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What Determines Inward FDI in China?

——An empirical study using firm-level data

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Bin Ni

PhD Candidate, Graduate School of Economics, Osaka University

Abstract: Using firm-level data from an Enterprise Survey of World Bank, this paper is designed to test how policy variables can affect inward foreign direct investment ("FDI") in China. After excluding the problems of sample selection and endogeneity, the result shows that investment promotion agencies (IPAs) and investment incentive zones (IIZs) have significant positive effect on absorbing FDI in China. Other factors such as sales volume and R&D also have significant impact. I also found that both IPAs and IIZs play a more important role in inviting other foreign companies to come to China than they do to Hong Kong, Macau, and Taiwan ("HMT") enterprises. The last finding is that if the city has IPA only, its promotion effect actually outweighs the city with IPA or IIZ combined; on the other hand, if the city has IPA or IIZ, then its positive effect on absorbing FDI will be larger than the city with IIZ solely.

Keywords: Investment promotion agency, firm-level data, sample selection, China

JEL classification: F21, F23

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1. Introduction

The past three decades have witnessed an unprecedented expansion in inward FDI in China. Actually, China has become one of the top three recipients of FDI in the world since 2003 (Cheng 2005). In the most recent World Invest Report 2012 issued by UNCTAD, by 2011 the inward FDI stock in China had reached a tremendous value of 712 billion US dollars. Despite the fact that China's inward FDI in 2011 ranked second, followed by the US, China remains the most populous host country for the MNCs surveyed. Statistics also show the importance of foreign capital in China's economic growth. In fact, foreign enterprises account for a large proportion of China's industrial added-value and nearly one-fifth of taxation. Furthermore, they promote the development of domestic firms through technological spillover and demonstration effect. In this way, FDI plays an indispensible role in propelling China's economy.

Then the interesting question is: why is China so attractive to multinational companies? What are the main factors to attract FDI into China? Does policy change or regulation have any impact on the increase in FDI?

Since quite a number of previous researches have been done to test the determinants of FDI in China, my interest should be to explore some new factors. Besides enterprises' characteristics, I would like to know if government interference has anything to do with multinational corporations' investment decision. And because of the scarcity of empirical studies using micro-level data to verify policy determinants, I want to fill in the blank in this field. In my paper, I will mainly concentrate on two kinds of policy tools: IPA(investment promotion agency) and IIZ(investment incentive zone). Jacques Morisset (2003) tests the effect of IPA on FDI using 58 countries' data while Hampton(2006) finds IPAs' facilitating effect on attracting inward FDI in China from a theoretical point of view. As for IIZ, Tung and Cho (2001) use city-level data to indicate that areas offering lower tax rates and

increased tax incentives are found to attract a greater amount of FDI. So, I want to build a model to empirically test the effects of both of these policies.

Apart from basic OLS estimation, I will also take into account the potential econometric problems, such as endogeneity and sample selection to increase the efficiency of my estimation. After that, my next step will be to augment the original model to analyze other issues, for example, how policy tools affect different types of companies. Then the policy implication will be given as the final conclusion. The structure of the paper is as follows: Section 1 is the introduction; Section 2 is for literature review; Section 3 shows the methodology and variable configuration; Section 4 explains the data; Section 5 presents the results and Section 6 is the conclusion.

2. Literature review

2.1 Traditional Determinants

There are already many empirical studies which are focused on the determinants of FDI in China either from the perspective of volume or location. As Shaukat Ali and Wei Guo (2005) have indicated that the determinants of FDI inflows into China identified by FDI theories can be classified into three categories: Macro, Micro, and strategic determinants.

Cheng and Kwan (2000) focuses on macro-economic determinants of FDI. They use regional data to show that regional income and infrastructure have significant effect; Sun, Tong and Yu (2002) uses provincial data to show that GDP and labor quality have positive impact on attracting FDI; Tung (2001) with city-level data finds that market size has a positive impact, while tax rate has negative impact on inward FDI. Other macro factors include taxes[1], political risk, exchange rates, and others.

[1] The new industry tax law of China has been applied since 2008. The data used in this paper refers to the tax rate before 2008.

In comparison to macro-determinants, the research on FDI's determinants from the perspective of micro level is scarce due to the unavailability of data. Ng and Tuan (2003) uses firm-level data to show that trade cost plays a negative role in inviting FDI from the outside; while Faqin Lin (2011) uses firm-level data based on the first national economic census to prove that labor quality measured by education level plays an important role in deciding the distribution of FDI but labor quality measured by working certificates loses its significance. Furthermore, firm ownership has specific advantages such as product differentiation and the size of the firm can also be an important micro-determinants.

Strategic determinants refer to those long-term factors such as defending existing foreign markets, diversifying firms' activities, gaining or maintaining a foothold in the host country, and complementing another type of investment. These factors are mainly shown in the form of policies or regulations (incentives or restrictions). Tung and Cho (2001) uses regional data to check the effect of IIZ on FDI in China, since the enterprises located in this zone will more or less have certain merits of tax-reduction or exemption. The result turns out to be highly positive; Graham (2004) shows that EPZ (export processing zone) has, amongst other factors, positive effect on inward FDI in China. It is another example to show the important role that policies might play in China.

Due to the fact that there are few empirical studies from the perspective of microeconomics to develop policy implications, I decided to specifically test some new policy variables using firm-level data. In spite of the enormous amount of researches on policy study, I found that IPA is a new area to explore. In my paper, I will mainly focus on two kinds of incentive policies: IPA and IIZ.

2.2 IPA in China

IPA stands for investment promotion agency. Alvin G. Wint in "*Public marketing of Foreign investment: Successful international offices stand alone*" in 1992 defined investment promotion as "efforts by a government to communicate to foreign investors the nature of the country's investment climate, and to persuade and assist these investors to invest, or reinvest in the country".

Most governments have now realized the substantial IPAs' facilitating function towards attracting foreign direct investment. By far, 81 percent of countries around the globe have a national IPA[2]. World Bank also made a report, "Global Investment Promotion Benchmarking (GIPB) 2009", to evaluate the performance of IPAs which suggests that IPAs in developed countries outperformed those in developing countries, however, the situation in Asia has been improved greatly in the past several years.

China Investment Promotion Agency (CIPA) as well, is engaged in Chinese investment promotion process and in charge of "Inviting in" (FDI to China) and "Going global" (outbound investment) two-way investment promotion work. Its roles are as follows: organizing and implementing the foreign investment promotion strategy; Guiding and involving the Federation of Investment Promotion Agencies of China; Guiding the work of investment promotion agencies of different areas[3]. Actually, the prevailing circumstance in China is that most promotion activities are taken by branches of Ministry of Foreign Trade and Economic Cooperation each province, most of which are poorly designed (Zhang Jinkang, 2005). Meanwhile the number of regional IPAs in China is skyrocketing. Then the controversial fact leads us to the next question: do IPAs really work to attract FDI in China?

[2] This figure is taken from UNCTAD IPA observer No.1-2013.

[3] The definition can be found at http://www.fdi.gov.cn/pub/FDI_EN/about/AboutusEn3.htm

Most of the researches on IPAs are from the perspective of qualitative evaluation, while few empirical studies have been made, particularly in the field concerning the performance of IPA in China. Jacques Morisset (2003) is one of the few empirical studies to test the effect of IPA on FDI, which uses 58 countries' data and finds a positive correlation between the two; Michal(2007) indicates that IPA in Czech and Slovakia are associated with higher FDI inflow. Hampton(2006) finds that IPAs have a facilitating effect on attracting inward FDI in China. To test the effect of IPA, I decide to incorporate it into an econometric framework. The details will be shown in section 3.

2.3 IIZ in China

IIZ represents investment incentive zone, which was originally designed for cities to attract FDI because companies that invest inside such zones are given income tax benefits[4]. In 1980 the first four IIZs were set up in China—Shenzhen, Zhuhai, Shantou and Xiamen. Then in the mid-1980s and early 1990s, more and different types of IIZs with varying tax rates and tax incentives were established in the Eastern Coastal Region, the Provincial Capitals, the cities along Yantze River, the Border Regions, and the State Tourist Districts (Cho and Tung, 1998). Even after China unified its income tax law for all FDI, all special tax treatments are still retained for FDI in these zones. So the question is: do IIZs really work? Many empirical studies have been done to test the effect of tax incentive on FDI, most of which lead to positive results. Hartman (1984) investigates the incentive effect of domestic tax policy on FDI in the U.S. and finds significant result. The study by Tung and Cho (2001) is one of the few empirical studies concerning China. They use city-level data to test the relationship between tax rates and the amount of FDI. However, almost no empirical research using micro data has been found. That is the reason why I also want to examine IIZs' effect on FDI besides IPA.

[4] See "Table of Investment Incentive Zone" in the Appendix for detailed tax benefit towards foreign companies.

Thus, this paper is designed to fill the blank to empirically evaluate policies' effects on absorbing FDI in China from a micro point of view. Other factors displayed in previous literature will also be controlled and their relative effects are to be determined.

3. Methodology

To test the influence of policy, I created a dummy variable—IPA. Since every province has regional investment promotion agency which is subject to the National Department of Commerce, the difference can only be captured by using the city-level data. If the city has IPA, the dummy takes the value of 1, otherwise 0. IIZ is created in the same way. If the city is defined as investment incentive zone, the dummy has a value of 1, otherwise it is 0. Following the most standard estimation of FDI's determinants[5], I construct my model that is derived from a reduced form specification. The right side of the equation should include a vector of variables X, which is meant to capture the overall elements that determine an individual firm's investment. The general form can be written as below:

$$\ln(FDI)_{it} = \alpha + \beta 1 \ln WR_{it} + \beta 2 \ln RD_{it} + \beta 3 \ln Sale_{it} + \beta 4 \ln Taxra_{it} + \beta 5 IPA_{i} + \beta 6 trade\_time_{i} + \eta_{it} + \varepsilon_{it} \quad \ldots\ldots(1)$$

(option: to replace IPA with IIZ)

I use the log of FDI value as the dependent variable. FDI is the product of foreign ownership share and new investment value. Sale equals the sum of main business and other business[6]. I also include other control variables like wage rate, the value of R&D, customs clearance time, and so on. Tax rate is equal to income tax/core business profit. All variables take the form of logarithm except for customs clearance time. ηt is the city dummy, which includes GDP per capita, the value of infrastructure

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5 Fung et al., 2000, 2002; Sun et al., 2002; Owen C. H. Ho et al 2004 all used the similar model to do panel data analysis.

6 We delete those which are below the value of zero for either category. And this applies to other variables as well.

investment for each government, etc. i and t indicate firm and time. I do not add an industry dummy because it is not available in the dataset.

Variable description		
Lny	log of fdi	
ipadummy	whether the city has ipa	*
iizdummy	whether the city is iiz	*
lnWR	log of average wage	
lnSale	log of sales revenue	
lnTaxra	log of tax rate	
lnRD	log of R&D	
trade_time	customs clearance time (days)	*
ln_gdp_percapita	log of gdp per capita of the city	
ln_infrainvest	log of infrastructure investment value of the city	

* in my model, these are time-invariant variables[7]

4. Data

There are mainly four kinds of data resources I am going to use in this paper. They consist of firm characteristics, IPA dummy, IIZ dummy and city-level factors. The details are as follows:

① World Bank, Enterprise Survey: China 2005 Investment Climate Survey

- It is three-year panel data covering 2002-2004. But some of the variables are constant throughout time, e.g. ownership share.

[7] In the dataset, the time covers 2002-2004. Since the IPA cities (or IIZ) all built the facility before 2002, we assume this variable is time-invariant.

- It was done based on an interview with 12,400 firms in China and takes the form of a questionnaire, requiring the interviewers to answer the questions qualitatively or quantitatively.
- Questions range from company information, international trade, to financing situation. It was conducted in 123 cities all over China.

As for the ownership share of these firms, 990 are HMT (Hongkong, Macau and Taiwan); 1398 are foreign-invested enterprises and 365 are foreign-domestic shared companies. Concerning FDI volume, firstly I use "new fixed asset investment" to represent FDI volume; Sales revenue is set to equal the sum of "core business" and "other business income". And I drop the value if the total is less than zero; R&D is the annual value invested in the R&D department; Wage rate is the average wage of permanent workers; Tax rate= income tax/total sales revenue, however, since in China if a foreign company did not make any profit (deficit) in the previous year, then in the following year the deficit will be deducted from the total tax that this company has to pay. So I assume it is reasonable to have negative figures for tax rate in our dataset. All variables are in the unit of thousand yuan[8].

② www.chinafdi.org.cn (China International Investment Promotion)

I found IPA for every province in China and 89 IPAs on the city-level (also set-up year, and as I mentioned previously, I assume it is a time-invariant variable). However, the shortcoming is that no data has been found to evaluate the quality of IPAs.

③ www.fdi.gov.cn/pub/FDI/ (Invest in China)

By 2005, 54 IIZs have been set up in China covering 49 cities[9]. Most are in east coastal cities and provincial capital cities. I assume the value of IIZ dummy equals 1 as long as the city has IIZ, regardless of the number of IIZs it has.

④ National Bureau of statistics of China

[8] The unit for wage rate is yuan. Thus we divide it by 1000 to make it consistent with other units.
[9] The information is taking from "Invest in China".
http://www.fdi.gov.cn/pub/FDI/gjjjjkfq/gjjkfqzl/fzbg/fzbg2006/t20070118_72536.htm

Data such as GDP per capita and the value of infrastructure investment are chosen to capture the effect of city characteristics on FDI. The original unit for all these variables is 10,000 yuan. Thus I take the logarithm form of each value.

5. Estimation result

Firstly I run OLS with random effect model over fixed-effect model, since IPA and IIZ dummy in our model are time-invariant. See table 1 for the results.

Positive impact of IPAs or IIZs can be seen on the increase of inward FDI. Sales volume and R&D also have significant effect on FDI. However, there might be two serious econometric problems: endogeneity and sample selection, which might cause bias to the estimation result. I will try to re-estimate by taking these problems into consideration.

5.1 Endogeneity

Since the policy variables in which I am interested are time-invariant, they can be treated as exogenous variables from firm's point of view[10]. Nevertheless, other decisive factors such as wage rate, R&D and sales volume might cause endogeneity problem.

To begin with, I use one period lag of lnSale, lnWR, lnRD to replace the original variables in order to avoid possible endogeneity. The result is also included in table 1. Then I apply IV and GMM[11] estimation, as a double check. The results are as shown in table 2.

[10] However, in reality, they are exposed to the risk of endogeneity and might cause omitted variable bias. Because IPAs or IIZs might self-select into certain areas with higher GDP per capita or places which have location advantage and are more possible to attract greater FDI. For robustness check, we also run the model after controlling geographical characteristics. The positive effect of IPAs or IIZs on FDI still holds.

[11] See David Roodman (2009) for reference.

It can be observed that the IIZ dummy is still significant in both cases while the IPA dummy is not. Hausman test for IV method shows that the hypothesis, in which lnSale, lnWR and lnRD have endogeneity is correct. Meanwhile GMM confirms this assertion. After excluding this possibility, the results are consistent with the previous OLS estimation. Sales volume always has positive effect and wage rate becomes negatively significant. R&D remains significant when using a one period lag while it loses significance for IV and GMM estimation.

5.2 Sample selection

Though OLS gives a significant estimation, the problem of sample selection will disrupt the accuracy of the coefficients. I will take a look at the cause of this problem both theoretically and technically.

Firstly, in the dataset, ownership can take several forms: (1) State-owned Enterprises (SOE) (2) Foreign Invested Enterprises (3) Share joint-owned units. However, in the dataset I find that even for state-owned enterprises, it is possible that foreign enterprises can also become the shareholders (this is reflected in the ownership structure—percentage of foreign ownership). In fact I have no idea why some foreign companies choose to set up wholly-owned subsidiaries while others like to cooperate with local Chinese companies. Yet it is not sure why foreign companies prefer to invest in certain Chinese companies to others. In other words, the standard by which foreign companies choose to invest in China is unobserved. The result is that the data of companies without foreign capital can not be used to estimate the FDI volume, which will lead to a censored sample problem. If I insist on using OLS, I will only get a biased estimation result. In this case, the coefficients of IPAdummy, IIZdummy and other variables can not be accurately estimated.

Then I will try to conduct an analysis from an econometric point of view. The precise value of the underlying continuous variable is unobserved if it falls below or above a certain censoring value (threshold), i.e. it is known that the continuous

dependent variable falls within the censoring range, but not the exact value. In our case, the dependent variable is the volume of FDI and since I do not know exactly under what conditions MNC will decide to invest or not, the censoring threshold is unobservable. Censored data will prevent us from getting the consistent estimation of the coefficient.

To solve the problem, I apply Heckman two-step sample selection model (Heckman, 1979). In the first step, I estimate the propensity of foreign investment and in the second step, I estimate the volume of FDI. In the selection equation, I use city characteristics as the "excluded variable" for precise estimation. The effect of IPA and IIZ will be evaluated separately. The results are shown in table 3.

For both cases, lambda is significant. That means that a sample selection problem exists. After excluding the effect of this problem, I still find that IPA and IIZ dummy are positively significant, which indicates that IPAs and IIZs are definitely important factors to draw inward FDI in the case of China.

As for other variables, I can say sales volume has significant positive effect on FDI. The city's high GDP per capita also attracts foreign companies to invest in domestic market. The estimated coefficient of wage rate is ambiguous because it shows unstable signs in the outcome equation and selection equation .

5.3 Other issues

① Analysis of HMT[12] (Hongkong, Macau, Taiwan enterprises)

From Figure-2, it is obvious to see that within the past two decades, HMT (HongKong, Macau and Taiwan) enterprises have played tremendous role in China's FDI growth, as confirmed by other researches (e.g. Huang 2004). Actually the three places take up more than half of China's inward FDI. The argument is that HMT

[12] In the dataset of enterprise survey taken from World Bank, the ownership characterized by "Foreign" can be divided into categories of HMT(Hongkong, Macau and Taiwan) and other FIE(foreign invested enterprises). It enables us to test the difference between these two types of firms.

companies invest more because of their geographical advantages, but how much will policy variables influence their decision-making? I would like to see if IPAs or IIZs will have different impact on these exclusive companies. For this purpose I created a new variable: ipa_HMT.

$$\ln(FDI)_{it} = \alpha + \beta 1 \ln WR_{it} + \beta 2 \ln RD_{it} + \beta 3 \ln Sale_{it} + \beta 4 \ln Taxra_{it} + \beta 5 IPA_i + \beta 6 trade\_time_i + \beta 7 ipa\_HMT_i + \eta_{it} + \varepsilon_{it} \quad \ldots\ldots (2)$$

(option: to replace IPA with IIZ)

First I construct HMT dummy that takes the value of 1 or 0. Then ipa_HMT is the interactive term between IPA dummy and HMT dummy. The same method is applied to iiz_HMT. I run the model again by using all the methods mentioned above and found that though by OLS ipa_HMT is not significant, it turns significant if I exclude sample selection or endogeneity problems. For iiz_HMT, it is negatively significant in all cases (Table 4,5 and 6).

Thus I can draw the conclusion that IPAs and IIZs have relatively negative effect on HMT companies compared to other foreign companies. In other words, IPAs and IIZs play more important role in inviting other foreign companies to come to China than they do to HMT enterprises. One explanation for this is that since HMT companies are close to the main land, the fact that whether the city has IPAs does not affect their decision so much. But on the other hand, IPAs fulfilled their responsibilities by convincing and assisting foreign companies from other regions to make the decision of investment in China. This indicates that IPAs and IIZs did work as originally intended. As for other control variables, in most cases, lnSale is positively significant, which shows that the bigger the company is, the larger the percentage of FDI. This indicates that FDI plays an important role in the development of big companies. The coefficient of wage rate is always negative, which corresponds to previous literature. GDP per capita normally shows a positive sign. Further study should be focused on how IPAs can be evaluated in terms of quality and function,

also the policies designed to attract different types of FDI, e.g. the type of FDI aimed to increase the high-tech industry of China.

② The individual effect of IPA or IIZ

It has been pointed out that the existence of IPA or IIZ might have interference with each other. In other words, if the city has both IPA and IIZ, and I run the regression with ipadummy or iizdummy only, then the individual effect of IPA or IIZ can not be identified. So the next step is to try to separate their exclusive effect.

Firstly, I created a combidummy. If the city has IPA and IIZ, the dummy value is 1, otherwise 0. I also include ipa_only_dummy(if the city has IPA only, the value is 1) and iiz_only_dummy, as shown in table 7. Unfortunately, since the iiz_only_dummy is omitted, I can not simply differentiate IPA's effect from that of IIZ.

Thus I figured out another way: to generated a new dummy variable "ipa_iizdummy". If the city has IPA or IIZ, the value is 1, otherwise it is 0. I compare its coefficient with that in table 1. As is shown in table 8 and 9, I found that if the city has IPA only, then its promotion effect actually outweighs the city with IPA or IIZ combined; on the other hand, if the city has IPA or IIZ, then its positive effect on absorbing FDI will be larger than the city with IIZ solely.

③ Robustness check

I use two instruments to test the robustness of the estimation result. The first one is the log form of profit (profit for the main business in the dataset, unit: 1000 yuan). And the second one is the log form of company size (the number of regular workers). The estimation results can be seen in table 10 and table 11 respectively. The positively significant results for ipadummy and iizdummy still hold. It is also robust for ipa_HMT and iiz_HMT.

6. Conclusion

The aim of this paper is to fill the role of an empirical study on how different policies like setting up IPAs or IIZs can affect inward FDI in China from the micro perspective. Using firm-level panel data, and after excluding the econometric problems of sample selection and endogeneity, I found that IPAs and IIZs both have significant positive effect on absorbing FDI in China. While other factors such as sales volume, R&D and city's GDP per capita are also important in MNC's decision making. The implication is that in China, government's policy tools regarding foreign enterprises' entries into China are quite active and effective. However, since IPAs and IIZs are concentrated in high GDP per capita cities, it is urgent that new policy should be made to invite foreign capital into the inland districts, otherwise it will expand the economic disparity among cities in China.

I also found that both IPAs and IIZs play a more important role in attracting other foreign companies to invest in China than they do to with HMT (HongKong, Macau and Taiwan). Due to the location advantages, HMTs are familiar with the business pattern in the mainland and it is easy for them to make investment decisions regardless of the existence of IPAs. In other words, such policies have little impact on HMT enterprises. Because of HMT's close connection with China and HMT enterprises' great influence on the mainland (employment, technological exchange or even cultural communication), I have every reason to believe that the Chinese government should work out more creative policy tools to work more closely with HMT partners. Concerning the doubt that IPA's effect might interfere with that of IIZ, I try to compare the co-effect with their individual effect respectively. And I found that if the city has IPA only, its promotion effect actually outweighs the city with IPA or IIZ combined; on the other hand, if the city has IPA or IIZ, then its positive effect on absorbing FDI will be larger than the city with IIZ solely. That means IPA and IIZ have similar yet different functions.

Lastly, due to data limitation, I can not evaluate on the quality of IPAs and I have not considered the situation of firm heterogeneity. I will leave this to future study.

Also a way to attract different types of FDI, e.g. high-tech oriented FDI, it might also be an interesting topic to develop.

7. **References**

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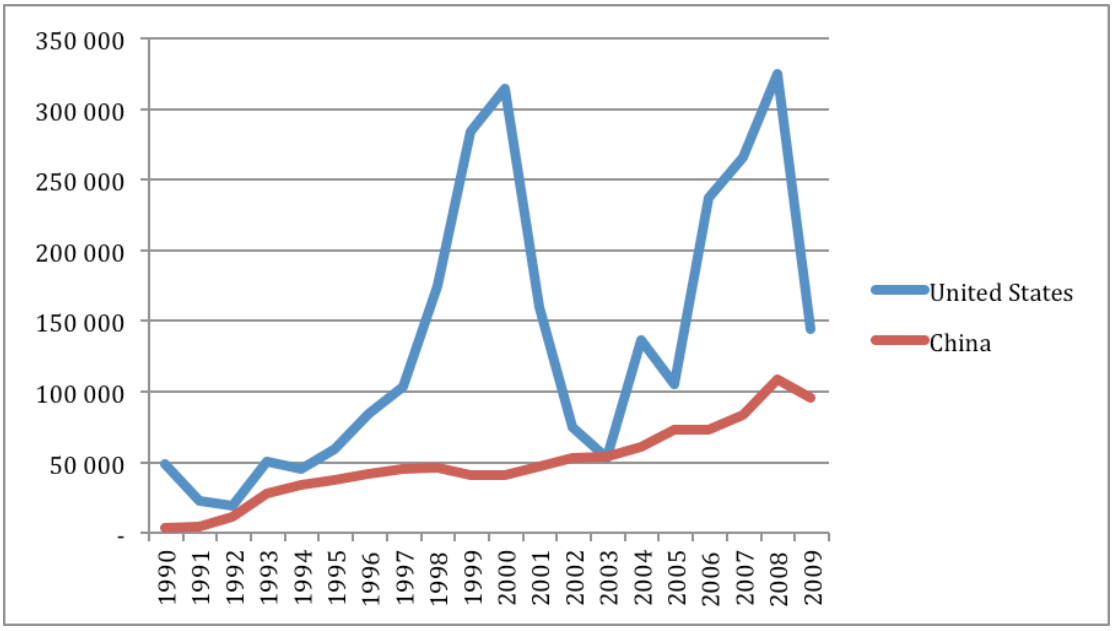
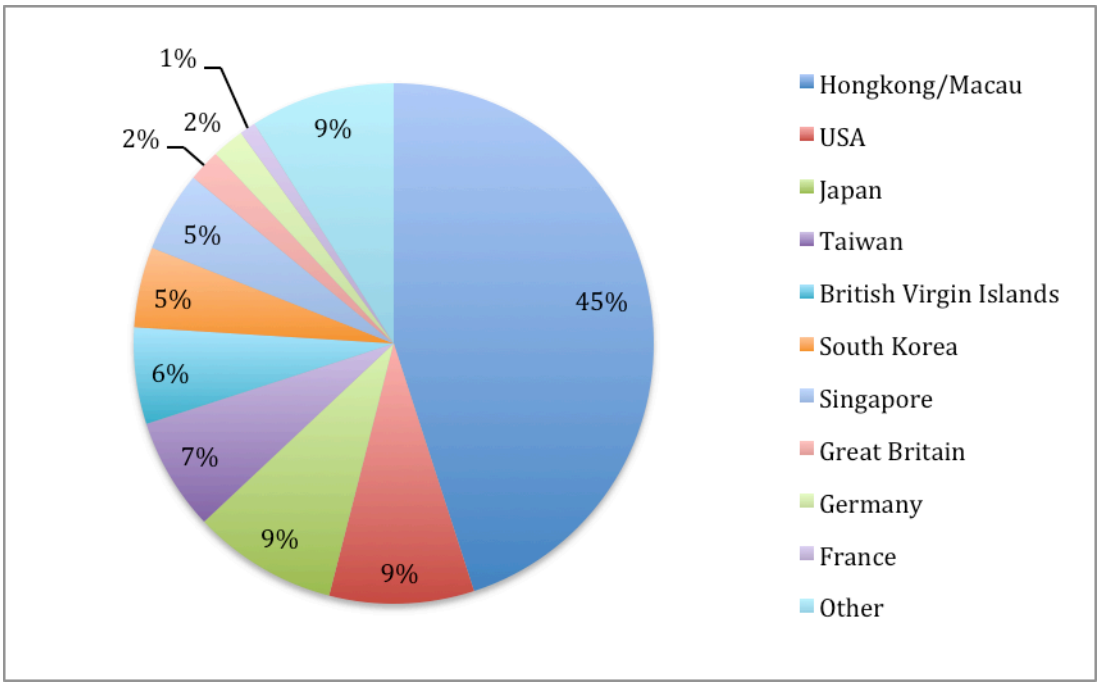
8. Appendix:

Figure-1 Comparison between US and China in FDI inflows (millions of dollars)



***Source: World Invest Report, UNCTAD.**

Figure-2 Actual Foreign Direct Investment (FDI) by Country of Origin, 1990-2004



***Source: National Bureau of Statistics of China**

Table of Investment incentive zones and their concessionary tax rates

Tax incentive zones	Year of opening	Concessionary tax rates
Special Economic Zones (5 zones)	1980, 1988	15% for all FIEs
Coastal Open cities (14 cities)	1984	24% for FIEs in production industries
Economic Coastal Open Zones (10 cities)	19,851,988	24% for FIEs in production industries
Ecnomic and Technology development Zones (32 cities)	Since 1992	15% for FIEs in production industries
New and high Technology industrial Development Zones (52 zones)	Since 1992	15% for FIEs in high-technology industries
Provincial capitals and Open cities along Yangtze River (24 cities)	1992	24% for FIEs in production industries
Border Open cities (13 cities)	1992	24% for FIEs in production industries

*Source: Cho and Tung (1998)

Descriptive Statistics:

Variable	Obs	Mean	Std. Dev.	Max	Min
FDI inflow	36921	33477	563431	8.41E+07	0
ipadummy	36921	0.443	0.497	1	0
iizdummy	36921	0.370	0.483	1	0
trade_time	36921	1.872	5.471	100	0
sale	36921	404143	2277339	1.02E+08	0
taxra	35948	0.089	3.862	705	-17.86765
wr	36921	1.023	0.731	14.660	0.033
rd	36921	5309	53141	4359900	0
infrainv	36921	162847	244495	1440384	0
gdp_per	36921	14748	12827	152099	0

Source: Investment Climate Survey China 2005, World Bank

*Statistics after data cleaning

Table-1 OLS estimation

	(1)	(2)	(3)	(4)
VARIABLES	lny	lny	lny	lny
ipadummy	0.271***		0.241**	
	(0.0906)		(0.0942)	
trade_time	0.00139	-0.000127	0.00546	0.00406
	(0.00615)	(0.00617)	(0.00708)	(0.00708)
lntaxra	-0.0132	-0.0136	-0.0188	-0.0192
	(0.0130)	(0.0131)	(0.0158)	(0.0158)
lnsale	0.631***	0.633***		
	(0.0283)	(0.0284)		
lnwr	-0.0542	-0.0533		
	(0.0522)	(0.0524)		
lnrd	0.0688***	0.0696***		
	(0.0152)	(0.0153)		
ln_infrainv	0.0517	0.0667**	0.0592	0.0674*
	(0.0339)	(0.0339)	(0.0366)	(0.0373)
ln_gdp_per	-0.0808	-0.0632	-0.0767	-0.0516
	(0.0515)	(0.0524)	(0.0607)	(0.0623)
iizdummy		0.150*		0.148*
		(0.0821)		(0.0858)
lnsale, lagged			0.686***	0.688***
			(0.0328)	(0.0329)
lnwr, lagged			-0.0918	-0.0924
			(0.0580)	(0.0587)
lnrd, lagged			0.0441***	0.0447***
			(0.0159)	(0.0159)
Constant	1.955***	1.663***	1.494***	1.192**
	(0.489)	(0.473)	(0.564)	(0.542)
Observations	2,789	2,789	1,896	1,896
R-sq	0.615	0.617	0.620	0.622
Number of firm_id	1,104	1,104	1,048	1,048

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table-2 IV and GMM

	(1)	(2)	(3)	(4)
	IV		GMM	
VARIABLES	lny	lny	lny	lny
ipadummy	0.0844		0.00827	
	(0.0663)		(0.00673)	
iizdummy		0.133**		0.0143**
		(0.0604)		(0.00618)
trade_time	0.00450	0.00418	0.000533	0.000505
	(0.00462)	(0.00460)	(0.000490)	(0.000491)
lntaxra	-0.0264	-0.0265	-0.00180	-0.00183
	(0.0221)	(0.0221)	(0.00226)	(0.00226)
lnsale	0.891***	0.892***	0.0853***	0.0854***
	(0.0236)	(0.0236)	(0.00234)	(0.00233)
lnwr	-0.155**	-0.172***	-0.0163***	-0.0183***
	(0.0632)	(0.0641)	(0.00628)	(0.00639)
lnrd	0.0239	0.0234	0.00225	0.00220
	(0.0168)	(0.0168)	(0.00157)	(0.00156)
ln_gdp_per	0.112**	0.141**	0.00970*	0.0129**
	(0.0571)	(0.0574)	(0.00552)	(0.00565)
ln_infrainv	-0.0232	-0.0326	-0.00100	-0.00212
	(0.0307)	(0.0311)	(0.00293)	(0.00306)
Constant	-1.908***	-2.098***	1.150***	1.129***
	(0.442)	(0.434)	(0.0442)	(0.0429)
Observations	1,878	1,878	1,878	1,878
R-squared	0.637	0.637		
Wu-Hausman F test: P value	0.00071	0.00073		
Durbin-Wu-Hausman: P value	0.00070	0.00072		
Hansen's J			7.2e-28	2.4e-27

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table-3 Heckman Sample Selection

	(1) Estimation for IPA		(2) Estimation for IIZ	
	2nd Step	1st Step	2nd Step	1st Step
VARIABLES	lny	ownerdummy	lny	ownerdummy
ln_frei		-0.169***		-0.167***
		(0.0263)		(0.0262)
ln_tradevol		-0.0324*		-0.0384*
		(0.0197)		(0.0198)
ipadummy	0.197***	0.199***		
	(0.0687)	(0.0315)		
iizdummy			0.189***	0.161***
			(0.0571)	(0.0301)
lntaxra	-0.0296	-0.0114	-0.0293	-0.0121
	(0.0189)	(0.00893)	(0.0188)	(0.00892)
lnsale	0.935***	0.133***	0.929***	0.135***
	(0.0327)	(0.00998)	(0.0326)	(0.00998)
lnwr	0.122	0.478***	0.0798	0.474***
	(0.0995)	(0.0323)	(0.0980)	(0.0325)
lnrd	0.0142	-0.0308***	0.0158	-0.0309***
	(0.0143)	(0.00714)	(0.0141)	(0.00714)
trade_time	0.00374	0.00453**	0.00283	0.00399*
	(0.00407)	(0.00203)	(0.00399)	(0.00204)
ln_infrainv	-0.0732**	-0.00350	-0.0726**	0.00256
	(0.0331)	(0.0163)	(0.0324)	(0.0163)
ln_gdp_per	0.340***	0.447***	0.351***	0.476***
	(0.102)	(0.0305)	(0.104)	(0.0307)
yeardummy1	0.211***	0.138***	0.207***	0.147***
	(0.0659)	(0.0354)	(0.0655)	(0.0353)
yeardummy2	0.129**	0.0871**	0.128**	0.0942***
	(0.0595)	(0.0345)	(0.0589)	(0.0345)
lambda	0.770***		0.675**	
	(0.278)		(0.272)	
Constant	-5.192***	-4.692***	-5.085***	-4.971***
	(1.384)	(0.248)	(1.408)	(0.240)
Observations	13,082	13,082	13,082	13,082

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table-4 OLS with HMT variable

	(1)	(2)	(3)	(4)
VARIABLES	lny	lny	lny	lny
ipadummy	0.327***		0.308***	
	(0.0969)		(0.101)	
iizdummy		0.229***		0.237**
		(0.0884)		(0.0920)
ipa_HMT	-0.163		-0.195*	
	(0.102)		(0.107)	
iiz_HMT		-0.247**		-0.279**
		(0.117)		(0.122)
trade_time	0.00141	1.72e-05	0.00526	0.00399
	(0.00615)	(0.00619)	(0.00706)	(0.00708)
lntaxra	-0.0136	-0.0140	-0.0199	-0.0204
	(0.0130)	(0.0131)	(0.0158)	(0.0158)
lnsale	0.628***	0.632***		
	(0.0284)	(0.0284)		
lnwr	-0.0573	-0.0590		
	(0.0521)	(0.0523)		
lnrd	0.0681***	0.0688***		
	(0.0152)	(0.0152)		
ln_infrainv	0.0455	0.0591*	0.0508	0.0581
	(0.0339)	(0.0338)	(0.0365)	(0.0371)
ln_gdp_per	-0.0737	-0.0567	-0.0644	-0.0419
	(0.0516)	(0.0524)	(0.0606)	(0.0619)
lnsale, lagged			0.682***	0.686***
			(0.0331)	(0.0328)
lnwr, lagged			-0.0985*	-0.103*
			(0.0577)	(0.0581)
lnrd, lagged			0.0434***	0.0441***
			(0.0158)	(0.0158)
Constant	1.988***	1.708***	1.512***	1.228**
	(0.491)	(0.473)	(0.564)	(0.541)
Observations	2,789	2,789	1,896	1,896
R-squared	0.615	0.617	0.621	0.623
Number of firm_id	1,104	1,104	1,048	1,048

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table-5 IV & GMM with HMT variable

	(1)	(2)	(3)	(4)
	IV		GMM	
VARIABLES	lny	lny	lny	lny
lnwr	-0.163***	-0.187***	-0.0170***	-0.0197***
	(0.0633)	(0.0642)	(0.00625)	(0.00633)
lnrd	0.0240	0.0235	0.00225	0.00223
	(0.0168)	(0.0167)	(0.00157)	(0.00156)
lnsale	0.887***	0.890***	0.0850***	0.0852***
	(0.0237)	(0.0236)	(0.00234)	(0.00232)
ipadummy	0.134*		0.0127*	
	(0.0714)		(0.00697)	
iizdummy		0.205***		0.0212***
		(0.0665)		(0.00648)
ipa_HMT	-0.144*		-0.0135*	
	(0.0772)		(0.00734)	
iiz_HMT		-0.221**		-0.0219**
		(0.0863)		(0.00855)
trade_time	0.00432	0.00410	0.000515	0.000492
	(0.00462)	(0.00460)	(0.000489)	(0.000490)
lntaxra	-0.0306	-0.0312	-0.00221	-0.00234
	(0.0222)	(0.0222)	(0.00226)	(0.00225)
ln_infrainv	-0.0301	-0.0398	-0.00164	-0.00283
	(0.0309)	(0.0312)	(0.00294)	(0.00305)
ln_gdp_per	0.125**	0.152***	0.0109*	0.0139**
	(0.0575)	(0.0574)	(0.00557)	(0.00563)
Constant	-1.926***	-2.109***	1.149***	1.128***
	(0.442)	(0.434)	(0.0443)	(0.0427)
Observations	1,878	1,878	1,878	1,878
R-squared	0.637	0.638		
Wu-Hausman F test: P value	0.00061	0.00055		
Durbin-Wu-Hausman: P value	0.00060	0.00054		
Hansen's J			4.0e-28	3.6e-27

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table-6 Heckman Sample Selection with HTM variable

	(1) Estimation for IPA		(2) Estimation for IIZ	
	2nd Step	1st Step	2nd Step	1st Step
VARIABLES	lny	ownerdummy	lny	ownerdummy
ln_frei		-0.240***		-0.236***
		(0.0298)		(0.0298)
ln_citygdp		0.0912**		0.0820**
		(0.0376)		(0.0374)
ipadummy	0.241***	0.202***		
	(0.0705)	(0.0316)		
iizdummy			0.260***	0.156***
			(0.0614)	(0.0298)
ipa_HMT	-0.0894			
	(0.0650)			
iiz_HMT			-0.181**	
			(0.0721)	
lntaxra	-0.0336*	-0.0125	-0.0344*	-0.0133
	(0.0192)	(0.00894)	(0.0191)	(0.00893)
lnsale	0.950***	0.134***	0.946***	0.137***
	(0.0333)	(0.00995)	(0.0333)	(0.00995)
lnwr	0.164*	0.469***	0.122	0.465***
	(0.0999)	(0.0321)	(0.0993)	(0.0323)
lnrd	0.00995	-0.0315***	0.0110	-0.0316***
	(0.0146)	(0.00713)	(0.0145)	(0.00714)
trade_time	0.00429	0.00445**	0.00348	0.00388*
	(0.00414)	(0.00204)	(0.00407)	(0.00204)
ln_infrainv	-0.0869***	-0.0215	-0.0894***	-0.0151
	(0.0327)	(0.0164)	(0.0322)	(0.0164)
ln_gdp_per	0.403***	0.399***	0.425***	0.427***
	(0.102)	(0.0308)	(0.105)	(0.0306)
yeardummy1	0.225***	0.128***	0.223***	0.132***
	(0.0669)	(0.0334)	(0.0666)	(0.0334)
yeardummy2	0.138**	0.0707**	0.137**	0.0730**
	(0.0605)	(0.0316)	(0.0600)	(0.0316)
lambda	0.931***		0.860***	
	(0.277)		(0.274)	
Constant	-6.037***	-5.322***	-6.060***	-5.552***
	(1.399)	(0.350)	(1.438)	(0.347)
Observations	13,082	13,082	13,082	13,082

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Test on ipa's individual effect:

Table-7 Estimation with combidummy

	OLS	One period lag
VARIABLES	lny	lny
ipaonlydummy	0.311**	0.292**
	(0.131)	(0.138)
iizonlydummy	-0.0410	0.253
	(0.461)	(0.403)
combidummy	0.260***	0.239**
	(0.0939)	(0.0982)
trade_time	0.00154	0.00560
	(0.00618)	(0.00709)
lntaxra	-0.0132	-0.0188
	(0.0130)	(0.0158)
lnsale	0.630***	
	(0.0283)	
lnwr	-0.0520	
	(0.0525)	
lnrd	0.0688***	
	(0.0153)	
ln_infrainv	0.0525	0.0616
	(0.0342)	(0.0375)
ln_gdp_per	-0.0858	-0.0850
	(0.0540)	(0.0665)
lnsale, lagged		0.685***
		(0.0328)
lnwr, lagged		-0.0898
		(0.0588)
lnrd, lagged		0.0446***
		(0.0159)
Constant	1.994***	1.536***
	(0.498)	(0.586)
Observations	2,789	1,896
Number of firm_id	1,104	1,048

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

*ipaonlydummy: within the city there is ipa only and there is no iiz (the same for iizonlydummy).

*combidummy: when the city has both ipa and iiz, the value is 1, otherwise 0.

Comparison between ipa-only and coexistence of the two:

Table-8 Estimation with ipa-or-iiz-dummy

	OLS	One period lag
VARIABLES	lny	lny
ipa_iizdummy	0.259***	0.249***
	(0.0902)	(0.0937)
trade_time	0.00125	0.00543
	(0.00614)	(0.00705)
lntaxra	-0.0133	-0.0188
	(0.0130)	(0.0158)
lnsale	0.631***	
	(0.0283)	
lnwr	-0.0539	
	(0.0522)	
lnrd	0.0691***	
	(0.0152)	
ln_infrainv	0.0545	0.0598
	(0.0339)	(0.0365)
ln_gdp_per	-0.0809	-0.0774
	(0.0515)	(0.0607)
lnsale, lagged		0.686***
		(0.0328)
lnwr, lagged		-0.0928
		(0.0580)
lnrd, lagged		0.0443***
		(0.0159)
Constant	1.921***	1.483***
	(0.489)	(0.562)
Observations	2,789	1,896
Number of firm_id	1,104	1,048

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table-9 Estimation with individual ipadummy (or iiz)

	OLS		One period lag	
VARIABLES	lny	lny	lny	lny
ipadummy	0.271***		0.241**	
	(0.0906)		(0.0942)	
iizdummy		0.150*		0.148*
		(0.0821)		(0.0858)
trade_time	0.00139	-0.000127	0.00546	0.00406
	(0.00615)	(0.00617)	(0.00708)	(0.00708)
lntaxra	-0.0132	-0.0136	-0.0188	-0.0192
	(0.0130)	(0.0131)	(0.0158)	(0.0158)
lnsale	0.631***	0.633***		
	(0.0283)	(0.0284)		
lnwr	-0.0542	-0.0533		
	(0.0522)	(0.0524)		
lnrd	0.0688***	0.0696***		
	(0.0152)	(0.0153)		
ln_infrainv	0.0517	0.0667**	0.0592	0.0674*
	(0.0339)	(0.0339)	(0.0366)	(0.0373)
ln_gdp_per	-0.0808	-0.0632	-0.0767	-0.0516
	(0.0515)	(0.0524)	(0.0607)	(0.0623)
lnsale, lagged			0.686***	0.688***
			(0.0328)	(0.0329)
lnwr, lagged			-0.0918	-0.0924
			(0.0580)	(0.0587)
lnrd, lagged			0.0441***	0.0447***
			(0.0159)	(0.0159)
Constant	1.955***	1.663***	1.494***	1.192**
	(0.489)	(0.473)	(0.564)	(0.542)
Observations	2,789	2,789	1,896	1,896
R-sq	0.615	0.617	0.620	0.622
Number of firm_id	1,104	1,104	1,048	1,048

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

*ipa_iizdummy: if the city has ipa or iiz, the value is 1, otherwise 0.

Table-10 Robustness check (OLS for IPA with HMT variables)

	(1)	(2)	(3)	(4)
VARIABLES	lny	lny	lny	lny
ipadummy	0.485***	0.498***	0.485***	0.498***
	(0.118)	(0.107)	(0.118)	(0.107)
ipa_HMT	-0.315**	-0.339***	-0.315**	-0.339***
	(0.131)	(0.108)	(0.131)	(0.108)
trade_time	-0.00449	-0.000624	-0.00449	-0.000624
	(0.00735)	(0.00539)	(0.00735)	(0.00539)
lnprof	0.162***		0.162***	
	(0.0163)		(0.0163)	
lnsize		0.773***		0.773***
		(0.0350)		(0.0350)
lntaxra	-0.0402***	-0.00532	-0.0402***	-0.00532
	(0.0148)	(0.0117)	(0.0148)	(0.0117)
lnwr	0.163**	0.278***	0.163**	0.278***
	(0.0712)	(0.0745)	(0.0712)	(0.0745)
lnrd	0.186***	0.0898***	0.186***	0.0898***
	(0.0171)	(0.0157)	(0.0171)	(0.0157)
ln_infrainv	0.0103	0.0770**	0.0103	0.0770**
	(0.0427)	(0.0370)	(0.0427)	(0.0370)
ln_gdp_per	0.127**	-0.0307	0.127**	-0.0307
	(0.0600)	(0.0549)	(0.0600)	(0.0549)
Constant	5.747***	3.773***	5.747***	3.773***
	(0.550)	(0.503)	(0.550)	(0.503)
Observations	2,657	2,789	2,657	2,789
Number of firm_id	1,082	1,104	1,082	1,104

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table-11 Robustness check (OLS for IIZ with HMT variables)

	(1)	(2)	(3)	(4)
VARIABLES	lny	lny	lny	lny
iizdummy	0.312***	0.509***	0.312***	0.509***
	(0.110)	(0.0979)	(0.110)	(0.0979)
iiz_HMT	-0.313**	-0.376***	-0.313**	-0.376***
	(0.148)	(0.121)	(0.148)	(0.121)
trade_time	-0.00683	-0.00218	-0.00683	-0.00218
	(0.00727)	(0.00541)	(0.00727)	(0.00541)
lnprof	0.164***		0.164***	
	(0.0164)		(0.0164)	
lnsize		0.784***		0.784***
		(0.0351)		(0.0351)
lntaxra	-0.0407***	-0.00550	-0.0407***	-0.00550
	(0.0149)	(0.0118)	(0.0149)	(0.0118)
lnwr	0.164**	0.267***	0.164**	0.267***
	(0.0716)	(0.0735)	(0.0716)	(0.0735)
lnrd	0.188***	0.0891***	0.188***	0.0891***
	(0.0171)	(0.0156)	(0.0171)	(0.0156)
ln_infrainv	0.0334	0.0828**	0.0334	0.0828**
	(0.0426)	(0.0366)	(0.0426)	(0.0366)
ln_gdp_per	0.146**	-0.00159	0.146**	-0.00159
	(0.0613)	(0.0560)	(0.0613)	(0.0560)
Constant	5.385***	3.403***	5.385***	3.403***
	(0.532)	(0.490)	(0.532)	(0.490)
Observations	2,657	2,789	2,657	2,789
Number of firm_id	1,082	1,104	1,082	1,104

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1