0.5043
SALARY?(-1)	-0.000893	0.000304	-2.938952	0.0074
LQUALITY?	-0.007469	0.012011	-0.621839	0.5402
HHI?	-505.5392	233.0212	-2.169499	0.0406

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.891614	Mean dependent var	19.27381
Adjusted R-squared	0.806790	S.D. dependent var	31.98096
S.E. of regression	14.05743	Akaike info criterion	8.426766
Sum squared resid	4545.064	Schwarz criterion	9.212855
Log likelihood	-157.9621	Hannan-Quinn criter.	8.714899
F-statistic	10.51137	Durbin-Watson stat	1.203056
Prob(F-statistic)	0.000000		

Annex 25: Fixed effect test of Model 1

Redundant Fixed Effects Tests

Pool: MODEL1

Test cross-section and period fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	11.556489	(102,288)	0.0000
Cross-section Chi-square	652.768639	102	0.0000
Period F	10.081487	(3,288)	0.0000
Period Chi-square	40.043600	3	0.0000
Cross-Section/Period F	11.893366	(105,288)	0.0000
Cross-Section/Period Chi-square	671.474255	105	0.0000

Annex 26: Fixed effect test of Model 2

Redundant Fixed Effects Tests

Pool: MODEL2

Test cross-section and period fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	11.978523	(102,288)	0.0000
Cross-section Chi-square	664.368041	102	0.0000
Period F	9.780639	(3,288)	0.0000
Period Chi-square	38.904746	3	0.0000
Cross-Section/Period F	12.422508	(105,288)	0.0000
Cross-Section/Period Chi-square	685.715654	105	0.0000

Annex 27: Fixed effect test of Model 3

Redundant Fixed Effects Tests

Pool: MODEL3_EAST

Test cross-section and period fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	16.140671	(50,139)	0.0000
Cross-section Chi-square	383.560821	50	0.0000
Period F	7.704676	(3,139)	0.0001

Period Chi-square	30.765205	3	0.0000
Cross-Section/Period F	16.539325	(53,139)	0.0000
Cross-Section/Period Chi-square	397.749080	53	0.0000

Annex 28: Fixed effect test of Model 4

Redundant Fixed Effects Tests

Pool: MODEL4_EAST

Test cross-section and period fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	13.653165	(50,139)	0.0000
Cross-section Chi-square	355.370128	50	0.0000
Period F	5.510033	(3,139)	0.0013
Period Chi-square	22.473069	3	0.0001
Cross-Section/Period F	14.244436	(53,139)	0.0000
Cross-Section/Period Chi-square	372.236323	53	0.0000

Annex 29: Fixed effect test of Model 5

Redundant Fixed Effects Tests

Pool: MODEL5_MIDDLE

Test cross-section and period fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	15.016032	(40,109)	0.0000
Cross-section Chi-square	299.745873	40	0.0000
Period F	2.465300	(3,109)	0.0661
Period Chi-square	10.503908	3	0.0147
Cross-Section/Period F	15.374120	(43,109)	0.0000
Cross-Section/Period Chi-square	312.824934	43	0.0000

Annex 30: Fixed effect test of Model 6

Redundant Fixed Effects Tests

Pool: MODEL6_MIDDLE

Test cross-section and period fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	13.277688	(40,109)	0.0000
Cross-section Chi-square	283.246126	40	0.0000
Period F	1.898820	(3,109)	0.1341
Period Chi-square	8.150606	3	0.0430
Cross-Section/Period F	13.992286	(43,109)	0.0000
Cross-Section/Period Chi-square	299.977269	43	0.0000

Annex 31: Fixed effect test of Model 7

Redundant Fixed Effects Tests

Pool: MODEL7_WEST

Test cross-section and period fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	13.644932	(11,20)	0.0000
Cross-section Chi-square	89.906058	11	0.0000
Period F	2.963229	(3,20)	0.0568
Period Chi-square	15.445600	3	0.0015
Cross-Section/Period F	11.111347	(14,20)	0.0000
Cross-Section/Period Chi-square	91.234169	14	0.0000

Annex 32: Fixed effect test of Model 8

Redundant Fixed Effects Tests

Pool: MODEL8_WEST

Test cross-section and period fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	18.292894	(11,20)	0.0000
Cross-section Chi-square	100.944216	11	0.0000
Period F	6.488893	(3,20)	0.0030
Period Chi-square	28.548428	3	0.0000
Cross-Section/Period F	15.258884	(14,20)	0.0000
Cross-Section/Period Chi-square	103.235257	14	0.0000

Annex 34: IHS copyright form

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