FIRMS' LOCATION CHOICES IN GUANGDONG

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ABSTRACT

This paper empirically examines the factors that drive firms to locate in Guangdong province, China. By dividing Guangdong province into 21 cities, I detect characteristics in each city and find how such characteristics affect firms' location choices. During the period of economic reform in China in the past decades, industrial agglomeration, government preferential policy, resource endowment costs, and FDI inflow all played a substantial role on the local economic development. By using an individual level micro cross sectional dataset and an empirical econometric conditional logit model, I reveal the determinants of firms' location choices as well as provide hints for local economic development. Regression results found that export-related factors and FDI-related factors are attracting firms to locate in Guangdong; yet agglomeration effects are insignificant on firms' location choices. R&D related factors are negative, which implies an unfinished industrial upgrading. Good infrastructure attracts firms. Overall results imply that without changing the local attracting point into higher level points like R&D and innovation China may be facing a difficult situation to cope with the coming economic slowdown.

Keywords: Industrial agglomeration, Economic development, Guangdong province

INTRODUCTION

It is well known that economic activities are unevenly distributed across a country or a region. Determinants of spatial differences in the pattern of production are usually thought as resource endowment costs, technologies, policy regimes, industrial agglomeration etc. Such effects would attract enterprises to locate in that place and in turn to improve local economic welfare. However, if the region is populated with too many enterprises, which facing surging land / labor cost and congestion, then not only new potential entrant enterprises won't locate in that place but also firms originally located in that place will prefer to move to other places. Beyond the above, regions in

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different development phases would be holding different comparative advantages. Usually, developing countries have comparative advantages in relatively inexpensive labor force and land costs; On the other hand, developed countries would have comparative advantages in affluent capital, high technology, management skills and so on. So instead of developed countries' multinational enterprises exploit developing countries' labor intensive benefit, they also convey spillover effects in there as what we always see in terms of FDI (Nicolini and Resmini, 2007). Thus by studying what factors are attracting foreign firms to locate there, people can judge what development stage that region is belonging to as well.

To study firm location choice is a meaningful subject for both firms, especially multinational enterprises (MNEs) who want to choose a location that can make them most benefit, and the local government who want to attract FDI and absorb advanced spillovers.

China has achieved huge economic development during the past decades. Most part of the economic growth was caused by FDI and exports (Zhang and Zhang, 2003). Its economic reforms and open-door policy have resulted in a phenomenal growth of trade and FDI inflows, especially the immediate period after economic reforms. Between 1984 and 1998, the value of exports grew 19% annually while manufactured exports grew 24% per year. In 1978, China's exports amount accounted for only 0.75% of world exports, the figure rose to 4% in 1998 (China statistical yearbook). On the other hand, FDI inflows had also changed in an amazing style. From an economy virtually without any FDI in 1978, China has become the largest recipient of FDI inflow among the developing world in 1998 ever since. In 2008, China's FDI inflow stock is ranked first among developing countries and 10th in the world (UNCTAD). It can be said that trade and FDI were two strongest engines which have been pulling China's economic growth.

Those multinational firms who brought FDI into China were heavily concentrated in coastal area of China. It is well said that coastal regions have good transportation access to their home market, and on top of that, local Chinese government provide MNEs with preferential policies, thereafter MNEs would like to locate in coastal China. On top of that, industrial agglomerations (clusters) have been formatted in coastal regions of China, those clusters also play an important role in attracting further investment firms and agglomeration effects (pecuniary externalities and technical externalities) are positive location factors other than good transportation access and local government preferential policies.

Among the whole provinces in China, Guangdong province held the best performance in terms of attracting foreign trade and FDI inflow. Almost half of trade and FDI in China are down to

Guangdong province. Compared with few trade and FDI are flew to inland areas, Guangdong is also called outside-oriented province.
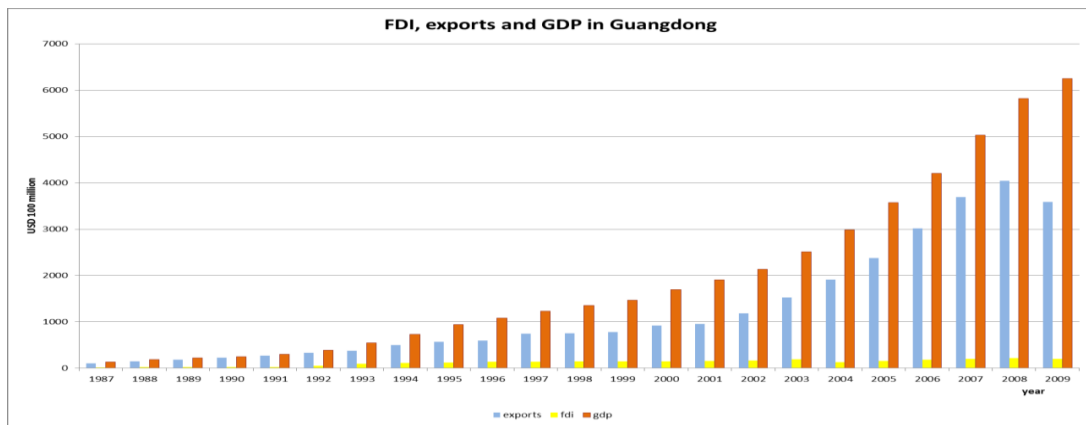
Data source: Guangdong statistical year book (2010)

Figure 1: FDI, exports and GDP in Guangdong province

On the other hand, from the theoretical point of view, trade theory and spatial economic theory had given many reasons about what factors attract firms, i.e. factor endowments (capital, labor), preferential policy, economies of scale, technological externality, pecuniary externality, home market effect, transport costs and so forth. These factors had played their role in different countries / regions and in different time period. Since entering the 21st century, economic globalization and free trade agreement had been improved than ever. Under such environment, enterprises' location decision making have also changed.

This study aims to identify factors are important for firms when they make their location decision. By using individual level micro data from Guangdong province in year 2005, I estimate firm location choice by using a conditional logit model. Regression results show export-related factors and agglomeration effects were important for firms' location decision. These results imply Guangdong province is still in its initial phase when absorb foreign / domestic investment. Supply (surrounding) industries there have not caught up to a relatively high level, on top of that, industry structure in Guangdong is still not mature enough to upgrade its economy yet. The implication for policy makers in there is to escape from labor-intensive and export-oriented economic development model as quickly as they can, and to raise tertiary industries' share in total GDP and highly educated personnel share out from total province people.

From the investing firms' point of view, as a micro subject, firms will always choose location in where they can maximize their profits. In previous literatures, it has been found that firms prefer

large agglomeration area (Head and Mayer, 2004) and policy preferential places (Amiti and Javorcik, 2008). In addition, it is also found foreign firms invested in China will give local firms technology spillovers (Buckley *et al.*, 2007). Depends on nationality, some country such as Japan prefers regions where previous home country firms already located (Head *et al.*, 1995).

From the results of this paper, I found firms go to invest in Guangdong were lured by preferable export environment and agglomeration effects. My dataset includes both foreign firms (from all countries in Guangdong) and local Chinese firms. I have not confirmed industrial upgrading or economic structure related factors that could attract investing firms. That is to say, Guangdong province is still being a factory that making numerous products for the world, rather than is situating in a higher level of the value chain. I suggest local policy makers had better to raise service industries' share and cultivate highly educated personnel for further economic upgrading.

The organization of the paper is as follows. Section 2 describes factors affect firm location decision and related previous literatures. Section 3 introduces model building and data issue. Section 4 reports the empirical results and comments are given in Section 5. Finally, section 6 concludes the paper.

FACTORS AFFECT FIRM LOCATION AND PREVIOUS LITERATURE

What factors are essential for firms to choose their location? The answer will different according to different time period. During nearly 33 years economic reform, there were huge changes over China's industrial distribution as well as industrial structure. Combined with pre-reform period, I roughly divide them into three phases that are before 1979 (Phase 1), 1979-2000s (Phase 2), post-2000s (Phase 3). Before 1979, i.e. the year of economic reform, almost all of important industries in China are distributed in inland areas for the military purposes. Industry productivity was low and there were no trade with the rest of the world. Since the opening policy had been launched, preferential policy, foreign investment, low wage rate labor force from inland China had made coastal regions in China prosperous in economic development. Export driving and industrial agglomeration were two characteristics in that time.

Since 2000s, however, the minus external economies, such as congestion, environment pollution, demographic change, request for industrial upgrading and so forth, began to appear. China is faced with a new challenge over its industrial distribution. Labor-intensive industries will move out from metropolitan areas instead of new entering of high-tech industries/firms and R&D centers. Low wage labor will not get into big cities but go to peripheral middle and small towns in where labor-intensive industries will also move. Current metropolitan regions will attract environmental friendly

industries as well personnel in service sectors. Therefore, I put the last two phases' firm location factors as the following figures.

Phase 2   Phase 3

Data source: Made by the author

Figure 2: Location essential factors by phases

As corresponding to the characteristics, major industries in Guangdong are also different among phases (Table 1). The fresh industries can be thought as the ongoing major industries for the moment, the traditional industries are those prosperous industries in the first stage of the development, and the potential industries can be considered as the industries that local government want to improve in the near future. For providing the background more specifically, I also put an all industries table as reference (Table 2).

Table 1: Nine major industries in Guangdong

| Nine Major Industries in Guangdong	
Three Fresh Industries	
	Electronic and Information Technology
	Electric Equipment and Special-purpose Machinery
	Petroleum and Chemistry
Three Traditional Industries	
	Textile and Garments
	Food and Beverage
	Building Materials
Three Potential Industries	
	Logging and Papermaking
	Medicine
	Motor Vehicles and Motorcycles

Data source: Guangdong statistical year book, 2010

Table 2: Description of the type of industries in Guangdong

Description of the type of industries in Guangdong

No.	Industry
1	Mining and Washing of Coal
2	Extraction of Petroleum and Natural Gas
3	Mining and Dressing of Ferrous Metal Ores
4	Mining and Dressing of Nonferrous Metal Ores
5	Mining and Dressing of Nonmetal Ores
6	Mining and Dressing of Other Ores
7	Processing of Farm and Sideline Food
8	Manufacture of Food
9	Manufacture of Beverage
10	Tobacco Products
11	Textile Industry
12	Manufacture of Textile Garments, Footwear and Headgear
13	Leather, Fur, Feather, Down and Related Products
14	Timber processing, Banboo, Cane, Palm Fiber & Straw Products
15	Manufacture of Furniture
16	Papermaking and Paper Products
17	Printing and Record Medium Reproduction
18	Manufacture of Cultural, Educational and Sports Articles
19	Prtroleum Refining, Coking and Nuclear Fuel Processing
20	Manufacture of Raw Chemical Materials and Chemical Products
21	Manufacture of Medicines
22	Manufacture of Chemical Fibers
23	Rubber Products
24	Plastic Products
25	Nonmetal Mineral Products
26	Smelting and Pressing of Ferrous Metals
27	Smelting and Pressing of Nonferrous Metals
28	Metal Products
29	Manufacture of General-purpose Machinery
30	Manufacture of Special-purpose Machinery
31	Manufacture of Transport Equipment
32	Manufacture of Electrical Machinery and Equipment
33	Manufacture of Communication Equipment, Computers and Other Electronic Equipment
34	Manufacture of Instruments, Meters and Machinery for Cultural and Office Use
35	Handicraft and Other Manufactures
36	Recycling and Disposal of Waste
37	Production and Supply of Electric Power and Heart Power
38	Production and Supply of Gas
39	Production and Supply of Water

Data source: Guangdong statistical year book, 2010

During the first stage development, which is characterized by foreign trade and FDI, cities in Guangdong province also appeared heterogeneity in terms of industrial value-added. Cities with better infrastructure and better access to foreign markets seem to get more benefits. The most benefited cities are around the Pearl River delta (PRD) area (Figure 3).
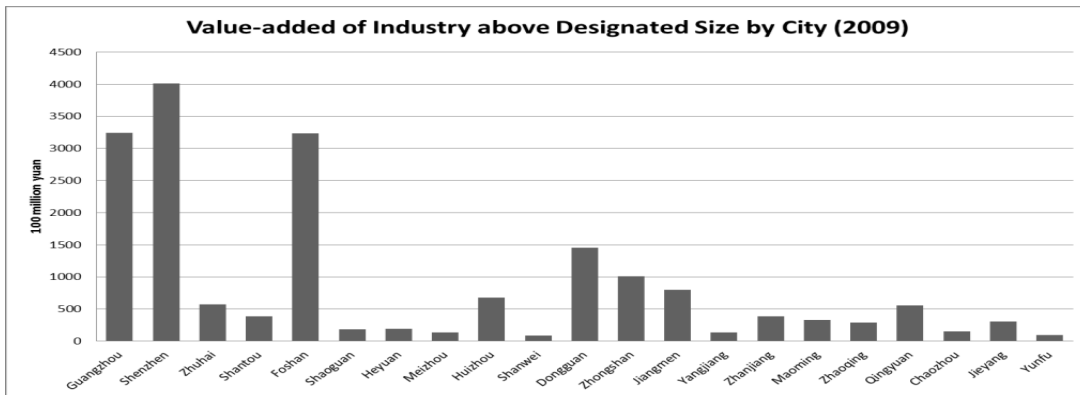
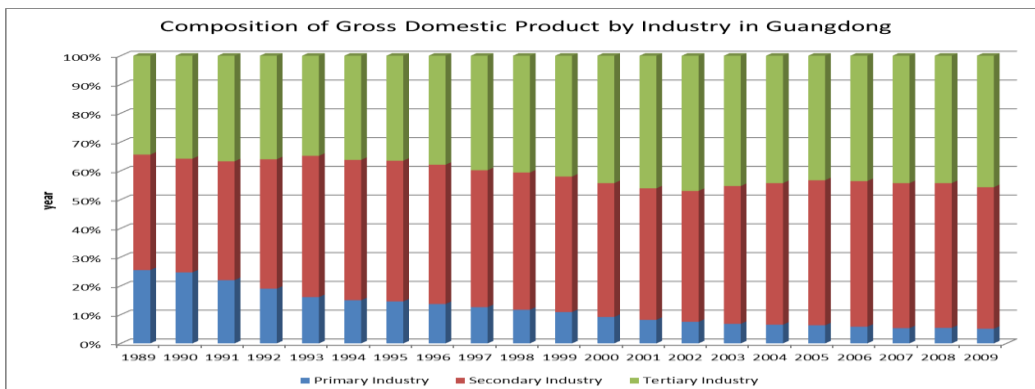**Data source**: Guangdong province statistical year book, 2010

Figure 3: Value-added of industry above Designated Size by City (2009)

After nearly 3 decades' development, not only Guangdong province achieved a huge fruit in terms of total GDP and growth rate, but also its industrial structure, i.e. the composition of industries also changed a lot (Table 3 & Figure 4).

Table 3: GDP growth rate among countries/province

| Country/Province	Time period	Growth rate
Guangdong	1979-2008	13.70%
Singapore	1970-1978	8.40%
South Korea	1966-1976	10.80%
Japan	1960-1970	10.50%

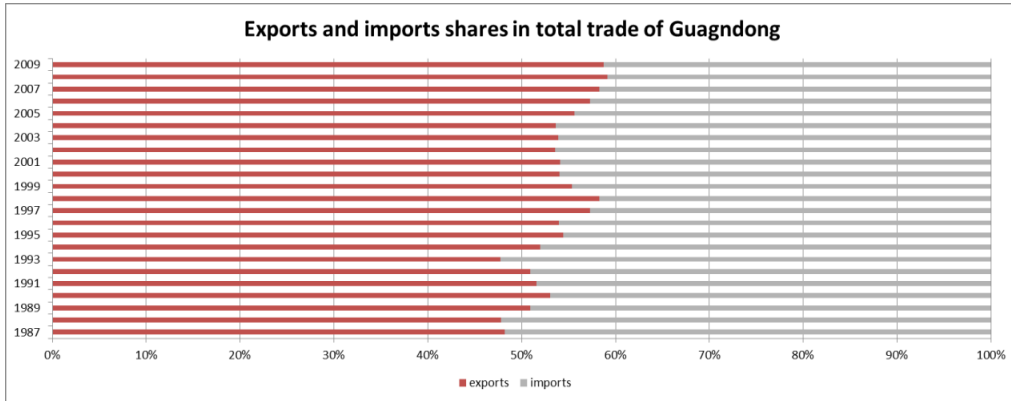**Date source:** Guangdong statistical year book, 2010

Data source: Guangdong statistical year book, 2010

Figure 4: Composition of domestic product by industry in Guangdong

In 1979, foreign trade and FDI were almost zero in China since it was a closed country. Thanks for the economic reform and the open-door policy many special economic zones (SEZs) were conducted in coastal regions (mainly in Guangdong province). Firms that invested in those SEZs can enjoy relatively preferable policy benefit. Utilized FDI amount in China was 116 billion USD in 2011, which is the biggest amount among developing countries. Guangdong province was the most important undertaker in terms of FDI inflow. In year 2009, FDI inflow in Guangdong has rose to 19.5 billion USD which is about 20~30% of the nation's FDI. Other than FDI, export and import also were crucial engines for Guangdong's economic growth. The total value of imports and exports in Guangdong province were 6.11 billion USD which is almost 45% corresponding to the nation's.
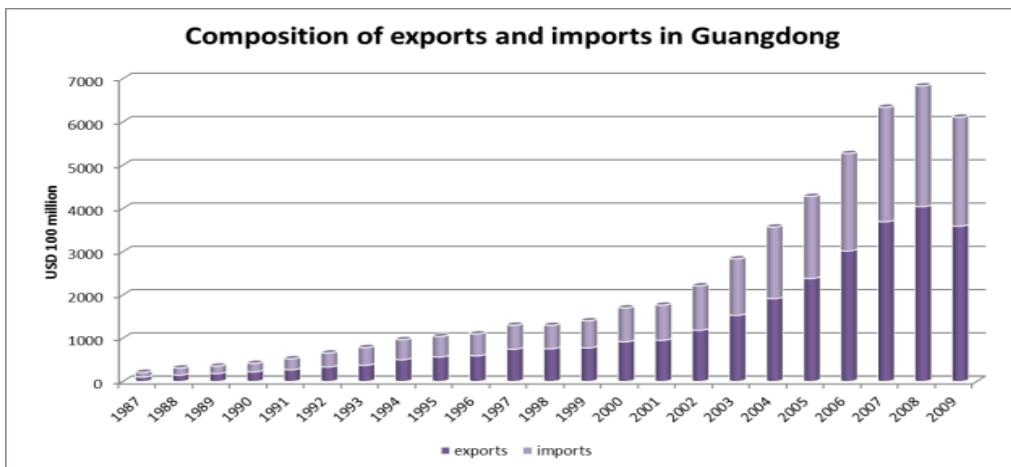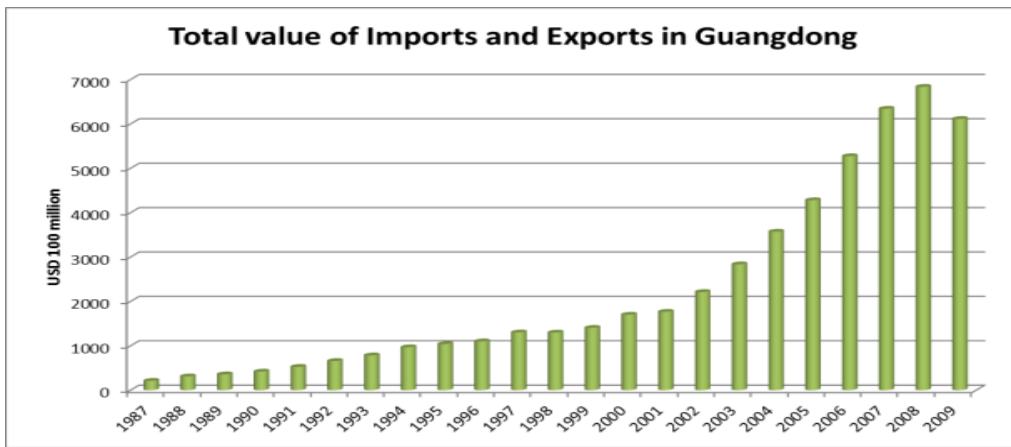
Data source: Guangdong statistical year book (2010)

Figure 5: Export and import in Guangdong province

Infrastructure is another important factor for developing countries, especially at the initial phase. Infrastructure specifically includes road (highway), bridge, port, airport, and other amenities. Among them, highway and port were particularly important for foreign investors because highway and port can transport the finished products fastest and most efficiently. Actually, when people say foreign investors inclined to invest in the coastal regions maybe caused by the preferential policies which provided by local government, there is another reason and exactly the most key reason lured foreign investors was the adjacency to their home market. That is to say, foreign investors intended to transport the assembled products back to their home market or other abroad market at the beginning. In recent years, as the IT progress and production block fragmentation's proceeding, not only highway and port, but also aircraft gradually started to play an important role in global transportation system.

As for agglomeration, as many scholar pointed out, China's economic development was based on a cluster (industrial agglomeration) (Fujita, 2007). Since there exist forward and backward linkages, economies of scale, pooled labor force market, easy information exchange, technological externalities and pecuniary externalities, firms would like to concentrated in certain regions. Beyond that, a core-periphery phenomenon would appear according to spatial economy theory, just like the observed Hong Kong-Guangdong case. Usually, by locating in a cluster or agglomeration location, firms there can raise the productivity easier than located in other places. However, the positive agglomeration effects only show up in the agglomeration process, once the congestion effects started, namely the economy start to disperse, there will exists negative agglomeration effects. I will include a congestion index as well in this paper. Other than congestion effects, a more concentrated regional industrial structure may also aggravate the local enterprises. Recent studies showed that a high level concentration-the dominance of a few large firms in a given industry in a region-limits

agglomeration economies and ultimately diminishes the economic performance of small firms in that industry (Drucker and Feser, 2012).

Jacobs externalities or spillovers that occur across industries would have positive impacts on firms located there. That is also called diversification. In Glaeser *et al.* (1992) paper, they emphasized competitiveness and spillover effects from other industries/sectors are good for firms' growth.

As the economy further go through, economic structure change and industrial upgrading are required. Old labor-intensive industries will be facing with environmental pressure, surging wage rate and land rent pressure, as well as higher technology level requirement pressure (See China 2030, World Bank. 2012). Due to the data limit, I omit the environment index this time but include R&D and wage rate. R&D investment and personnel cultivation in China started just recently, I hardly find the figures before 2000s from the statistical yearbooks. Guangdong province is faster than other provinces but still slow compared with developed countries. In 2009, number of personnel engaged in scientific and technological activities in Guangdong was 341434 person and internal expenditures for scientific and technological activities was 63.5 billion RMB. The share of R&D personnel out of total population is less than developed countries such as US and Japan.

With regard to the wage rate, since 2000s, wage rate in Chinese coastal regions began to surge. Different from 30 years ago, low cost labor force is already not the landscape in China. One reason was foreign R&D center entered in and high technology firms' joining encouraged talented people, especially highly educated young people. The other reason was local Chinese people were aware of simple assembly can't be continued forever and they were conscious of the importance of high level human resource and high level productivity. Therefore, in 1980s, firms may be lured by low wage rate and invested, but in 2000s different firms entered and they may be lured by high wage rate.

My dataset is in the year 2005, which is just a changing year between phase 2 and phase 3. I will shed special light on agglomeration benefit, infrastructure and R&D investment, wage rate. I expect infrastructure will lose its charm, agglomeration still beneficial even congestion effect began to appear, and R&D will have just started and bring significance gradually.

Empirical literature about firm location choice had been conducted in various countries/regions and showed various results until now. Hanson (1997a) suggests when two countries open their economies to trade, high skill level country will specialize in high skill required production stage and low skill level country will specialize in assembly and export final goods. Meanwhile, firms that originally located in capital city in the low skill level country will relocate their production base to border region. I apply this model to Hong Kong-Guangdong free trade opening, and suggest firms

will agglomerate in border cities between Hong Kong and Guangdong such as Shenzhen, Zhuhai, Dongguan. Therefore, agglomeration effects are significantly important for firms' location choice under a free trade area backcloth.

This paper also says the opening to trade causes labor to migrate from the inland region to coastal region. So, labor force is another attraction for firms majoring assembly.

Head *et al.* (1995) find Japanese investors prefer to site their plants in areas where they find concentrations of previous Japanese investments in the same industry while they study 751 Japanese manufacturing plants invested in the United States since1980.

Cainelli *et al.* (2003) found agglomeration effects and R&D activities are positively related with firm productivity. Their results showed that innovating firms out-perform non-innovating firms in terms of productivity levels and economic growth. They also found productivity is linked to the amount of innovation expenditures especially those devoted to the acquisition and internal development of new software.

Belderbos and Carree (2002) confirm agglomeration effects at different levels for firm location choices by Japanese electronics manufacturers invested in China during 1990-1995. They found the effects of key determinants of locational choice very substantially by investor size and market orientation of manufacturing plants. Small and medium-sized enterprises are more sensitive to Japanese agglomeration and prefer locations closer to Japan than larger firms, but appear to benefit less from region-specific investment incentives. Export-oriented plants are more responsive than local-market-oriented plants to Japanese (keiretsu) agglomeration and the presence of seaports, but less responsive to regional demand and region-specific incentives.

Head *et al.* (1999) studies Japanese investments between 1980 and 1992 to assess the effectiveness of US state promotion efforts in light of strong agglomeration effects in Japanese investment. They found the provision of foreign trade zones, lower taxes, and job-creation subsidies have statistically significant effects on the location of investment.

MODEL AND DATA

The data employed in this paper is from Bureau van Disk corporation Japan. For each subject (firm) in the dataset, I know the employment, capital, sales, as well as location (city), industry, firm type, etc. Explanatory variables' data source is China statistical year book. I get wage, FDI, port, R&D

expenditure, R&D personnel, freight, bridge, highway, import, and export from the statistical yearbook and take variables at city level.

The variable descriptive statistics are as follows:

Table 4: Variable descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
capital	32361	2382.547	9827.373	0	534251
labor	32361	329.7495	1091.293	1	90000
sales	32361	11806.17	131838.5	0	1.60E+07
specia	32361	0.1786279	0.1369384	0.064	0.554
wage	32361	22868.27	7125.822	10936	31928
import	32361	249.257	275.2487	0.52	812.69
export	32361	312.0395	336.5175	2.39	1015.22
bridge	32361	46054.07	24428.79	12339.6	92599.5
highway	32361	3556.233	2337.876	1074.3	12125.4
portfreight	32361	8103.34	9326.94	49	27283
freighttonkm	32361	453.1506	825.2273	2.98	2431.16
fdi	32361	136640.8	101420.6	3762	287734
rdexpen	32361	360675.9	402531.2	5840	1200000
rdperson	32361	18304.05	18287.93	530	57273

The probability that investor "j" chooses a region "s" to set up a plant is then expressed as

$$P_s^j = \frac{exp\left(U_{sj}\right)}{\sum_{k=1}^{s} exp\left(U_{kj}\right)}$$

The above equation expresses the conditional logit formulation. U_{sj} is a linear combination of the explanatory variabes:

$$U_{sj} = \beta_1 X_s^1 + \beta_2 X_s^2 + \cdots + \beta_m X_s^m + \gamma_{1s} Z_j^1 + \gamma_{2s} Z_j^2 + \cdots + \gamma_{ns} Z_j^n$$

In my paper, X_s^i (i=1……m) include explanatory variables such as FDI inflow, export/import, infrastructure (Refer to Table 5). The independent variables include characteristics of the region and can be roughly divided into four parts which are external-related (FDI, export, import), infrastructure (bridge, highway, port), agglomeration effects (specialization effect), and R&D-related (personnel, expenditure). On the other hand, Z_j^i (i=1……n) refers to individual characteristic by firm. In this paper, I used firm sales.

Table 5: Variable definition and unit

variables	description	unit	note
WAGE	average wage rate	CNY	city level
FDI	foreign direct investment amount	10000 $	city level
SPECIA	industrial specialization herfindahl index	figure (0, 1)	city level
PORT	freight throughput of ports	10000tons	city level
HIGHWAY	highway length	km	city level
BRIDGE	bridge length	m	city level
FERIGHT	amount * length	ton*km	city level
RDEXP	expenditures for scientific and technological activities	10000 yuan	city level
RDPER	of personnel engaged in scientific and technological a	person	city level
EXPORT	export amount	100 million $	city level
IMPORT	import amount	100 million $	city level

Data source: Guangdong statistical year book, 2010

The agglomeration effect, i.e. specialization variable is represented by the Herfindahl index.

$$H_s = \sum_i (Share_{is})^2$$

H_s is the sum of squares of value-added shares of all industries in region.

When I calculate the agglomeration index, I found there is an increasing trend of agglomeration in Guangdong province (See Table 6).

Table 6: Industrial specialization Herfindahl index for Guangdong province

industry	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Processing of Far	0.113	0.120	0.117	0.111	0.112	0.115	0.122	0.133	0.115	0.104
Manufacture of F	0.194	0.215	0.225	0.194	0.190	0.185	0.178	0.195	0.150	0.154
Manufacture of B	0.144	0.155	0.226	0.167	0.172	0.175	0.172	0.204	0.163	0.192
Tobacco Product	0.337	0.411	0.193	0.284	0.283	0.288	0.269	0.275	0.279	0.273
Textile Industry	0.113	0.102	0.099	0.107	0.104	0.111	0.110	0.113	0.112	0.118
Manufacture of T	0.103	0.108	0.136	0.109	0.112	0.117	0.117	0.115	0.108	0.109
Leather, Fur, Fea	0.180	0.155	0.204	0.133	0.132	0.126	0.118	0.120	0.110	0.105
Timber Processin	0.136	0.138	0.164	0.111	0.111	0.101	0.106	0.104	0.105	0.100
Manufacture of F	0.119	0.124	0.113	0.144	0.148	0.168	0.171	0.169	0.161	0.159
Papermaking and	0.122	0.122	0.115	0.126	0.123	0.146	0.154	0.157	0.156	0.134
Printing and Reco	0.121	0.121	0.110	0.133	0.129	0.163	0.145	0.143	0.124	0.113
Manufacture of C	0.148	0.142	0.138	0.142	0.137	0.140	0.135	0.135	0.121	0.109
Petroleum Refinin	0.430	0.450	0.390	0.388	0.404	0.341	0.306	0.337	0.296	0.228
Manufacture of R	0.220	0.231	0.217	0.244	0.283	0.230	0.186	0.250	0.173	0.179
Manufacture of M	0.182	0.179	0.165	0.168	0.157	0.146	0.145	0.169	0.131	0.127
Manufacture of C	0.229	0.139	0.152	0.129	0.135	0.123	0.314	0.207	0.258	0.244
Rubber Products	0.247	0.237	0.274	0.236	0.227	0.194	0.178	0.164	0.153	0.126
Plastic Products	0.119	0.119	0.118	0.119	0.118	0.126	0.130	0.136	0.127	0.125
Nonmetal Mineral	0.125	0.157	0.152	0.170	0.181	0.199	0.204	0.214	0.200	0.177
Smelting and Pres	0.237	0.264	0.221	0.190	0.195	0.172	0.189	0.130	0.170	0.176
Smelting and Pres	0.194	0.250	0.296	0.300	0.289	0.269	0.264	0.291	0.207	0.200
Metal Products	0.120	0.116	0.121	0.124	0.128	0.130	0.130	0.146	0.139	0.152
Manufacture of G	0.172	0.152	0.143	0.134	0.171	0.151	0.143	0.129	0.147	0.157
Manufacture of S	0.113	0.127	0.125	0.127	0.133	0.159	0.162	0.176	0.162	0.169
Manufacture of T	0.335	0.411	0.446	0.486	0.490	0.475	0.484	0.519	0.453	0.475
Manufacture of E	0.172	0.180	0.172	0.164	0.159	0.167	0.167	0.190	0.175	0.179
Manufacture of C	0.266	0.297	0.297	0.311	0.311	0.372	0.389	0.351	0.380	0.361
Manufacture of In	0.280	0.312	0.270	0.216	0.220	0.201	0.206	0.208	0.209	0.218
Handicraft and Ot	0.118	0.128	0.117	0.130	0.123	0.180	0.176	0.150	0.210	0.206

Data source: Guangdong statistical year book 2000-2010

It implied that much more firms would like to choose Guangdong province as their investment location. At the same time, this might make local firms benefit from foreign firms' agglomeration in terms of spillover. However, the agglomeration effects could also have a negative impact on firms located there, because as the agglomeration developed to a certain point, the centrifugal power will overpass the centripetal power, which is called congestion in spatial economics. Usually, the congestion effects will appear in a mature cluster that industrial agglomeration had already developed a long while.

As we can see in my later regression results part, using the dataset in year 2005 in Guangdong province, I found the industrial specialization effect is not significant. This result is a little different from main previous literatures (Ng and Tuan, 2006), and it hints that Guangdong may have a problem of congestion and is coming to a turning point to further industrial agglomeration upgrading.

Before go into empirical regression step, I would like to describe the conditional logit model briefly. The basic setup for this model consists of observations on "n" individuals, each of whom makes a single choice among "J" choices, or alternatives. The data will typically consist of the choices and observations on "K" attributes for each choice. The attributes that describe each choice, i.e., the variables that enter the utility functions, may be the same for all choices, or may be defined differently for each utility function. The estimator described in this section allows a large number of variations of this basic model. In the discrete choice framework, the observed dependent variable usually consists of an indicator of which among "J" alternatives it was most preferred by the respondent. All that is known about the others is that they were judged inferior to the one chosen. But, there are cases in which information is more complete and consists of a subjective ranking of all J alternatives by the individual. Conditional logit model (CLOGIT model) allows specification of the model for estimation with ranks data. In addition, in some settings, the sample data might consist of aggregates for the choices, such as proportions (market shares) or frequency counts. CLOGIT will accommodate these cases as well.

EMPIRICAL RESULTS

By using conditional logit model (CLOGIT model), I got the regression results as follows (see Table 7). From the CLOGIT model regression results, I know that wage rate, FDI inflow, port, R&D personnel, bridge, highway, and export positively affect firms to choose there as their firms' locations. While R&D expenditure, freight (congestion effect), and import have the negative impacts on enterprises.

Table 7: Regression results

Variable	Coefficient	Standard Error	b/St.Er.	P[|Z|>z]
SPECIA	−0.185	0.169	−1.095	0.273
WAGE	0.793	0.547	14.492	0.000
FDI	0.125	0.101	12.286	0.000
PORT	0.000	0.156	7.569	0.000
RDEXP	−0.723	0.504	−14.344	0.000
RDPER	0.000	0.153	10.104	0.000
FREIGH	−0.002	0.000	−10.901	0.000
BRIDGE	0.224	0.132	16.986	0.000
HIGHWA	0.000	0.833	−24.700	0.000
IMPORT	−0.014	0.001	−17.938	0.000
EXPORT	0.007	0.001	9.991	0.000
CIT_SAL2	0.000	0.378	3.204	0.001
CIT_SAL9	0.742	0.378	1.963	0.050

According to the CLOGIT regression results, specialization coefficient is negative but not significant. Since my dataset cover the year 2005 in which the industrial specialization level had started to go down, it seems that agglomeration effect (industrial specialization here) is not the attracting point for investment firms. This result usually happens when the congestion effects appear or agglomeration economy began to disperse.

The wage rate was significantly positive. This means higher the wage rate, much more motivation for firms would like to invest in there. At the initial development stage in China, which just like my description as period2, inexpensive labor force was the most charming point for foreign investors. It was because, in that period, China only took over assembly production process without sophisticated technology contents. After nearly 30 years' development, those labor-intensive industries are threatened to get out or disappear. Instead, Chinese government is faced with industrial upgrading subject, which requires high level technology and skill level and accordingly high wage rate. My dataset is in 2005, the positive sign may refer to the new trend in Chinese labor market. At the same time, the result implies labor intensive firms or industries have to bankrupt (get out from the region) or upgrade themselves.

FDI coefficient was significantly positive. That means much more FDI inflows had been gone into the region, more firms would like to invest in there. This result is corresponding to most previous literatures (Ng and Tuan, 2004). As mentioned in the introduction part, China's economic reform was mainly pulled by two engines, i.e., trade and FDI. Especially, the enormous amount of exports from China was known as have been taken over by foreign invested firms. However, FDI could have both positive and negative impacts. The positive impact can appear as spillover effects, capital

inflow, and personnel cultivation and so on. On the other hand, the negative impact can appear as foreign set makers' competitiveness make local set makers' performance go down as well as those part and components makers (small and medium firms) have to be closed up (refer to Tanaka and Hashiguchi, 2012).

The port coefficient was significantly positive which means that the transportation access to abroad still is an import point for firms to locate there. As mentioned before, China's development model (especially for Guangdong province) is an outside oriented one, local firms provide inexpensive labor force and do the assembly and processing for foreign firms. The core parts and materials are come from abroad as well as the final market (Guangdong development road 2009). This is usually called "Both raw-materials' purchasing and product marketing taking place abroad". For both parts, port should be used. As the purchasing power of Chinese domestic market become stronger, port coefficient may become not positive, but at the time point 2005, my data still failed to verify that situation.

R&D expenditure and R&D personnel were significantly negative and positive respectively. China (Guangdong was the earlier province among Chinese provinces) started to think highly of R&D expenditure and R&D personnel just from the late 1990s. Because simple assembly and processing production can't continue long and foreign R&D institutes started to enter into China since then. It is a good sign for China what has verified industrialization progress in China. But at the same time, it is also showing a huge shortage in terms of human resource store and research and development level. Even though China has a lot of university graduates that ease the personnel shortage in some content, the R&D investment which is known need huge amount seems to still be going behind developed countries.

Freight coefficient was significantly negative. I use this variable as a proxy for congestion effect. As being well known, when industrial agglomeration develop into certain extent, the centrifugal power will become bigger than the centripetal power, which means too many firms concentrated in one congested place and some firms begin to go out (or say disperse). The negative result shows firms would like to locate in locations without congestion.

The coefficient of bridge and highway were both positive and significant. These two belongs to infrastructure, products after being assembled and processed will be tracked and transported back to foreign market using infrastructure like bridge and highway.

Import coefficient was significantly negative and export coefficient was significantly positive. These results showed firms will choose locations with small import amount and big export amount.

Thinking of Guangdong province is an abroad-oriented development model, export is most important for it. From the figures I mentioned above, it is also saying the export always overpass the import at the whole province, especially recently. Referring to the regression results of wage and R&D, I know that Guangdong province had just get out from low wage labor-intensive economic development style, but still do not have enough power to research and development new products (hold famous brand products of themselves as well) by themselves. Therefore, at the time point of my dataset, Guangdong province is still relying on processing and export yet.

I also estimated the interaction terms between city and firm sales. Due to the regression results amount are too big, I omit the insignificant results and just report the significant ones. The last two rows in my regression table showed that firms with large sales amount would like to choose city2, which refer to Shenzhen, as their location. Similarly, firms with large sales amount would like to choose city9, which refer to Dongguan, as their location.

DISCUSSION

From the above empirical results report, I can see Guangdong province is already doing very well in terms of poverty reduction and catching up with developed economies. However, they seemed to be faced with so many new challenges. The capital city of Guangdong province, i.e. Guangzhou, has already got the per capita GDP amount over 14000$, but since usually 20000$ is the watershed between newly emerged economy and developed economy, Guangdong have to develop more. When per capital GDP reached 20000$ level, there also exist several social and culture challenges, which means that economic structure and social structure should be changed correspondingly. To acquire that goal, I think the promotion of service industries (including financial system, law support, education, IT, and so forth) and R&D (innovation) capability are essential.

The above mentioned issues never can be easily resolved. Get back to my subject, with respect to the economic structure change, Guangdong have to reduce export market and expand domestic market. According to statistical data from Chinese statistic bureau, in the first half of year 2012, China's export began to slow down. At the same time, there was no sign of healthy domestic consumption market. Many firms went to bankrupt, and the using amount of power and railway went down at the national range as well. Certainly, the export slowing down is related with Europe economic crisis, but I think it also revealed that the nature of Chinese economy is weak and sensitive, or to say that it relies on international trade immensely.

Infrastructure related coefficients (bridge, highway, port) are positive. Under the situation of both private part and foreign trade depression, only infrastructure can improve the total demand. On top

of that, in the initial development stage, infrastructure is usually the important attracting point for foreign investors (Sonobe and Otsuka (2006)).

The agglomeration (specialization) effect was insignificant. Combined with freight coefficient was significantly positive, it seems that industrial agglomeration effects had declined. By spatial economy theory, when industrial agglomeration develops to a certain extent, the agglomeration will change to disperse, which is accompanied by congestion effects as well. And I think there is another reason that old labor-intensive firms/industries had been cleaned out due to serious competition however high-tech companies have not entered in yet. To attract high-technology firms/investors, not only the local hardware is required but also the local software is essential. Unfortunately, Guangdong province has not achieved the conditions enough yet. For further development, Guangdong province should expand the tertiary industry, especially service industry, share out of total GDP as well as put investment in human resource and R&D.

CONCLUSION REMARKS

China's economic growth slows to 7.6% in the second quarter in 2012, which is the worst figure in last three year. The reason is thought to be that investment slowed and demand fell in key markets such as the US and Europe. If this bad economic performance in China continue to fail to pick up in a short time period, that's going to mean a very difficult environment for most manufactures in not only China but also Asia region.

As above mentioned, Guangdong province had taken over most of trade (export and import) and FDI inflow among China. Recent financial crisis and demand decrease in the US are giving a huge attack on Guangdong's production activities as well as economic performance. Many firms went to bankruptcy and electric power is sufficient enough now rather than electric power shortage just a couple of years ago. Several truths verified that China's economic growth is experiencing a slowdown. To escape from such situation, policy makers in Guangdong have no choice but to upgrade the economic structure and raise domestic firms' innovation capacity, technology level of products, and managerial skills in domestic firms.

Firms will always choose locations where can help their plants making maximum profits. After experiencing preferential policy attracting method and providing inexpensive labor force and land, some new comparative advantages are needed for China from now on. Those old comparative advantages are losing their charm gradually, and are going to be instead by poorer countries. Faced with such situation, I think the Chinese (as well as Guangdong) government have to put the following points as their new comparative advantages.

First is to expand the tertiary industry share out of total GDP. To increase employment in service sector such as financial, low, transportation, and various consulting parts. To improve the R&D investment and the R&D employment. Put local people to join the innovation activities for new products development. Raise the college education rate as well as increase masters and doctors. Take foreign R&D that entering in as a valuable source, send capable young people to study and get spillover effect. Create a new science and technology agglomeration instead of manufacturing industrial agglomeration.

Second is to continue to construct infrastructure not only infrastructures like port and highway but also the internet condition like wireless network covering and internet business. Virtually improve the soft power of the city. Expand the information channels for local people, reduce the internet limits and put access to foreign website more easily. Let local people know more about what is happening now in the world.

Third is to improve private sector's development and domestic consumption. As most people know, the only method for Chinese government to boost the stabilizing economy is government investment. But in developed countries, this role is usually instead by private sectors' investment and personal consumption. Of course, the purchasing power is accompanied by wage rate, i.e., the income level. And the income level is closely linked with education level and technology level what I mentioned in the first point. I think these points are closely correlated with each other, so it seems to need a comprehensive policy portfolio to reform the ongoing situation.

Last but not least, I want to mention the "green growth" even it looks like have no direct relationship with economy. Actually, for my theme in this paper, i.e. firms' location choice, I think the environment is undoubtedly an important attracting point. Especially R&D institution and high-tech firms would like to choose a clean place that can inspire them to develop a new product for better life. Chinese environment situation such as water environment, atmosphere environment, weather environment are situating in a relatively low level according to the international standard (China 2030 (2012) World Bank). Without improving such shortages, China may have difficulties to attracting higher level foreign institutions, not mention local development.

 Therefore, after nearly 30 years economic reform, China now is coming to a turning point that will decide if this country can change itself into a real developed economy. As per capita GDP going up further, new economic challenges as well as social problems will exist. I hope Chinese government with good luck to tackle with those problems well. Much more excellent firms would like to choose Guangdong as their locations undoubtedly, as long as their new problems are resolved.

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