UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

INVESTMENT-PROMOTION POLICIES AND EMPLOYMENT BY FOREIGN FIRMS IN THE U.S. STATES

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

Degree of

DOCTOR OF PHILOSOPHY

By

CHEN WU
Norman, Oklahoma
2012

INVESTMENT-PROMOTION POLICIES AND EMPLOYMENT BY FOREIGN FIRMS IN THE U.S. STATES

A DISSERTATION APPROVED FOR THE DEPARTMENT OF ECONOMICS

BY

Dr. Cynthia Rogers, Chair

Dr. Xin Huang

Dr. Gregory Burge

Dr. Jennifer Graves

Dr. Guoqiang Shen

Acknowledgements

I would like to convey my gratitude to my Dissertation Committee. They each contributed to this dissertation. First of all, I am indebted to my advisor Dr. Cynthia Rogers for her invaluable advice. Dr. Rogers has been very supportive throughout my graduate study at the University of Oklahoma. Not only is she my academic advisor, she is also my life mentor. She had the deepest impact on my thinking in the realm of economics. I am sincerely thankful for her excellent supervision and her encouragement all the time.

I thank Dr. Xin Huang for the econometric techniques she taught me in her course, which equipped me with the skills that I need. I also thank Dr. Gregory Burge and Dr. Jennifer Graves for their extremely constructive suggestions and comments on my dissertation. Dr. Guoqiang Shen's expertise in the field of Economic Geography favorably broadened my research horizon. It is their wisdom that enlightened me and led me to the road of becoming a researcher.

Table of Contents

List of Tables

List of Figures

Abstract

This study examines the relationship between state-level attributes and employment outcomes of US inbound Foreign Direct Investment (FDI). In particular, I investigate how investment-promotion policies influence the employment of workers in the US by foreign-owned manufacturing firms (FDI-related employment, hereafter). As discussed in the first two dissertation chapters, there are critical shortcomings and gaps in the existing literature. My research addresses these gaps. In so doing, the implications are of interest to researchers and policy makers regarding the strategic use of business incentives to promote US employment.

Chapter 3 analyzes the effectiveness of US investment-promotion policies aimed at attracting FDI. It begins by reviewing four principal business incentives offered by state governments: favorable corporate income taxation, non-tax financial support, the provision of Foreign-Trade Zones (FTZs), and the establishment of trade offices abroad. Using data from 50 states between 1999 and 2008, I employ a two-way fixed effects panel data framework and a dynamic system GMM approach to address the dynamic features of employment outcomes. I also correct for potential measurement errors and potential endogeneity of policy variables. The results suggest that state business incentives such as providing more FTZs (both general-purpose and subzones), spending more on public services even with higher corporate

income taxes, and holding overseas offices in particular countries, have statistically significant effects on FDI-related employment in the US.

Chapter 4 builds on Chapter 3 by exploring the potential heterogeneous response to state investment-promotion policies. Because state-level FDI-related employment does not follow a normal distribution, the conditional mean effects generated by standard least squares estimates may be unreliable. Accordingly, I employ a simultaneous quantile regression approach to reveal the relative importance of each policy at various locations of the employment distribution. I empirically investigate the employment by foreign-owned manufacturing firms aggregated to the state level for 50 US states between 1997 and 2008. The results suggest that the estimated effects of a better transport infrastructure, the provision of FTZs, the count of offices abroad and the selection of office-host countries, vary significantly across the FDI-related employment distribution. Therefore, unequal employment benefits of attracting FDI could be expected between states, as well as more interest in FDI for some states than for others.

Chapter 5 introduces a third line of inquiry that draws from industrial organization. It offers a novel application of FDI location choices within the context of a dynamic market structure. The recent development in empirical studies of firm entry/exit behavior fully takes advantage of the aggregate-level information. For instance, Pakes, Ostrovsky and Berry (POB, 2007) model the number of firms as endogenous because it is determined by firms' entry/exit decisions. Given that firms' choices of entry/exit depend upon their continuation value and entry value, the key step is to estimate the incumbents' (potential entrants') perceived transition probabilities across states of the market. This methodology provides a framework for analyzing how state-level attributes (particularly business incentives) affect foreign firms' entry costs and fixed costs, and further impact foreign firms' entry/exit decisions in the US. I outline in this proposal how to apply the POB (2007) methodology to the study of FDI location choice decisions within the US retail industry.

Chapter 1:

Foreign Direct Investment in the United States: Facts and Literature

1.1. World-wide Operations by Multinational Enterprises

The International Labor Organization (ILO) has defined Multinational Enterprises (MNEs) as corporations that "(w)hether they are of public, mixed or private ownership, own or control production, distribution, services or other facilities outside the country in which they are based".[1] As economic globalization takes hold, more and more firms are now using foreign countries or regions to finance, produce and diversify. MNEs have made substantial contribution in providing jobs, enhancing workers' compensation, bringing new research and innovation, and stimulating output in both Home and Host countries. Take U.S. owned MNEs for example. In 2007, parent enterprises of US-owned MNEs (hereafter referred to simply as U.S. Parents) accounted for 19.1 percent of total private-sector payroll employment, i.e. 22 million U.S. workers. The average wage per-worker paid by U.S. Parents was $63,272, 18.7 percent higher than the rest of the private sector. Total output produced by U.S. Parents was equal to 24.3 percent of all private-sector

[1] Cite source: *Tripartite Declaration of Principles Concerning Multinational Enterprises and Social Policy*, ILO, DOCUMENT:(OB Vol. LXI, 1978, Series A, No. 1) DOCNO:28197701.

output. On the other hand, foreign affiliates of U.S. owned MNEs employed 10 million workers and produced totally $1.1 trillion output all over the world.[2]

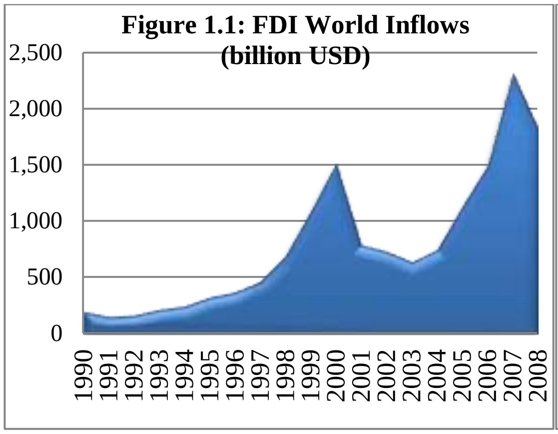
Associated with the global expansion of MNEs is a remarkable development of worldwide Foreign Direct Investment (FDI, hereafter) activity. FDI is a measure of foreign participation into a country's domestic economic activity. As Figure 1.1 and Figure 1.2 show, world-wide FDI inflows, measured by both absolute value and the share of Gross World Product (GWP), increased steadily during the last decade of 20th century and the years 2002 to 2007.[3] World FDI inflows peaked in the year of 2000 with $1519.4 billion investment flows and 4.8% of the current GWP. It dropped since 2001 and slipped down to its bottom since 1997 with $643.1 billion investment volume and 1.7% of the GWP in 2003. But, since then, it began to increase exponentially until 2007, when FDI inflow reached its summit with a value of $2322.9 billion. During the recent Economic Crisis in 2008, FDI declined but still with a large volume of $1823.3 billion and a share over GWP of 3.1%. Figure 1.3 indicates that in the 1990s, global FDI inflows increased annually by around 29.6 percent (24.7 percent for the share of FDI over GWP) and this average annual

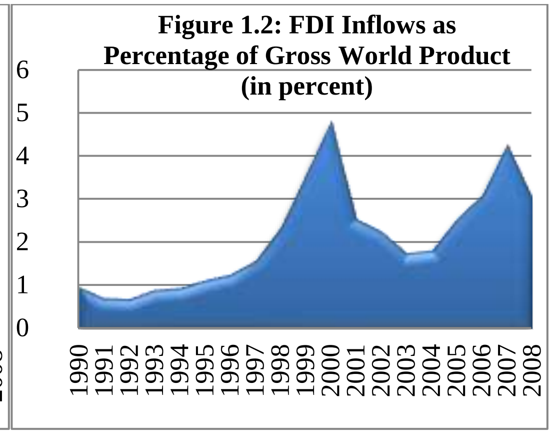
---

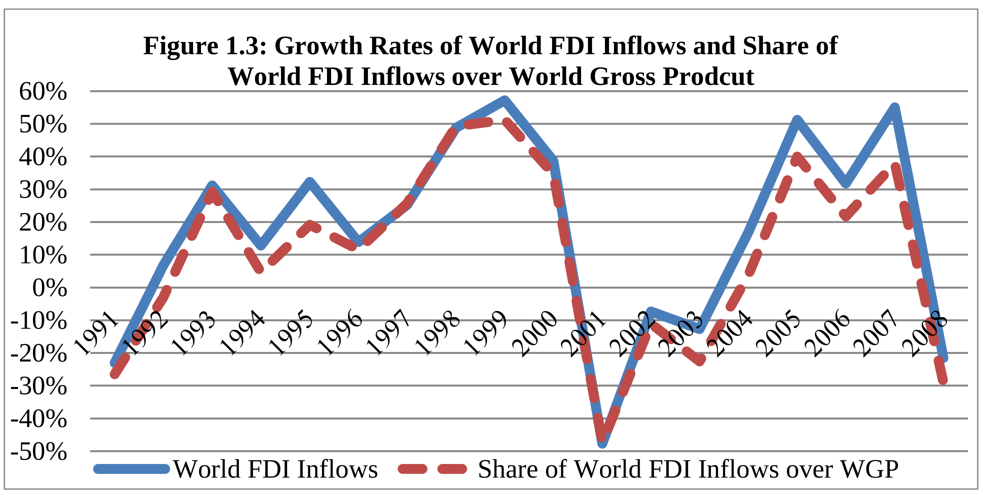
[2] Data source: Matthew J. Slaughter, 2010, "Data update to *How U.S. Multinational Companies Strengthen the U.S. Economy*", United States Council for International

[3] Data Source for Figure 1.1: International Monetary Fund (IMF), International Financial Statistics (IFS) and Balance of Payments (BOP) databases, World Bank, Global Development Finance (GDF), and World Bank and OECD GDP estimates. http://search.worldbank.org/data?qterm=foreign%20direct%20investment&language=EN&format=html. Data Source for Figure 1.2: IMF, IFS and BOP databases, and World Bank, GDF. http://search.worldbank.org/data?qterm=foreign%20direct%20investment&language=EN&format=html.

growth rate equals 22.5 percent (16.2 percent for the share of FDI over GWP) between 2002 and 2007. Compared with the 1.5% annual growth in world exports and the 0.6% annual increase in world GDP, the growth of global FDI is dramatic (Blonigen et al., 2007).







1.2. FDI in the U.S.: the Stylized Facts

Different countries have established various standards regarding foreign ownership of domestic productive assets. In the United States, according to *the International Investment and Trade in Services Survey Act*, Foreign Direct Investment (FDI), defined by the Bureau of Economic Analysis (BEA), refers to "ownership or control, directly or indirectly, by one foreign person, or entity, of 10 percent or more of the voting securities of an incorporated U.S. business enterprise or an equivalent interest in an unincorporated U.S. business enterprise[4]." FDI is often measured by the value of a firm's asset owned by foreign investors.

1.2.1. U.S. FDI Inflows: Overview

The United States has been the world's largest recipient of FDI. As Figure 1.4[5] and Figure 1.6[6] show, during the 1990s, the value of world-wide FDI flowing into U.S. surged from $19.8 billion (or 0.3% of U.S. GDP) in 1992 up to $321.3 billion (or 3.3 of U.S. GDP) in 2000. Since the year of 2003, the upward trend of U.S. FDI inflows occurred again. In 2008, more than $328.3 billion investment (or 2.3% of U.S. GDP) flowed into US, which is a 21 percent increase from 2007 ($271.2 billion). Even during the recent Economic Crisis in 2009, the U.S. still received more than $134.7 billion investment (about 1% of U.S. GDP) from all over the world.

---

[4] ALICIA M. QUIJANO, 1990, "A Guide to BEA Statistics on Foreign Direct Investment in the United States", pp. 29.

[5] Data source for Figure 1.4: "*Table 1. U.S. International Transactions*" of U.S. International Transactions Accounts Data, the Bureau of Economic Analysis.

[6] Data source for Figure 1.6: *Foreign Direct Investment in the U.S.: Financial and Operating Data for U.S. Affiliates of Foreign Multinational Companies*, BEA.

Figure 1.5[7] describes the US share of world FDI inflows since 1980. The United States received on average about one third of the global FDI inflows during the 1980s. Between 1992 and 2000, the average U.S. share of world FDI inflows was one fifth. Since 2003, this share dropped a little, but was still as large as 15 percent on average and was 21 percent in 2008. The growth of U.S. inbound FDI is also notable: as shown by Figure 1.8, U.S. FDI inflows increased on average by 23.1 percent (13.8 percent for the share of U.S. inbound FDI over GDP) annually in 1980s and the average annual growth rate was even higher in 1990s at 32.2 percent (25.1 percent for FDI share as of GDP). After a substantial drop in 2001 and 2002, U.S. inbound FDI (its share as of U.S. GDP) has been going up with an average annual growth rate of 24.5 percent (18.5 percent).

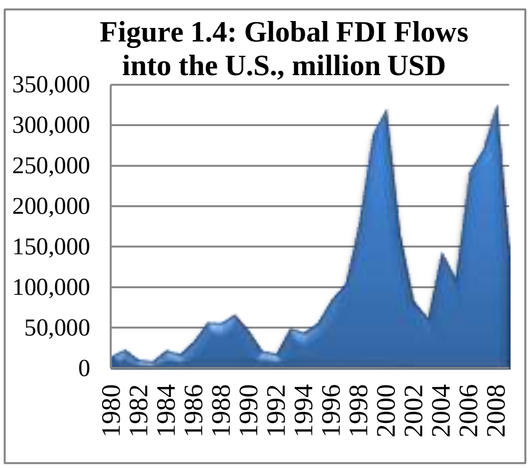


Figure 1.4: Global FDI Flows into the U.S., million USD

Figure 1.5

[7] Source for Figure 1.5: Invest in America, International Trade Administration, http://www.investamerica.gov/home/iia_main_001155.asp.

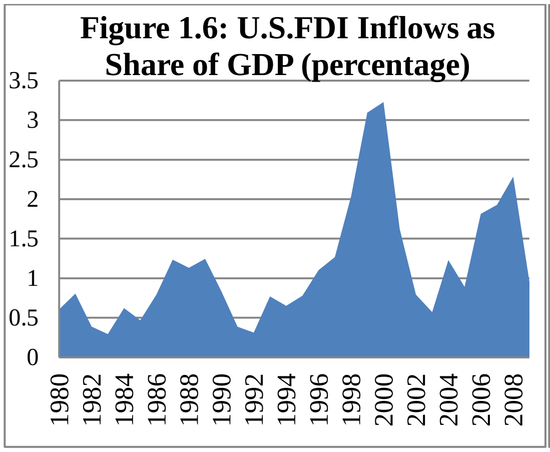


Figure 1.6: U.S.FDI Inflows as Share of GDP (percentage)

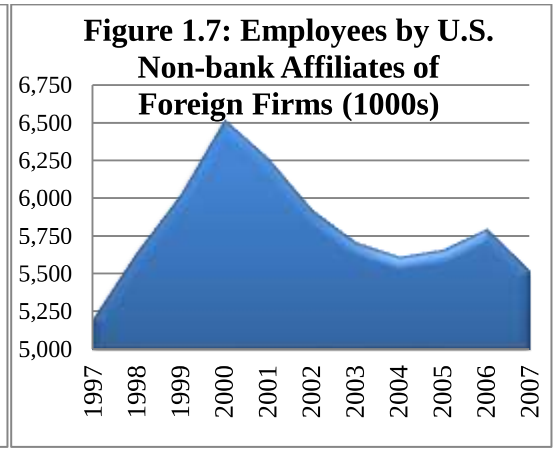


Figure 1.7: Employees by U.S. Non-bank Affiliates of Foreign Firms (1000s)

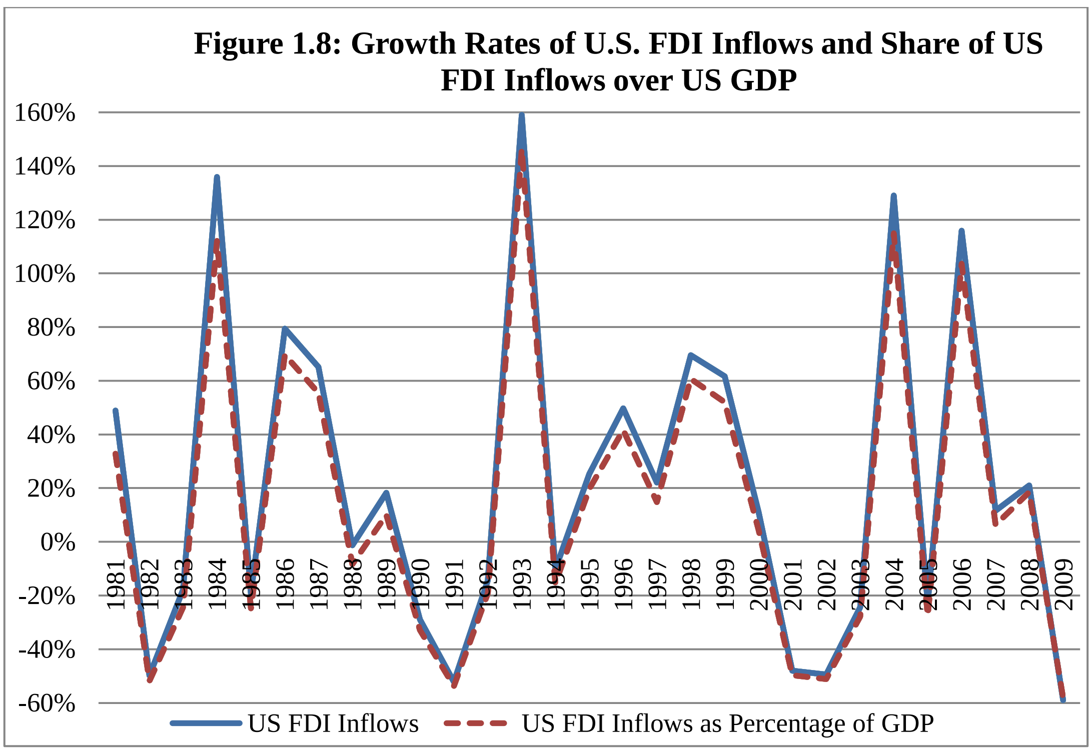


Figure 1.8: Growth Rates of U.S. FDI Inflows and Share of US FDI Inflows over US GDP

Since 1997, the value of gross Property, Plant and Equipment (PP&E) by U.S. non-bank affiliates of foreign firms has been increasing steadily: as shown by Figure 1.13, the average annual gross PP&E was $1180.1 billion, with a maximum value of $1407.6 billion in 2006; compared with the year of 1997, the gross PP&E

by foreign non-bank firms in U.S. has grown by 46.2 percent (i.e. $1283 billion). Total sales by U.S. non-bank FDI inflows was averaged at $2414.4 billion per year between 1997 and 2007: Figure 1.14 shows that it kept increasing until 2001 and after 2002 it has been going steadily upward before reaching a summit value of $3277.2 billion in 2007; the average annual growth rate of total sales equals 9.6 percent between 2002 and 2007.

The United States benefits from inbound FDI in several important ways. Figures 1.7 through 1.14 are constructed based on the data from "*Foreign Direct Investment in the U.S.: Financial and Operating Data for U.S. Affiliates of Foreign Multinational Companies" by BEA.* Figure 1.7 shows the employment contribution by U.S. non-bank affiliates of foreign firms. Between 1997 and 2007, the average annual employment by non-bank foreign plants in U.S. was 5.8 million. In 2007, U.S. affiliates of foreign companies (majority-owned) employ approximately 5.5 million U.S. workers. According to *Invest in America* by *the ITA*, this amount equals 4.6% of total U.S. private industry employment.[8] During the years 1997 – 2007, U.S. non-bank affiliates on average pay 25 percent higher wages and salaries than that of all U.S. establishments: as Figure 1.10 indicates, the average annual U.S. payroll supported by non-bank affiliates of foreign-owned firms was $334 billion, with an average annual per-employee compensation of over $68,000.[9]

[8] BEA, "International Economic Accounts", Operations of Multinational Companies, http://www.bea.gov/international/index.htm#omc.
[9] BEA, "National Economic Accounts", http://www.bea.gov/national.

The inbound FDI does not only contribute to U.S. employment and labor compensation, it also stimulates U.S. exports: as shown by Figure 1.11, annual exports shipped by U.S. non-bank affiliates have been going up since 2002 with an average annual growth rate of 8.7 percent and the average absolute volume was $167.8 billion per year between 1997 and 2007. In 2006, $205.9 billion of goods (around 20 percent of all U.S. exports) were shipped by U.S. subsidiaries of foreign companies[10] and in 2007, this number increased to $215.5 billion. The U.S. FDI inflows also bring in new research, technology and skills: Figure 1.12 shows that, from 1997 to 2007 a total of $338.2 billion was spent on Research and Development (R&D) by U.S. non-bank affiliates. The R&D spending by U.S. inbound FDI has been going steadily upward except for a small drop (i.e. $27 million) in 2001 and the average annual growth rate equals 10.5 percent. Since 2001, U.S. non-bank affiliates spent on average $34 billion annually on R&D. This number increased by 5.3 percent from $37.8 billion in 2006 to $39.8 billion in 2007.

1.2.2. U.S. FDI Inflows: Manufacturing

The U.S. FDI inflow greatly strengthens US manufacturing industry. Figures 1.9 through 1.14 suggest the importance of manufacturing FDI inflows among the total U.S. non-bank inbound FDI. Since 1997, about 40.2 percent of total jobs supported by U.S. non-bank affiliates of foreign firms are in the manufacturing sector: as shown by Figure 1.9, on average more than 2.3 million workers were

[10] BEA, "Foreign Direct Investment in the U.S.: Financial and Operating Data."

employed by foreign manufacturing firms in U.S. per year, accounting for 12 percent of all manufacturing jobs in the United States.

Figure 1.10 indicates that the average annual compensation paid by U.S. manufacturing affiliates was $155.5 billion, which equals 45 percent of annual compensation paid by all non-bank FDI inflows. Between 1997 and 2007, a total of $1091.3 billion exports was shipped by U.S. inbound FDI in the manufacturing sector: as shown by Figure 1.11, this number amounts to 60 percent of total exports shipped by all U.S. non-bank affiliates of foreign firms. In 2007 alone, $125.7 billion exports were shipped by US manufacturing affiliates, which equals a 7.1 percent increase compared with 2006.

Figure 1.12 shows that the share of U.S. non-bank affiliates' R&D expenditure going to the manufacturing sector is even more prominent, reaching the summit of 77.7 percent in 2000. During the years 1997 - 2007, U.S. manufacturing affiliates of foreign firms spent a total of $247.7 billion on R&D, accounting for 73.7 percent of the total foreign R&D expenditure in all sectors; the average annual growth rate of R&D spending by foreign manufacturing firms was 7.3 percent. Since 2004, the R&D spending by foreign manufacturing plants in the U.S. has increased by 38.2 percent and reaches $30.6 billion in 2007.

The U.S. inbound FDI in the manufacturing sector captures 43.6 percent of total gross PP&E by all non-bank affiliates in the U.S.: as indicated by Figure 1.13, between 1997 and 2007, foreign manufacturing plants owned on average $514.4

billion of the gross PP&E per year; compared with the year of 1997, this number in 2007 was raised by 27.1 percent. During the same period, 40 percent of total sales by U.S. non-bank affiliates came from the manufacturing sector: Figure 1.14 shows that, foreign manufacturing firms sold on average $964.3 billion of goods per year with a summit value of $1195.8 billion in 2007; the average annual growth rate of total sales by U.S. inbound manufacturing FDI equals 7.5 percent.

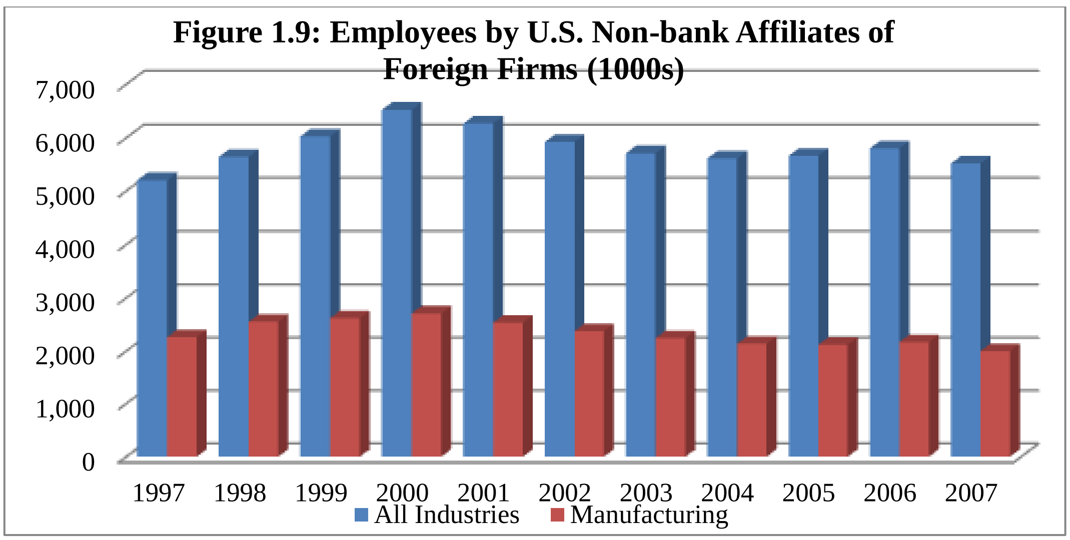


Figure 1.9: Employees by U.S. Non-bank Affiliates of Foreign Firms (1000s)

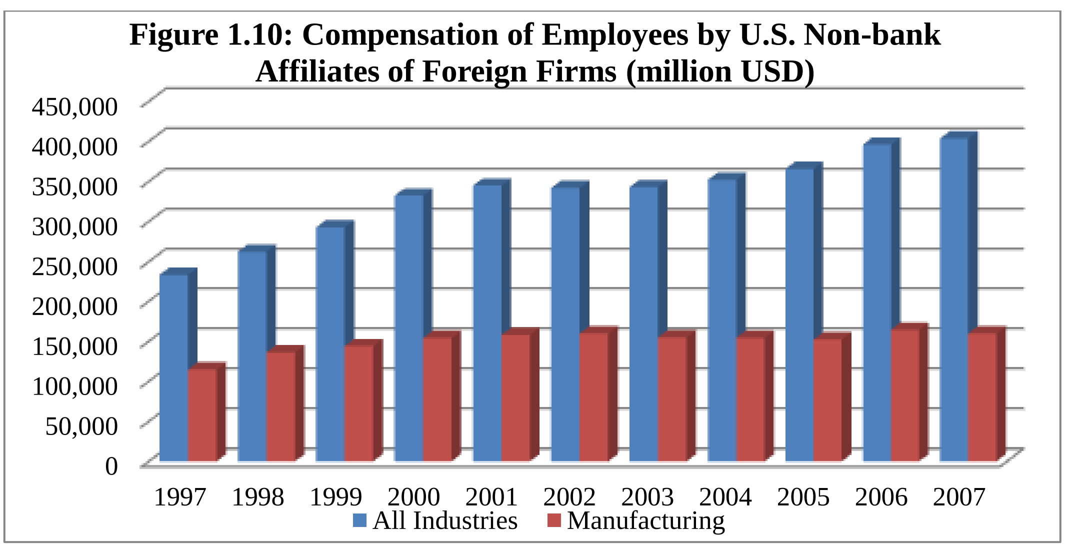


Figure 1.10: Compensation of Employees by U.S. Non-bank Affiliates of Foreign Firms (million USD)

Figure 1.11: U.S. Exports Shipped by U.S. Non-bank Affiliates of Foreign Firms (million USD)

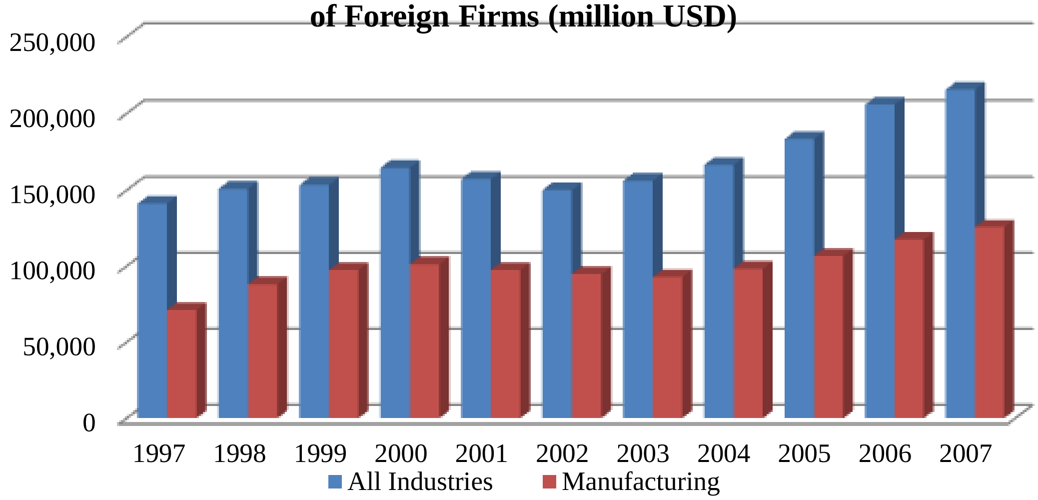
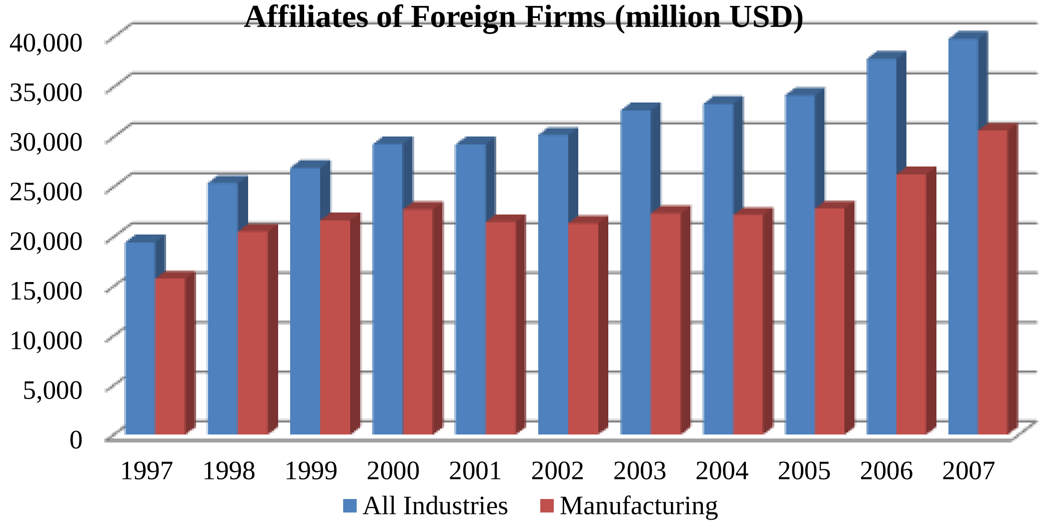


Figure 1.12: Research and Development by U.S. Non-bank Affiliates of Foreign Firms (million USD)



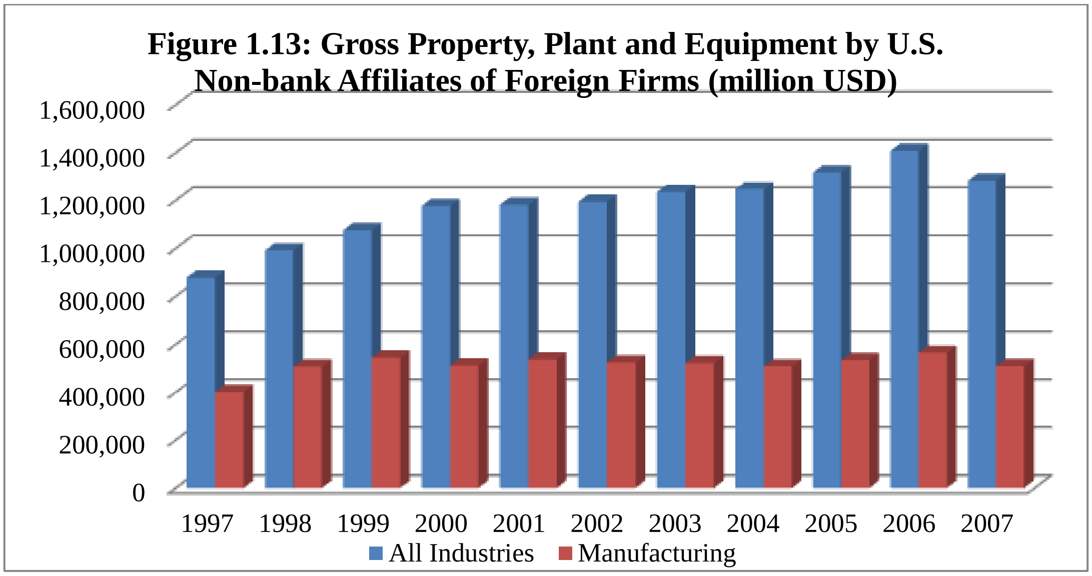


Figure 1.13: Gross Property, Plant and Equipment by U.S. Non-bank Affiliates of Foreign Firms (million USD)

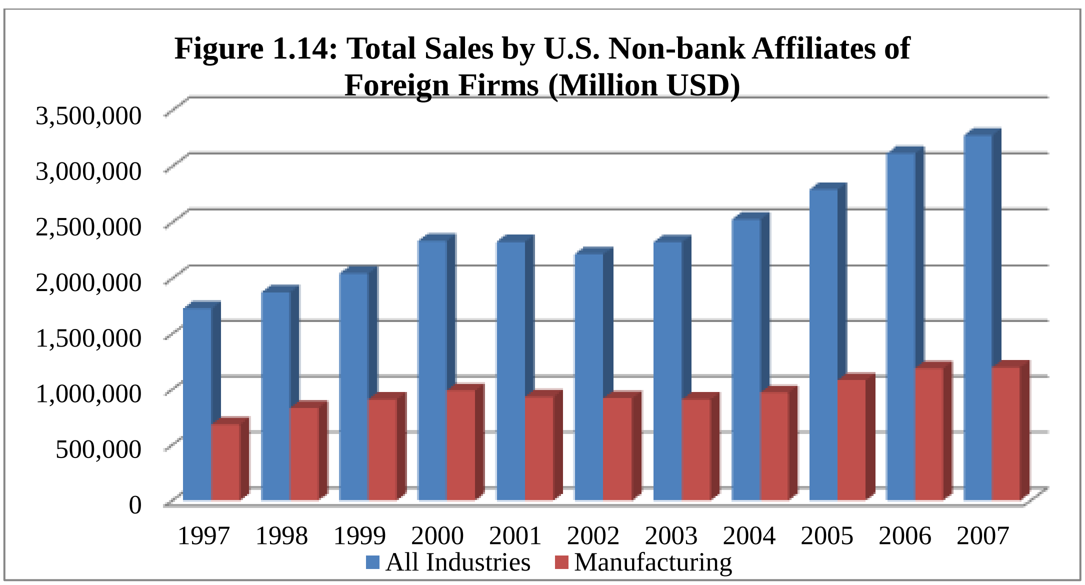


Figure 1.14: Total Sales by U.S. Non-bank Affiliates of Foreign Firms (Million USD)

1.3. Critical Review of Literature on Foreign Firms' Location Decisions and Employment

The question of what determines MNEs' decisions of where to locate affiliates among foreign countries has been hotly debated among academics and policy-makers.

1.3.1. Aggregate-level Studies

One large group of empirical studies investigates what aggregate market characteristics will attract more FDI. According to different measures of FDI activity, these studies use a variety of econometric methods. Most aggregate-level studies of FDI location choices measure foreign firms' activity by their assets, sales or the gross value of property, plant and equipment (Fredriksson 2003). They utilize either a gravity-type linear panel data model (e.g. Broaconier et al 2005; Tuan and Ng 2001, 2007; Hejazi 2009; Blonigen et al 2007) or a dynamic system Generalized Method of Moments (GMM) model (e.g. Ge 2009; Barrios et al 2006; Cheng and Kwan 2000; Kemegue and Mohan 2009). Some aggregate-level studies utilize the count of foreign establishments to represent the foreign presence and apply either a Poisson model (List 2001; List et al 2004) or a Negative Binomial model (Coughlin and Segev 2000; Jin et al 2006).

The spatial unit of aggregate-level research also varies. Conventional aggregate studies employ cross-country data (see for reference, Blonigen and Davies 2004; Kemegue and Mohan 2009; Blonigen et al 2007 and Baltagi et al 2007). More recently, researchers acknowledge that the substantial heterogeneity across countries may lead to a significant issue of unobservable factors. Because of this wide recognition, the aggregate-level FDI location analysis has moved towards smaller geographical areas (Arauzo-Carod 2010), such as state/province-level (e.g. Sun 2002; Fredriksson et al 2003; Ge 2009; Cheng and Kwan 2000; etc), and even county-level studies (e.g. Coughlin and Segev 2000; Barrios et al 2006; Figlio and Blonigen 2000; List 2001; List et al 2004).

1.3.2. Firm-level Studies

Meanwhile, considerable effort has been devoted into micro-level FDI location analysis utilizing establishment-level data. Most plant-level studies are theoretically built upon McFadden's Discrete Choice theory (Arauzo-Carod et al. 2010). Empirically, they are interested in the determinants of MNEs' location decision of affiliates and employ either a Conditional Logit model (see for reference, Woodward 1992; Du et al. 2008a,b; Levinson 1996; List and Co 2000; Devereux et al. 2007; Blonigen et al. 2005; Buettner and Ruf 2007; Head et al. 1999 and Dean et al. 2009), or a Nested Logit model (Lee et al. 2007; Dean et al. 2009).

1.3.3. Determinants Suggested by Literature

Empirical results with regard to determinants of FDI location choices are quite mixing. In addition to the conventional determinants offered by Gravity model (e.g. market size, distance, production costs, etc), the main findings of those studies that utilize different econometric methods described above call people's attention to various *neoclassical* and *institutional factors*[11](Arauzo-Carod et al. 2010). *Neoclassical factors* include the agglomeration economies of FDI (Woodward 1992; Du et al. 2008 a, b; Devereux et al. 2007; Blonigen et al. 2005; Lee et al. 2007; Sun et al. 2002; Ge 2009; Barrios et al. 2006) and the human capital conditions (Gross and Ryan 2008; Broaconier et al. 2005; Sun et al. 2002). *Institutional factors* contain the "pollution haven hypothesis" (List 2000; List and Co 2000; List et al. 2004; Levinson 1996; Dean et al. 2009; Fredriksson et al. 2003), the effect of taxation (Woodward 1992; Coughlin and Segev 2000; Buettner and Ruf 2007; Desai et al. 2004; Ng and Tuan 2003; Fredriksson et al. 2003; Blonigen and Davies 2004), local business promotion policies (Woodward 1992; Coughlin and Segev 2000; Devereux et al. 2007; Head et al. 1999; Dean et al. 2009; Jin et al. 2006; Cheng and Kwan 2000) and spatial interaction of FDI between regions (Head et al 1999; Ng and Tuan 2006; Kemegue and Mohan 2009; Blonigen et al. 2007; Baltagi et al. 2007).

1.3.4. A Critical Evaluation of Shortcomings in Aggregate-Level Studies

The measurement of FDI activity and foreign presence is a core issue in aggregate-level studies. However, the intensively employed measures are unsatisfactory in terms of capturing the economic contribution of FDI on local economies. The count measure inappropriately assigns each foreign establishment an equal size such that a region with more foreign plants is automatically assumed to

[11] Arauzo-Carod (2010) define *neoclassical factors* as "(p)rofit- or cost-driving factors such as agglomeration economies, transport infrastructures, technology and human capital" (pp.702). *Institutional factors*, on the other hand, refer to determinants that affect profit and cost through a "(n)etwork of economic relations" between the firm and other agents, e.g. clients, suppliers, governments, etc".

have a larger volume of FDI inflows and more employees supported by foreign firms (Blonigen et al. 2005). None of other widely used measures (i.e. foreign assets, sales and the gross value of property, plant and equipment) explicitly captures the employment contribution associated with foreign investments. Accordingly, I focus on the employment outcome of FDI activity by using the employment measure and further investigate the relationship between FDI-related employment and state attributes in the U.S.

Chapter 2:

Investment-Promotion Policies in U.S. States: Facts and Literature

Foreign direct investment (FDI) has been playing an important role in the United States economy. It has been serving as a key source of innovation, exports and jobs. It also contributes to the U.S. economy by boosting U.S. wages, strengthening U.S. manufacturing and services, and rising U.S. productivity.[12] The U.S. governments, from the federal level to state and local levels, have always provided foreign investors a stable and friendly market. The efforts made by U.S. governments to encourage foreign investments cover all needs to conduct a business, from a predictable and transparent legal system, low taxes, outstanding infrastructure, to direct financial supports for the usage of production factors.

2.1. Investment-Promotion Policies in U.S. states: the Stylized Facts

This chapter mainly discusses a total of four principal promotion policies used by U.S. state governments: competitive corporate income taxes, non-tax direct financial supports, foreign-trade zones and state trade offices abroad.

2.1.1. Low Corporate Income Tax

Corporate tax is one fiscal factor commonly considered by studies of industrial location. Most of those earlier studies find evidence revealing that high

---

[12] *Invest in America*, The International Trade Administration, U.S. Department of Commerce. http://www.investamerica.gov/home/iia_main_001154.asp.

corporate taxes deter foreign investment (see for reference, Head et al. 1999; Woodward 1992; Coughlin and Segev 2000; List and Co 2000; Levinson 1996; Fredriksson et al. 2003; Desai et al. 2004). So, relatively low tax on corporate income is an important policy option for state governments to attract business. Compared with some of other OECD countries, state-level corporate taxes in U.S. are relatively low. For example, in 2009, the average top state Corporate Income Tax (CIT) rate was 6.3% (ranging from 0% in Nevada to 12% in Iowa), while the average top state/provincial CIT rates in Switzerland (14.47%), Germany (14.4%), Canada (12.3%), Japan (11.56%) and Luxembourg (6.75%) were higher than that of the U.S.[13] If we consider a relative low corporate tax as an effort by a state government to offer an investors-friendly atmosphere (which is reasonable according to the findings of previous studies), then this cross-country comparison may indicate that U.S. states do more work to promote business development than their counterparts in some OECD countries.

Between 1991 and 2009, forty five out of the fifty U.S. states imposed a direct CIT.[14] Comparing states within the U.S., as described in Figure 2.1, we could observe that there exists substantial heterogeneity in their top CIT rates. In 1991, Iowa had the highest top rate of 12%, and the second highest rate was 11.5% in Connecticut. Michigan's 2.35% corporate tax rate was the lowest among the states

[13] Data source: "*Comparing U.S. State Corporate Taxes to the OECD"*, Tax Foundation. http://www.oecd.org/dataoecd/26/56/33717459.xls.

[14] Five states that have no direct CIT are Nevada, S. Dakota, Washington, Texas and Wyoming.

with corporate income tax, and Indiana had the second lowest rate of 3.4%. In 2001, although the highest top CIT rate was still 12% in Iowa, the second highest rate decreased to 10.5% in North Dakota. The lowest top tax rate dropped to 2.1% in Michigan. In 2009, top state CIT rates varied from 12% in Iowa and 9.99% in Pennsylvania to 4.63% in Colorado and 0.26% in Ohio. Texas has a franchise tax, *the Texas Margins Tax,*[15] with the tax rate of 4.5% before 2007, and then it dropped to 1%.Washington did not levy income tax on firms until 2007. And then, it began to charge a franchise tax, *the Washington Business & Occupation (B&O) Tax*, with a top rate of 1.5%.[16]

Figure 2.2 shows that state-level top CIT rates change over time for most states. From 1991 to 2009, twelve states have decreased their top CIT rates. Ohio has the sharpest drop (from 8.9% to 0.26%). North Dakota and Connecticut each reduced its top tax rate by 4 percentage points (PP). Arizona's top CIT rate declines by 3.532PP, followed by New York (1.8PP) and Kentucky (1.25PP).[17] In the mean while, seventeen states have raised their top CIT rates. The largest increase was

[15] The *Texas Margins Tax* is a gross receipts tax paid by most taxable entities. Since 2007, qualified entities with $10 million or less in total revenue pay 0.575%. Qualifying retailers and wholesalers pay 0.5%. Taxable entities with total revenue of $300,000 or less will owe no tax. Taxable entities with tax due of less than $1,000 will owe no tax. (Source: "*State Corporate Income Tax Rates*" by Tax Foundation).

[16] *The Washington Business & Occupation (B&O) Tax is also* a gross receipts tax like *the Texas Margins Tax*. It is levied at various rates. The major rates are 0.471% for retail sales, 0.484% for wholesale and manufacturing, and 1.5% for service and other activities. (Source: "*State Corporate Income Tax Rates*", various years, Tax Foundation; state tax forms and instructions. www.taxfoundation.org).

[17] West Virginia, California, Idaho, Colorado, Missouri and North Carolina also reduced their top tax rates by, respectively, 0.95, 0.46, 0.4, 0.37, 0.25 and 0.1 percentage points.

5.1PP in Indiana. Ten other states boosted their top rates by more than one PP.[18] Even that relatively more states have raised their top CIT rates, the average state-level top CIT rate actually declined from 6.8% in 1991 to 6.3% in 2009. Assuming that a reduction in top CIT rate is an indicator of a state government's effort to attract business developments, we may infer from this longitudinal comparison that U.S. states differ in terms of their promotion effort. However, as a whole, they tried to promote more investments by decreasing the top CIT rate.

2.1.2. Non-tax Direct Financial Support

In addition to relatively low corporate tax rates, states offer various non-tax direct financial assistances. Direct factor subsidy/grant is one widely applied tool by state and local governments.[19] Governments encourage investors to start or expand their business by subsidizing their factor inputs. To be qualified to receive subsidies/grants, applicants must satisfy certain requirements on minimum jobs or investment levels. For example, to promote high-wage jobs, the *Delaware New Economy Jobs Program* offers a qualified business a subsidy of up to 65% of the firm's whole withholding taxes. An applicant for this subsidy must create at least 50

---

[18] Those states are, ranked by the absolute value of increase in percentage points, Indiana (5.1), Illinois (3.3), Michigan (2.6), Alabama (1.5), Washington (1.5),Pennsylvania (1.49), Oregon (1.3), Maryland (1.25), Nebraska (1.16), Oklahoma (1), and Rhode Island (1).

[19] Other non-tax financial supports include state loans or loan guarantees, state or local issued bonds, venture corporations, tax credits, abatements and deductions, etc.

net new jobs with each having an annual salary of at least $100,000.[20] Due to the variety of eligibility conditions across all states, implementation of this business promotion policy has significant heterogeneity across all U.S. states. Table 2.1[21] lists all the direct factor subsidy/grant programs by states in 1991 and 2009. In 1991, thirty one out of fifty states offered subsidy/grant programs for labor inputs, twenty states provided subsidies /grants for investors' capital inputs, and fourteen states had both. Twelve states did not offer either job or capital subsidy/grant to business expansions or start-ups.

Historically, elected officials treated the investment-development programs as a luxury item reserved for a good time of plenty. As a result, they usually first cut budgets for business incentives when an economic distress occurred. Until better times emerged, they would put the development-promotion programs back on table. However, during the recent Economic Crisis, things have changed somehow. Starting from *the Federal Stimulus package*, what has emerged is a reinforced participation of government in the economy. State and local governments have been pursuing a so-called "Incentives as Investments" strategy. They work on promoting

---

[20] "Delaware Direct Financial Incentives 2010", Delaware Economic Development Office, http://www.areadevelopment.com//stateResources/delaware/Delaware-direct-financial-incentives2010-100990.shtml.

[21] Data source: Information on state subsidy/grant programs in 1991 is from a publication of National Association of State Development Agencies (NASDA), named "Directory of Incentives for Business Investment and Development in the United States: A State-by-State Guide, 1991". This is the newest edition of this publication available. Information on state direct financial support is from the website "Area Development Online", http://www.areadevelopment.com//stateResources, and websites of state governments 'department of commerce, economic development, etc.

jobs, controlling over tax increases, and making a more investors-friendly environment in the hope of solidifying "(e)xisting and further developing new tax revenue on the eventual upswing of the business cycle" (*Business Incentives in 2010: Alive and Well* by Thomas J. Stringer).

From Table 2.1 we can observe this trend toward an "Incentives as Investments" strategy and a more strengthened government participation in economy. In 2009, thirty seven states offered employment subsidy/grant programs. The number of states that offer subsidy/grant for capital inputs rises by more than 50 percent (from twenty in 1991 to thirty one). Meanwhile, the count of states providing both kinds of subsidy/grant program almost doubled, changing from fourteen to twenty six. Only eight states did not directly subsidize labor or capital usage by investors. Compared with 1991, twenty states have expanded their factor subsidy/grant offering by adding at least one category of grant programs in 2009. Eleven states[22] have made great effort on attracting business by offering subsidy/grant programs in both categories, and only four[23] states have no subsidy/grant categories during the years of 1991 to 2009.

2.1.3. Foreign Trade Zones

In the U.S., the duty on an imported product which is manufactured abroad is assessed on the finished product rather than on its individual parts, materials, or

[22] They are Arkansas, Florida, Illinois, Iowa, Maryland, Michigan, Minnesota, New York, North Carolina, Pennsylvania and Washington.
[23] They are Georgia, Nebraska, South Carolina, and South Dakota.

components. However, if the same product was manufactured in the U.S., then U.S. based manufacturers have to pay a higher tax on imported materials or components used in the manufacturing process. As a result, they have a disadvantage compared with their foreign competitors in terms of the taxation on imported goods. To correct this imbalance which is adverse to U.S. based manufacturers, and to encourage companies to maintain and expand their operations in America, some sites within the U.S., called Foreign Trade Zones (FTZs), are considered by federal government as outside Customs territories. Products manufactured in those zones, for the purpose of tariff assessment, are treated as if they were manufactured abroad. So, a U.S. based manufacturer that uses imported component in his manufacturing process could benefit by only paying duty based on its status when it actually enters the U.S. Within FTZs, imported merchandise can be re-exported or destroyed without ever incurring Customs duties. The FTZ program will also benefit a host state because the zone manufacturers rely on the state for labor, services, and inputs.[24]

Currently, two kinds of FTZ widely exist in U.S. states. One is the General-Purpose Zone (GP Zone), and the other is the Subzone. A GP zone is a "(f)oreign trade zone in which any number of firms may operate, constrained only by the physical limitations of space in the zone". But, a subzone is a "(s)ingle-firm site, normally involving manufacturing, whose operations and control are separate from

[24] *Foreign-Trade Zones Manual*, the United States Customs Service, the Foreign-Trade Zones Board, the Bureau of Census and the National Association of Foreign-Trade Zones,

the general purpose zone; in this sense, it is approved only for a specific activity".[25] Producers in certain industries, such as automobile and television, must apply for subzone status to obtain tariff reductions (Head et al, 1999).

The prevalence of FTZs has increased since 1991 for majority of states. As of 1991, 47 out of the 50 states had GP zones (Head et al. 1999).[26] In 1999, 236 GP zones were offered by all U.S. states and 381 subzones existed in all but 6 states (Idaho, Montana, Rhode Island, S. Dakota, Utah and Wyoming). The count of zones varied among states, reflecting different efforts to attract business developments. In 1999, Texas ranked first with 29 GP zones and 55 subzones, followed by California, which offered 16 GP zones and 26 subzones. Ohio ranked third with 8 GP zones and 27 subzones. Thirty states had less than 10 FTZs (GP and subzones together).

As shown by Figure 2.3 and 2.4, the first decade of the 21st century has observed substantial expansion of FTZs in U.S. states. As of 2009, 253 GP zones are widely distributed in all states and 523 subzones are offered by all but 5 states (Montana, Rhode Island, S. Dakota, Utah and Wyoming). Texas still ranked as number one with 32 GP zones and 72 subzones. California followed Texas with 19 GP zones and 36 subzones. Twelve states had more than twenty FTZs, while the count of states with less than ten FTZs (GP and subzones) decreased to 25[27].

---

[25] *Foreign Trade Zones,* Economic Development Partnership of Alabama, www.edpa.org.

[26] The three states with no FTZs are Idaho, South Dakota and West Virginia.

[27] Data source*: Annual Report of the Foreign-Trade Zones Board to the Congress of the United States, 1999-2009, the Department of Commerce.*

Compared with 1999, only 11 states (Alaska, Arizona, Delaware, Hawaii, Ohio, Rhode Island, S. Dakota, Tennessee, Utah, W. Virginia and Wyoming) have kept their FTZs constant, but all other 39 states have added 159 FTZs by 2009. Texas added 20 FTZs, followed by California with an increase of 13. S. Carolina, Illinois and Louisiana each had increased 10. There are 5 states (New York, N. Carolina, Michigan, Massachusetts, Indiana and Georgia) that gained 6 more FTZs between 1999 and 2009.

2.1.4. Overseas Investment-Promotion Offices

Another common practice by states is the opening of overseas offices to attract international companies. The official presence of a state in foreign countries usually provides foreign investors with various advisory and support services, such as professional support in the business site selection process, information on industry sectors and operating costs, access to technical and workforce training programs, and the provision of governmental assistance, etc.

Before 1990s, the prevalence of foreign business-promotion offices was not impressive. As of 1991, only twenty states had foreign offices or official business representatives abroad. Among those states, Illinois ranked first with seven foreign offices in six countries or districts (Belgium, Brazil, Hong Kong, Japan, China and Russia). New York followed closely with six foreign offices distributed in five countries (Canada, Germany, Hong Kong, Japan and the United Kingdom). Indiana ranked third with international offices in five countries (China, Germany, Japan, Korea and Tai Wan). Alabama, Georgia, Maryland, N. Carolina and Wisconsin each had overseas offices in four countries[28].

The 1990s, however, had experienced prominent increase in the operation of opening overseas offices by U.S. states. From 1991 to 2002, twenty four states with no foreign offices in 1991 opened their overseas offices. As a result, only six states (Nebraska, Nevada, New Hampshire, Rhode Island, Vermont and Wyoming) had no official presence in foreign countries as of 2002. Although that majority of U.S. states opened official representatives abroad, there was significant heterogeneity in their efforts. In 2002, Pennsylvania, which had eighteen overseas offices, led all other states. Eight other states (California, Florida, Indiana, Maryland, Missouri, Ohio, Pennsylvania, and Utah) each had official trade/business representatives in more than ten foreign countries.[29] Five states (Alabama, Hawaii, Massachusetts, Montana and New Mexico) each had two foreign offices, and seven states each had only one.

After 2002, states' effort to open overseas offices kept growing, although the growth was not as prominent as the one in 1990s. Compared with 2002, nineteen

[28] Information on state overseas offices in 1991 is from a publication of National Association of State Development Agencies (NASDA), named "Directory of Incentives for Business Investment and Development in the United States: A State-by-State Guide, 1991".

[29] Information on counts and locations of states' foreign offices in 2002 is from appendix A (pp. 49 - pp.51) of "State *Official's Guide to International Affairs*" 2003, by Chris Whatley**,** the Council of State Governments.

states[30] have expanded their official presence abroad by opening more trade offices in foreign countries in 2009. Currently, only four states (Wyoming, Utah, Rhode Island and Maine) have no foreign offices.[31] States differ significantly in terms of their efforts to attract foreign companies by opening official representatives abroad. Pennsylvania is still leading all other states. Its international offices increased from eighteen in 2002 to twenty three in 2009. Five other states (California, Florida, Georgia, New York and Ohio) have more than ten overseas offices. Illinois and Maryland each have nine, followed by Texas with eight. Eleven states each have only two or one. Table 2.2 lists the counts and locations of overseas offices for all U.S. states in 1991, 2002 and 2009

2.2. Critical Review of Literature on Investment-Promotion Policies

In addition to its direct contributions to the employment and exports in the host economy, FDI also affects the local market by its spillovers to domestic firms. As a result, world-wide governments have been providing various promotion policies to encourage foreign plants.

2.2.1. Why Governments Attract FDI: Literature on FDI Spillover Effects.

[30] They are Alabama, Georgia, Illinois, Massachusetts, Nebraska, Nevada, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Pennsylvania, South Dakota, Tennessee, Texas, Vermont, Washington, and Wisconsin.

[31] Information on state international offices for the current year is from websites of economic development authorities for all states, such as the department of commerce.

Empirical studies of FDI spillover effects report a significant influence of FDI inflows on domestic economies.

First, foreign-owned plants create jobs and boost local real wages. For example, Figlio and Blonigen (2000) investigate the effects of FDI on local wages and public spending in South Carolina counties from 1980 to 1995. They find that foreign manufacturing firms boost local real wages more than domestic investment does.

Second, they bring in new research and enhance the host economy's innovation ability by knowledge spillover effect. Branstetter (2006) examines two directions knowledge spillover effects on firms' innovation ability between Japanese plants and U.S. domestic firms. Their empirical results indicate that Japanese innovation investments have positive effect on domestic U.S. firms' patent number. Cheung and Lin (2004) pay attention to knowledge spillover effects of inward FDI on Chinese provincial domestic economy. They also find evidence confirming a positive spillover effect of foreign firms' R&D activity on the number of domestic patent applications in China.

Finally, they also induce positive spillover effects in domestic labor productivity by training workers. Jordaan (2005) focuses on the potential spillover effects from foreign manufacturing investments on Mexican manufacturers 'labor productivity. His empirical estimation supports the "absorptive capacity hypothesis" by showing that foreign plants induce positive spillovers to Mexican labor productivity in manufacturing sector through FDI agglomeration in regions that have large technological gap between foreign and domestic firms. Using firm-level data on Chinese manufacturing industry from 1998 to 2005, Lin et al (2009) find heterogeneous spillover effects based on the source of FDI. FDIs from OECD countries induce help on Chinese Total Factor Productivity (TFP), while Hongkong, Macao and Taiwan firms have adverse impacts on domestic Chinese firms' productivity due to more intense competition between them.

2.2.2. Literature on Investment-Promotion Policies: World-Wide Studies

Global wide governments have been providing a variety of business incentives to encourage foreign developments. Those promotion policies are investigated extensively by the literature.

In the United Kingdom, governmental grants are reported as conducive to attract new business. Devereux et al (2007) investigate the question that whether potential benefits from agglomeration affect the effectiveness of fiscal instruments like government discretionary grants to investors. They apply this to data on new establishments in the British manufacturing sector between 1986 and 1992. They conclude that fiscal incentives, like grants, will be more effective accompanied with agglomeration effects within the area, and foreign-owned plants also favor locations with larger numbers of existing foreign-owned plants in their industry.

Considerable effort has been made to study business promotion incentives in China. For example, Jin et al (2006) utilize a city-level panel data of Japanese food manufacturing investments in China to investigate the role by agglomeration and policy incentives as determinants of Japanese food FDI location decisions in China. Dean et al (2009) use Chinese provincial data on manufacturing joint venture projects and pollution regulation from 1993 to 1996 and mainly investigate the effects of regional environmental regulation and FDI promotion policies on FDI location choices in China. In both papers, the authors simply create an incentive dummy which equals one if there is a special economic zone (SEZ) or open coastal city (OCC) in the province. Note that, this variable may be constant during a certain period. Cheng and Kwan (2000) focus on the dynamic adjustment process of FDI in China and rely on a panel data of 29 Chinese regions from 1985 to 1995. They construct a variable which is the sum of all Open Coastal Areas/Cities and Economic and Technological Development Zones to work as an aggregate policy indicator. Those papers all find evidence that FDI promotion policies in China have significantly attracted more foreign investors. However, one common disadvantage for all three studies is that they do not distinguish between various incentives given to FDI.

2.3. Literature on Investment-Promotion Policies: the Case of the U.S.

Investment-promotion policies in the U.S. have been examined by some studies of FDI location choices.

To my knowledge, Head et al. (1999) is the first and the most comprehensive investigation of state-level investment incentives within the context of MNEs' decisions of locating affiliates in the U.S. A total of six investment-promotion tools used by state and local governments are examined, namely, 1) low corporate income tax; 2) labor subsidies; 3) capital subsidies; 4) existence of investment promotion office in Japan; 5) existence of a foreign trade zone in the state and 6) unitary taxation by the state. They report that the provision of lower corporate income taxes, job subsidies and Foreign-Trade Zones (FTZs) significantly help a state to attract Japanese investment.

However, most papers investigate only one or a couple of business incentives. For example, Woodward (1992) also analyzes the location of Japanese-affiliated manufacturing plants in U.S. for 1980-1989. Unlike Head et al. (1999), who focus on state-level attributes and business incentives, Woodward (1992) clearly separates state-level and county-level variables. The separation of state and sub-state decisions has advantage in studying the agglomeration economies. However, state-level analysis may be more reasonable for investigating investment promotion policies given that most business incentives are provided by federal and state administrative. Woodward reports a negative effect of taxes, but a positive effect of overseas offices on FDI location choices.

Coughlin and Segev (2000) examine the location pattern of new foreign-owned manufacturing firms in U.S. counties from 1989 to 1994. They consider two state-level promotion policies, namely corporate taxation and international office. Their Negative Binomial regression indicates that the corporate taxation as a percent of state gross product has negative effect on attracting new foreign plants, and that the number of foreign offices is insignificant. Note that, they include the manufacturing employees as a share of county labor force to measure manufacturing agglomeration effect. However, FDI agglomeration was not considered in their research.

Fredriksson et al. (2003) also report a negative impact of corporate income taxes on FDI spatial allocation decisions among U.S. states over the period 1977-1987. Their main focus is given to the environmental policy and they find that the environmental policy stringency deters the entry of foreign plants. List et al. (2004), in the contrast, find that foreign plants are not significantly influenced by environmental regulations in U.S. counties. They also examine the effect of property taxes on FDI location choices and report that this effect is negative.

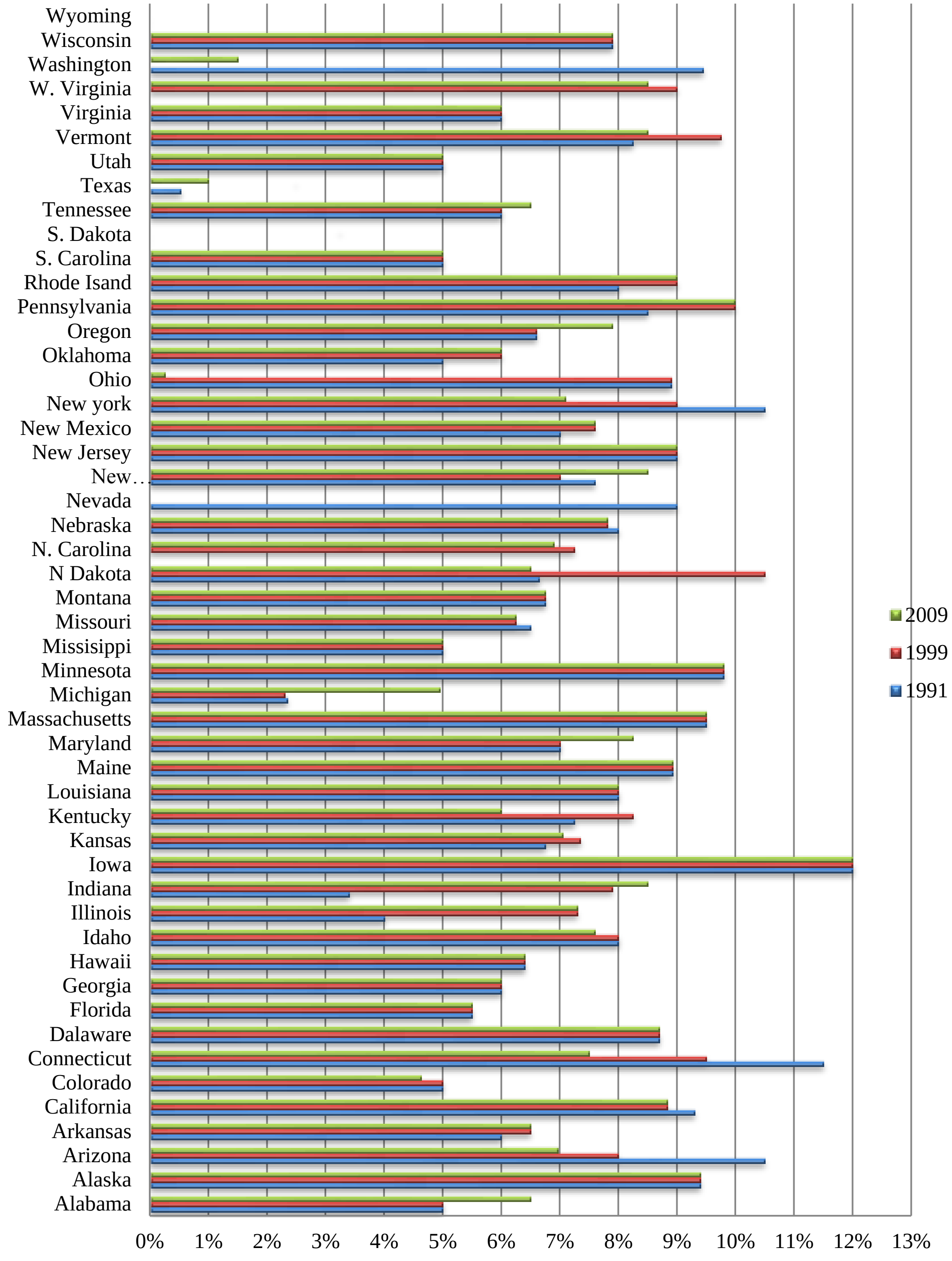
2.4. A Critical Evaluation of Shortcomings in this Literature

Two critical shortcomings make the existing literature unsatisfactory in terms of providing valid advice on using investment-promotion policies to promote FDI and employment. First, very little attention has been currently devoted into a comprehensive investigation of all state-level investment incentives within the context of FDI location choices in the United States. Most studies in this literature have considered only one type of business-promotion policy, namely the low corporate taxation (e.g. Woodward 1992; Coughlin and Segev 2000; List et al. 2004; Fredriksson et al. 2003). Some studies incorporate into consideration the role of overseas offices in attracting FDI (Woodward 1992; Coughlin and Segev 2000; Head et al. 1999). However, they only investigate such state offices in Japan. As a result, the policy implications of their paper are quite restricted.

Second, the common measurement errors and policy endogeneity associated with policy variables are ignored in the literature. For example, using a variable *Tax Burden,* which indicates the share of corporate tax collection over state personal income or gross product, is problematic in terms of measuring tax policy due to changes from non-tax source (Reed and Rogers 2006). Meanwhile, some promotion policy variables, such as job/capital grants, are endogenous in the determination of FDI activity (Devereux et al. 2007).

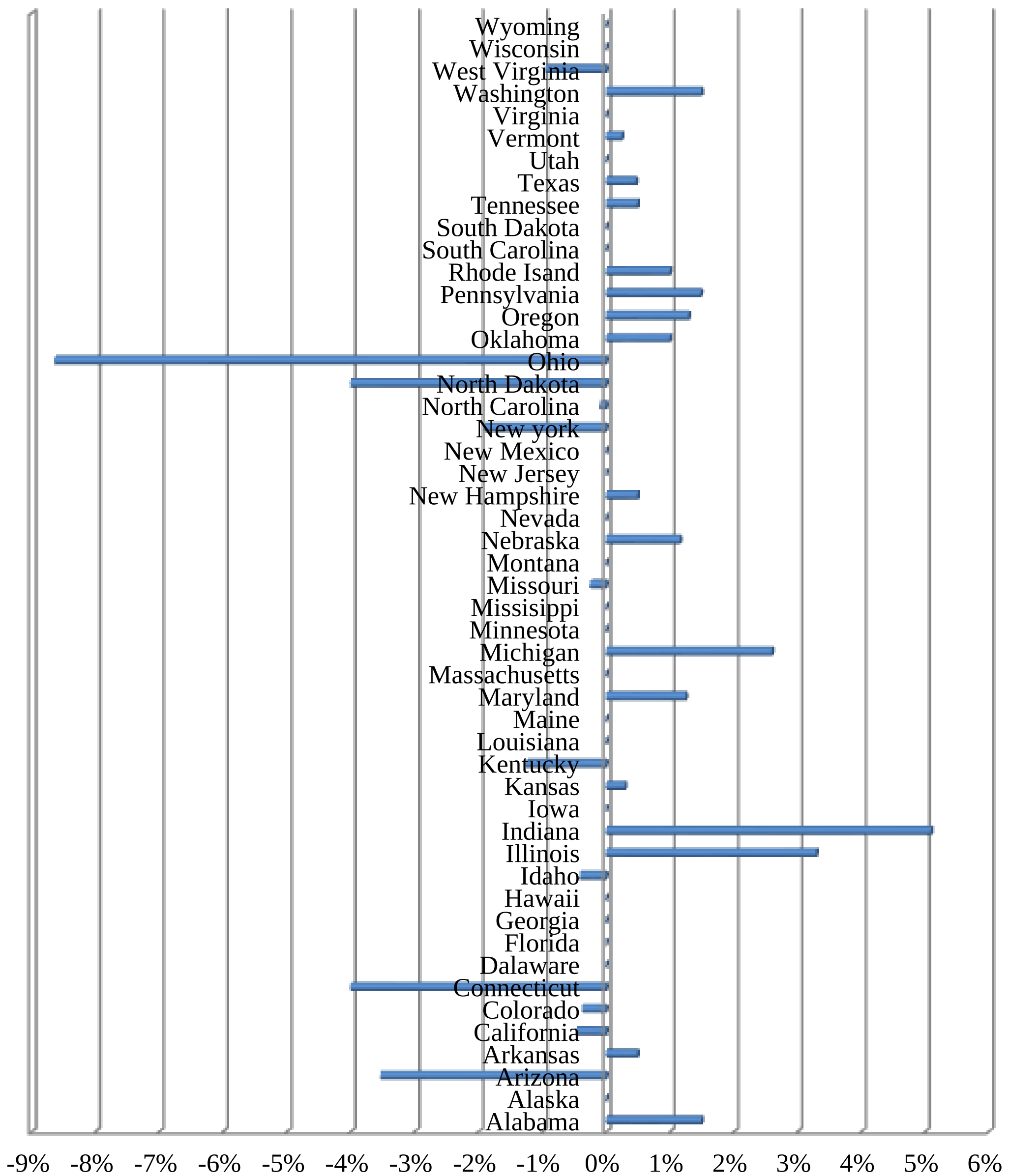
By systematically investigate a basket of investment-promotion polices, the present study attempts to draw valid implications on the role of governmental business incentives in promoting FDI-related employment.

Figure 2.1: U.S. Top Corporate Income Tax Rate by States, 1991, 1999 and 2009



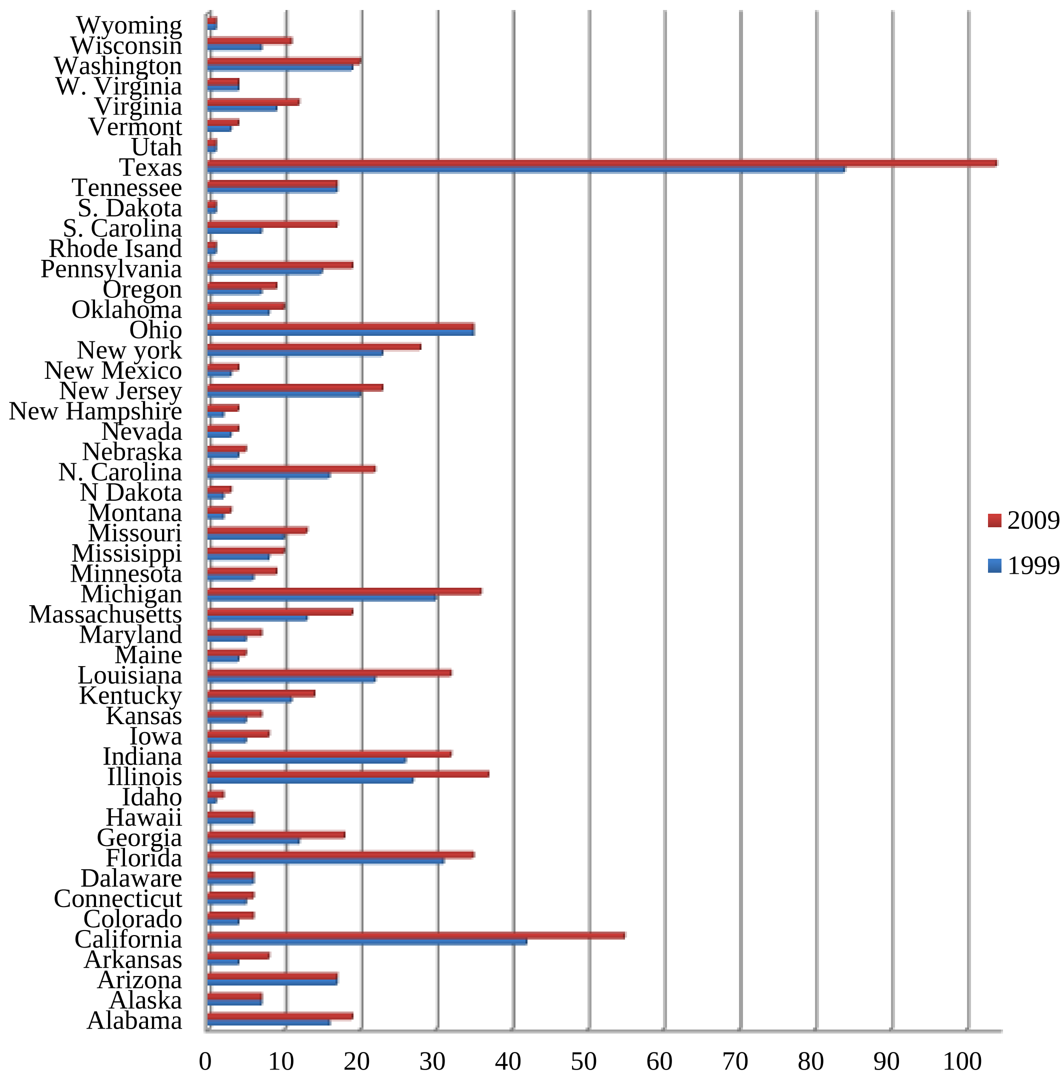
Data Source: "*State Corporate Income Tax Rates*", various years, Tax Foundation; state tax forms and instructions. www.taxfoundation.org.

Figure 2.2: U.S. Top Corporate Income Tax Rate Change by States, 1991-2009



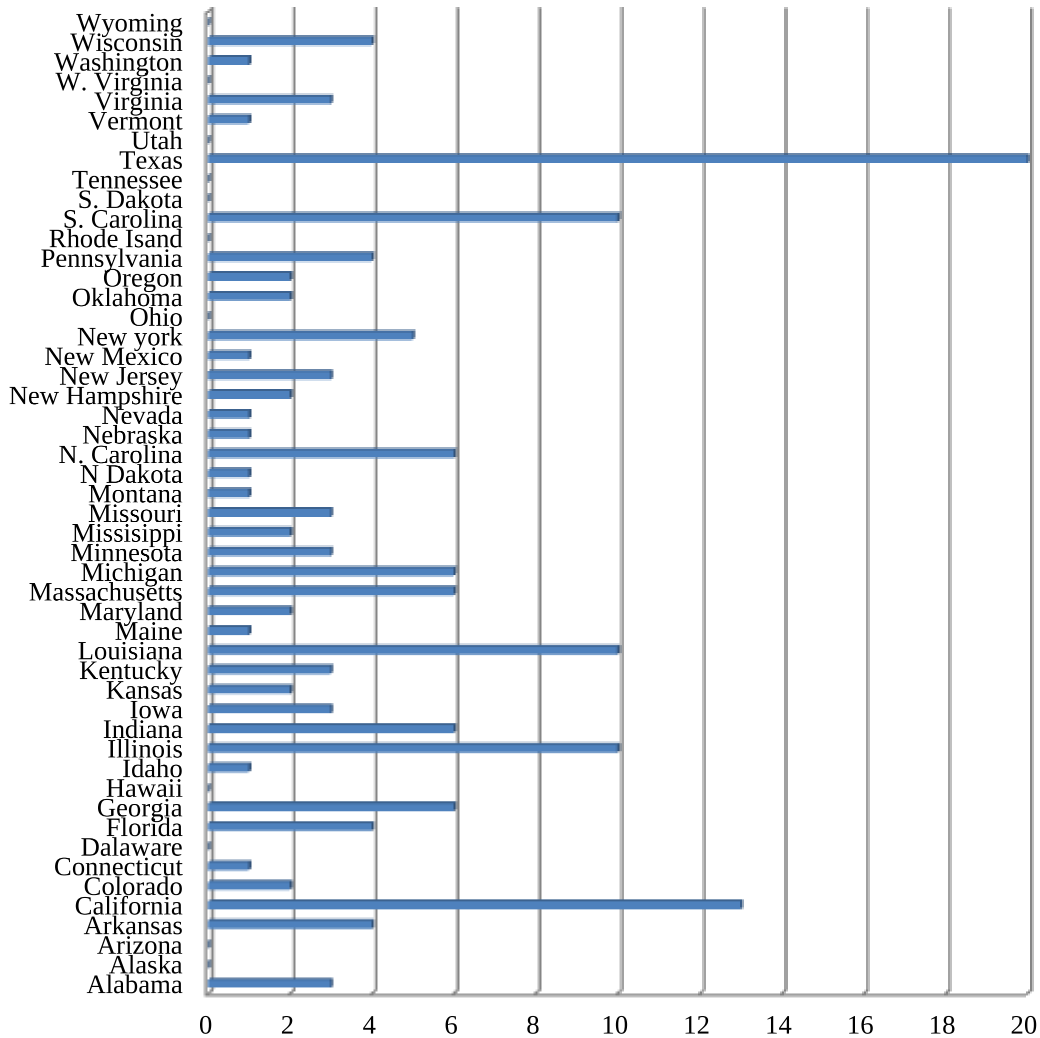
Data source: *State Corporate Income Tax Rates*, various years,Tax Foundation; state tax forms and instructions. www.taxfoundation.org

Figure 2.3: U.S. Foreign-Trade Zones (General-Purpose Zones and Subzones) by States , 1999-2009



Data source: *Annual Report of the Foreign-Trade Zones Board to the Congress of the United States*, various years, the U.S. Department of Commerce.

Figure 2.4: Net Change in Counts of Foreign-Trade Zones (General-Purpose Zones and Subzones) in U.S. States, 1999-2009



Data source: *Annual Report of the Foreign-Trade Zones Board to the Congress of the United States*, various years, the U.S. Department of Commerce.

Table 2.1: U.S. State and Local Government Subsidy/Grant Programs, 1991-2009			
State	**Yr.**	**Employment Subsidy**	**Capital Subsidy**
Alabama	*1991*	*Economic Development Block Grant*	*Industrial Site Preparation Grants*
Alabama	*2009*	*none*	*Industrial Site Preparation Grants*
Alaska	*1991*	*none*	*Capital Matching Grants Program*
Alaska	*2009*	*none*	*none*
Arizona	*1991*	*none*	*none*
Arizona	*2009*	*Arizona Job Training Program*	*none*
Arkansas	*1991*	*Arkansas Industry Training Program*	*Basic Research Grant Program; Applied Research Grant Program*
Arkansas	*2009*	*Create Rebate Program*	*Venture Capital Investment Fund*
California	*1991*	*Employment Training Panel*	*none*
California	*2009*	*Employment Training Panel; Market Development and Expansion Grant Program; Beverage Container Recycling Grant Program*	*Market Development and Expansion Grant Program ; Beverage Container Recycling Grant Program*
Colorado	*1991*	*Colorado First Customized Training Program ; Existing Industry Training Program*	*none*
Colorado	*2009*	*Colorado First Customized Training Program ; Existing Industry Training Program*	*Community Development Block Grant funds; Bioscience Discovery Evaluation Grant Program*
Connecticut	*1991*	*Urban Jobs Program; Urban Enterprise Zones; Connecticut Labor Training Program*	*none*
Connecticut	*2009*	*none*	*Risk capital/technology assistance*
Delaware	*1991*	*Delaware Technical Innovation Fund; Industrial Training Programs*	*none*
Delaware	*2009*	*New Economy Jobs Program ;The Clean Energy Partnership*	*Delaware Competitiveness Fund; Delaware Strategic Fund; Emerging Technology Funds*
Florida	*1991*	*Sunshine State Skills Program*	*Applied Research Grants Program*
Florida	*2009*	*Quick Response Training Grant ; High-Impact Performance Incentive Grant*	*High-Impact Performance Incentive Grant*
Georgia	*1991*	*none*	*none*
Georgia	*2009*	*none*	*none*
Hawaii	*1991*	*Aloha State Specialized Employment and Training*	*none*
Hawaii	*2009*	*Hawaii Investment Attraction Program*	*Community-Based Economic Development (CBED) program ; Small Business Innovation Research Grant Program*

Continued

State	Yr.	Employment Subsidy	Capital Subsidy
Idaho	*1991*	*New Industry Training Program*	*none*
Idaho	*2009*	*Workforce Development Training Fund*	*none*
Illinois	*1991*	*Illinois Industrial Training Program; Prairie State 2000*	*Illinois Coal Demonstration Program; Build Illinois Frail Freight and Local Rail Service Assistance Programs*
Illinois	*2009*	*Employer Training Investment Program;* *Large Business Development Program*	*Illinois Department of Agriculture AgriFIRST Grant Program;* *Large Business Development Program*
Indiana	*1991*	*Training-for-Profit Program; Basic Industries Retraining Program)*	*Industrial Development Grant Fund; Industrial Development Infrastructure Program*
Indiana	*2009*	*state-funded Industrial Development Grant fund ; Skills Enhancement Fund grants program*	*none*
Iowa	*1991*	*Community Economic Betterment Account; New Jobs Training Program*	*Export Trade Assistance Program*
Iowa	*2009*	*New Jobs Training Program*	*The Entrepreneurial Ventures Assistance (EVA) program and Community Economic Betterment Account (CEBA) "Venture Project"*
Kansas	*1991*	*Kansas Industrial Training Program; Kansas Industrial Retraining Program*	*none*
Kansas	*2009*	*none*	*none*
Kentucky	*1991*	*Bluegrass State Skills Corporation*	*none*
Kentucky	*2009*	*none*	*Kentucky New Energy Ventures Fund*
Louisiana	*1991*	*Industrial Start-up Training*	*none*
Louisiana	*2009*	*Quality Jobs; Economic Development Award Program*	*Economic Development Award Program*
Maine	*1991*	*Job Opportunity Zone Program*	*none*
Maine	*2009*	*Employment tax increment financing*	*Grants to Municipalities for Direct Business Support*
Maryland	*1991*	*Maryland Industrial Training Program*	*Maryland Industrial and Commercial Redevelopment Fund*
Maryland	*2009*	*Economic Development Opportunities Fund*	*Economic Development Opportunities Fund ;Maryland Venture Fund*
Massachusetts	*1991*	*Bay State Skills Corporation*	*none*
Massachusetts	*2009*	*Training Grants ; Hiring Incentive Training Grant*	*none*
Michigan	*1991*	*Michigan Business and Industrial Training Program, Training Incentive Fund*	*State Research Fund*
Michigan	*2009*	*Site development and infrastructure grants; Michigan New Jobs Training Program*	*Site development and infrastructure grants*

Continued

State	Yr.	Employment Subsidy	Capital Subsidy
Minnesota	*1991*	*Minnesota Pilot Community Development Corporations*	*Wastewater Treatment Programs; Challenge Grant Program; Economic Development Grants; Technology Research Grants*
Minnesota	*2009*	*Minnesota Job Skills Partnership ;Job Opportunity Building Zone Program*	*Job Opportunity Building Zone Program*
Mississippi	*1991*	*Start-up Training for Industry*	*none*
Mississippi	*2009*	*Job Protection Act ;Mississippi Business Investment Act Program*	*Mississippi ACE Fund ;Community Development Block Grant Program ; Mississippi Business Investment Act Program ; Rural Impact Fund Program*
Missouri	*1991*	*Small Business Incubator Loan Program*	*Higher Education Research Assistance Applied Projects Fund; Small Business Incubator Loan Program*
Missouri	*2009*	*none*	*none*
Montana	*1991*	*none*	*none*
Montana	*2009*	*Big Sky Economic Development Fund ; Montana Department of Commerce Economic Development Finance Program; Primary Sector Workforce Training Grant (WTG) program ; Workforce Investment Act (WIA) funds*	*Montana Department of Commerce Economic Development Finance Program*
Nebraska	*1991*	*none*	*none*
Nebraska	*2009*	*none*	*none*
Nevada	*1991*	*Nevada Quick Start Job Training Program*	*none*
Nevada	*2009*	*Nevada's Train Employees Now (TEN) Program*	*none*
New Hampshire	*1991*	*none*	*none*
New Hampshire	*2009*	*Job Grants Program*	*none*
New Jersey	*1991*	*none*	*Small Business Innovation Research Bridge Grants*
New Jersey	*2009*	*Business Employment Incentive Program ;Business Retention and Relocation Assistance Grant Program*	*Clean Energy Financing ; Petroleum Underground Storage Tank Remediation, Upgrade & Closure Program*
New Mexico	*1991*	*Industrial Development Training Program*	*none*
New Mexico	*2009*	*Job Training Incentive Program*	*none*
New York	*1991*	*Industrial Access Program,*	*University-Industry Energy Research Program; Secondary Materials Program; Small Business Innovation Research Matching Grants*

New York	*2009*	*JOBS Now Manufacturing Assistance Program ;Entrepreneurial Assistance Program*	*Environmental Investment Program*

Continued

State	Yr.	Employment Subsidy	Capital Subsidy
North Carolina	*1991*	*Industrial Building Renovation Fund*	*Incubator Facilities Program; North Carolina Biotechnology Center)*
North Carolina	*2009*	*Job Development Investment Grant ; One North Carolina Fund*	*One North Carolina Fund*
North Dakota	*1991*	*none*	*none*
North Dakota	*2009*	*Workforce 20/20*	*none*
Ohio	*1991*	*Thomas Edison Program*	*Selective Excellence Initiatives*
Ohio	*2009*	*none*	*Small Business Innovation Research (SBIR) program*
Oklahoma	*1991*	*none*	*none*
Oklahoma	*2009*	*Quality Jobs Program; Small Employer Quality Jobs Program; Training for Industry Program*	*none*
Oregon	*1991*	*none*	*none*
Oregon	*2009*	*Governor's Strategic Training Fund ;Film production(Oregon Production Investment Fund rebates 20 percent of Oregon-based production expenses and 10 percent of wages paid).*	*Film production*
Pennsylva nia	*1991*	*Customized Industrial Training*	*Pennsylvania Energy Development Authority; Challenge Grants/Technology Centers; Research Seed Grants; Seed "Venture" Capital*
Pennsylva nia	*2009*	*Opportunity Grant Program; Workforce Leadership Grants*	*First Industries Fund; Infrastructure Development Program*
Rhode Island	*1991*	*Rhode Island Partnership for Science and Technology*	*none*
Rhode Island	*2009*	*none*	*none*
South Carolina	*1991*	*none*	*none*
South Carolina	*2009*	*none*	*none*
South Dakota	*1991*	*none*	*none*
South Dakota	*2009*	*none*	*none*
Tennessee	*1991*	*none*	*Tennessee Industrial Infrastructure Program*
Tennessee	*2009*	*none*	*Small Cities Community Development Block Grant*

Continued

State	Yr.	Employment Subsidy	Capital Subsidy
Texas	*1991*	*Industrial Development Training Program*	*none*
Texas	*2009*	*Self-Sufficiency Fund ; Texas Enterprise Fund; Texas Enterprise Zones*	*Texas Enterprise Fund; Texas Enterprise Zones*
Utah	*1991*	*Custom Fit Program*	*none*
Utah	*2009*	*Industrial Assistance Fund ; Short-Term Intensive Training*	*Industrial Assistance Fund*
Vermont	*1991*	*none*	*none*
Vermont	*2009*	*Vermont Employment Growth Incentive*	*none*
Virginia	*1991*	*none*	*Virginia Coalfield Economic Development Authority*
Virginia	*2009*	*Virginia Economic Development Incentive Grant ;Enterprise zone grants;Tobacco Region Opportunity Fund*	*Virginia Investment Partnership Grant and Major Eligible Employer Grant Fund ; Virginia Economic Development Incentive Grant; Enterprise zone grants; Tobacco Region Opportunity Fund*
Washington	*1991*	*Washington State Job Skills Program*	*Community Economic Revitalization Board (CERB) Program*
Washington	*2009*	*Washington State Job Skills Program*	*Community Economic Revitalization Board (CERB) Program*
West Virginia	*1991*	*none*	*none*
West Virginia	*2009*	*Jobs Investment Trust*	*none*
Wisconsin	*1991*	*none*	*Technology Development Fund*
Wisconsin	*2009*	*Technology Assistance Grant Program ; Auto Adjustment Entrepreneurial Support Initiative*	*Community Development Block Grant Program; Technology Assistance Grant Program ; Technology Bridge Grant Program*
Wyoming	*1991*	*none*	*none*
Wyoming	*2009*	*Business Training Grants ; Pre-Hire Economic Development Grants*	*Business Ready Community (BRC) Grant and Loan Program ; Wyoming SBIR Phase 0 Program*

Source: Information on state subsidy/grant programs in 1991 is from a publication of *National Association of State Development Agencies (NASDA)*, named "*Directory of Incentives for Business Investment and Development in the United States: A State-by-State Guide, 1991*". This is the newest edition of this publication available. Information on state direct financial support is from the website "*Area Development Online*", http://www.areadevelopment.com//stateResources, and websites of state governments' department of commerce, economic development, etc.

Table 2.2: U.S. State Overseas Offices in 1991, 2002 and 2009		
State	Year	Count of Foreign Offices and Locations
Alabama	1991	4 (HK,JP,KO,Switzerland)
	2002	2(GM,JP)
	2009	4 (HK,JP,KO,Switzerland)
Alaska	1991	none
	2002	5(CN,JP,KO,Russia,TW)
	2009	3 (KO,JP,TW)
Arizona	1991	none
	2002	4(JP,Mexico,TW,UK)
	2009	4 (Mexico, Mexico,JP, Canada)
Arkansas	1991	3 (Belgium, JP, TW)
	2002	4(Belgium, JP,Malaysia,Mexico)
	2009	2 (JP,CN)
California	1991	none
	2002	12(Argentina,, CN, UK, GM, HK, Israel, JP, KO, Mexico, Singapore, S. Africa, TW)
	2009	12(Argentina,, CN, UK, GM, HK, Israel, JP, KO, Mexico, Singapore, S. Africa, TW)
Colorado	1991	none
	2002	3 (Mexico,JP,GM)
	2009	3 (Mexico,JP,GM)
Connecticut	1991	2 (Germany, JP)
	2002	7(Argentina, Brazil, CN,,Israel,Mexico,S. Africa, Turkey)
	2009	7(Argentina, Brazil, CN,,Israel,Mexico,S. Africa, Turkey)
Delaware	1991	none
	2002	4(CN, Israel, JP, TW)
	2009	4(CN, Israel, JP, TW)
Florida	1991	3 (EU, UK, Latin American)
	2002	14(Brazil, Canada, CN, Czech Republic,GM, Israel, JP, KO, Mexico, S. Africa, Spain, TW UK, Venezuela)
	2009	13 (Canada, Czech, France, GM, Israel, JP, Mexcico, CN,CN,S.Aferica, UK,Spain, TW)
Georgia	1991	4 (Belgium, Canada, JP,KO)
	2002	9(Brazil, Canada, EU, Israel, JP, KO, Mexico, S. Africa, UK)
	2009	10 (Brazil,Canada, Chile, CN,EU,JP,KO,Mexico,Isreal, UK)
Hawaii	1991	none
	2002	2(CN, TW)
	2009	2 (CN,TW)
Idaho	1991	none
	2002	4(CN, KO, Mexico, TW)

	2009	3 (TW, Mexico, CN)
Illinois	1991	7(Belgium, Brazil,HK,JP,JP,CN,Russia)
	2002	8(Belgium, Canada,CN, Israel, JP, Mexico, Poland, S. Africa)
	2009	9(Belgium, JP,HK, Mexico,Brazil,CN,Canada,Israel, Poland)
Indiana	1991	5(CN,EU,JP,KO,TW)
	2002	15(Australia, Argentina, Brazil, Canada, Chile, CN,, India, Israel, JP, KO, Mexico, Netherlands, Singapore S. Africa, TW)
	2009	6(Australia, CN, EU, JP, TW,UK)
Iowa	1991	3(GM,HK,JP)
	2002	4(GM,JP,HK,Mexico)
	2009	4 (CN,Mexico,JP,EU)
Kansas	1991	none
	2002	7(Australia, Brazil, Chile, EU, JP, KO, Mexico)
	2009	3(CN,JP,Mexico)
Kentucky	1991	none
	2002	4(Belgium, Chile, JP, Mexico)
	2009	3 (CN,JP,Mexico)
Louisiana	1991	none
	2002	1(TW)
	2009	1(Mexico)
Maine	1991	none
	2002	1(GM)
	2009	none
Maryland	1991	4(EU,HK,JP,TW)
	2002	10(Brazil, Chile, CN, Israel, JP, Mexico, Netherlands, S. Africa, Singapore, TW)
	2009	9(KO, JP, Montenegro, Canada, Brazil, S. Africa, India, Scandinavia, Vietnam)
Massachusetts	1991	none
	2002	2 (CN, EU)
	2009	4 (Brazil,CN,EU,Mexico)
Michigan	1991	none
	2002	5(Canada, CN, JP, Mexico, S. Africa)
	2009	3(Canada,JP,GM)
Minnesota	1991	none
	2002	1(GM)
	2009	1 (China)
Mississippi	2002	5(JP, Santiago, Chile, Singapore, UK)
	1991	none

	2009	5(CN,Chile,JP,EU,GM)
Missouri	1991	3(GM,JP,KO)
	2002	10(Belgium, Brazil, GM, , Ghana, Israel JP, , KO, Mexico, S. Africa, UK)
	2009	6(UK,JP,KO,TW,Mexico,CN)
Montana	1991	2(JP, TW)
	2002	2(JP, TW)
	2009	2(TW,JP)
Nebraska	1991	none
	2002	none
	2009	2(JP,Brazil)
Nevada	1991	none
	2002	none
	2009	6(Shanghai,Beijing,HK,GM,Brazil,Italy)
New Hampshire	1991	none
	2002	none
	2009	1 (Ireland)
New Jersey	1991	none
	2002	9(Brazil, CN, Egypt, England, Greece, Israel, JP, KO, Mexico)
	2009	12
New Mexico	1991	none
	2002	2(Mexico, TW)
	2009	2(Mexico, TW)
New York	1991	6(Canada, Canada,GM,HK,JP,UK)
	2002	8(Argentina, Brazil, Canada, Chile, Israel, JP, S. Africa, UK)
	2009	14(Canada, Canada,GM,CN,UK,France,India,Isreal,Mexico,Turkey,Australia,Brazil,Chile,S.Africa)
North Carolina	1991	4 (GM, HK, JP,KO)
	2002	6(Canada, GM, HK, , JP, KO, Mexico)
	2009	7 (Canada, EU, HK, JP,KO,CN,Mexico)
North Dakota	1991	1 (JP)
	2002	1
	2009	5(Ukraine,HK,Turkey,KO,Astana)
Ohio	1991	2(Belgium, JP)
	2002	10(Argentina, Brazil, Canada, Chile, China, Europe, Israel, Japan, Mexico, South Africa)
	2009	11(Canada,Mexico,Belgium,Chile,Brazil,Israel,S.Africa,SE.Asia,CN,JP,India)
Oklahoma	1991	none

	2002	4 (Israel, China, Mexico, and Vietnam)
	2009	4 (Israel, China, Mexico, and Vietnam)
Oregon	1991	none
	2002	6(China, Japan, Mexico, South Korea,Taiwan, United Kingdom)
	2009	4(CN,JP,KO,EU)
Pennsylvania	1991	3(Belgium,GM,JP)
	2002	18(Argentina, Australia, Belgium, Brazil, Canada, Chile, China, Czech Republic, Germany, India, Israel, Japan, Korea, Mexico, Singapore, South Africa, UK-Trade Office, UK- Investment Office)
	2009	23(Dubai,Australia,Brazil,Canada,Chile,CN,CN,Czech,Israel,France,GM,India,JP,KO,Mexico,Netherlands,Saudi Arabia,S.Aferica,Singapore,Spain,TW,UK,Vietnam)
Rhode Isand	2002	0
	1991	none
	2009	none
South Carolina	1991	2(GM,JP)
	2002	1(GM, JP)
	2009	2(GM,CN)
South Dakota	1991	none
	2002	1(Netherlands)
	2009	7(France,GM,Italy,JP,Netherlands,UK,CN)
Tennessee	1991	none
	2002	3(Canada, JP, UK)
	2009	4(Canada,CN,JP,GM)
Texas	1991	3 (JP, Mexico,TW)
	2002	1(Mexico)
	2009	8(Mexico,Canada,Brazil,Argentina,CN,France,United Arab Emirates,Qatar)
Utah	1991	none
	2002	13(Austria, Belgium, Brazil, Chile, China, Germany, Italy,Japan, Korea, Mexico, Singapore, Sweden, United Kingdom)
	2009	none
Vermont	1991	none
	2002	none
	2009	2(CN,TW)
Virginia	1991	2 (Belgium,JP)
	2002	6(Brazil, China, Germany, Japan, Korea,Mexico)
	2009	3(Belgium,HK,JP)
Washington	1991	none
	2002	5(China, France, Japan, Korea, Taiwan)

	2009	6 (CN,EU,JP,JP,TW,Mexico)
West Virginia	1991	none
	2002	3(Germany, Japan, Taiwan)
	2009	2 (JP,GM)
Wisconsin	1991	4 (GM,HK,JP,KO)
	2002	3(Brazil, Canada, Mexico)
	2009	4 (Brazil, Cananda, CN,Mexico)
Wyoming	1991	none
	2002	none
	2009	none

Data source:

1. "*Directory of Incentives for Business Investment and Development in the United States: A State-by-State Guide, 1991*", by *National Association of State Development Agencies (NASDA).*
2. Appendix A (pp. 49 - pp.51) of " *State Official's Guide to International Affairs*" 2003, by Chris Whatley**,** the Council of State Governments.
3. Websites of economic development authorities for all states, such as the department of commerce.

Key Abbreviation:

AG-Argentina; AT-Australia; AR-Austria; BZ-Brazil; CA-Canada; CH-Chile; CN-China; CZ-Czech Republic; DB-Dubai; EG-Egypt; EU-Europe Union; FR-France; GM-Germany; GN-Ghana; GR-Greece; HK-Hongkong; IL-Ireland; IN-India; IR-Israel; IT-Italy; JP-Japan; KO-Korea; KZ-Kazakhstan; LA-Latin American; ML-Malaysia; MT-Montenegro; MX-Mexico; NL-Netherlands; PL-Poland; QT-Qatar; RS-Russia; SA-South Africa; SB-Saudi Arabia; SD-Scandinavia; SG-Singapore; SL-Switzerland; SP-Spain; TK-Turkey; TW-Tai Wan; UK-United Kingdom; UR-Ukraine; VN-Vietnam; VZ-Venezuela.

Chapter 3:

FDI Location Choices and Employment in the U.S.:

Do State “Incentives as Investments” Strategies Matter?

3.1. Introduction: Research Question and Contributions

This study investigates the extent to which state-level attributes affect employment by foreign manufacturing plants in U.S states. Particular attention is given to the role of business incentive policies in foreign manufacturing plants’ employment decisions. The question is: do variations in state investment-promotion policies influence the geographical distribution of foreign manufacturing firms’ employment in U.S. when other FDI location choice determinants are also incorporated?

Research examining the determinants of Foreign Direct Investment (FDI) location choice is extensive. Typically, researchers regress various measures of location outcome on explanatory variables such as market size, labor conditions and infrastructures, etc.[32] One insightful branch of research focuses on the employment decisions by foreign plants (Fredriksson et al. 2003; Gross and Ryan 2008). A related branch of analysis investigates the impact of investment-promotion policies on U.S. inbound FDI (Woodward 1992; Head et al. 1999; Coughlin and Segev 2000).

---

[32] For a detailed discussion of the literature on FDI location choice, please refer to Chapter 1.

However, conclusive evidence on the relationship between state business-promotion policies and foreign plants' employment decisions in the U.S. has been elusive. Possibly two reasons are responsible for this unsatisfactory result. First, most aggregate-level studies measure FDI activities by foreign plants' assets, sales and the value of property, plant and equipment (PP&E). The employment contribution of foreign plants in the U.S. has been largely ignored. To my knowledge, only a few studies have empirically examined determinants of FDI-related employment. Gross and Ryan (2008) investigate the employment by Japanese firms in Western Europe. Fredriksson et al. (2003) is the only paper that focuses on foreign plants' employment levels in the U.S. Second, empirical studies that investigate the role of state investment-promotion policies in influencing FDI are rare. Woodward (1992) and Coughlin and Segev (2000) only incorporate the provision of overseas investment-promotion offices by states. Head et al. (1999) is the first to comprehensively investigate a total of four categories of business incentives: competitive corporate income taxes and unitary taxation, job/capital subsidies, foreign-trade zones and international offices. However, better measures of these policies are needed to address empirical issues such as measurement errors and the policy endogeneity.

My study contributes to the aggregate-level research of FDI location choices in two ways. The principal contribution lies in its focus on the employment effect related to investments by foreign enterprises. Creating jobs is a prominent contribution of foreign firms on U.S. economy. In 2007, about 5.5 million U.S.

workers were employed by foreign plants.[33] Between 2003 and 2009, foreign companies created about 632,500 new jobs in over 4,500 new projects.[34] However, very few studies in the literature of FDI location decisions have explicitly investigated the determinants of foreign firms' employment outcomes. To address this gap in the literature, I treat the employment level by foreign manufacturing plants as the dependent variable so as to focus on the employment contribution associated with FDI activity. Moreover, the employment measure of foreign presence could reflect an important mechanism through which the technical spillover effect is imposed by foreign firms on the local economy (Ford and Rork, 2010).

My research also contributes to the literature by comprehensively examining the role of state business-promotion policies in influencing FDI-related employment and paying particular attention to potential measurement errors associated with policy endogeneity. Following Head et al. (1999), I investigate four categories of business incentives offered by state and local governments: low corporate income tax, Foreign Trade Zones (both "general-purpose" zones and "subzones"), subsidies paid to factor usage (both job and capital subsidy/grant), and overseas investment-promotion offices. I extend Head et al. (1999) by utilizing measures that better

[33] *Foreign Direct Investment in the U.S.: Financial and Operating Data for U.S. Affiliates of Foreign Multinational Companies*, BEA.

[34] Data source: Invest in America, The International Trade Administration, the U.S. Department of Commerce. http://www.investamerica.gov/home/iia_main_001154.asp.

reflect the impacts of policies. Furthermore, I employ econometric techniques to explicitly address common endogeneity problems.

My results are important for researchers and policy makers who are interested in the effect of business-promotion policy on employment outcomes. By systematically investigating the relationship between state-level attributes (especially the business-development incentives) and employment by foreign-owned manufacturing firms, valid implications can be drawn by policy makers in terms of their effort to promote FDI and employment.

3.2. Related Literature

This study merges two lines of literature. One is the literature on aggregate-level studies of FDI-related employment, and the other is on the role of governmental investment-promotion policies in industrial location decisions.[35] As to the first set of studies, this research closely relates to Gross and Ryan (2008). In the second set, it directly builds off of Head et al. (1999).

3.2.1. Aggregate-level Studies on Foreign Firms' Location and Employment

Several papers investigate the impact of employment by foreign plants on local economies: the FDI spillover effect.[36] However, few studies treat employment supported by foreign firms as the dependent variable of interest.

---

[35] For a detailed discussion of the two literatures, refer to Chapter 1 and Chapter 2, respectively.

[36] For example, Figlio and Blonigen (2000) focus on the spillover effects of employment by foreign greenfield manufacturing establishments on local real wages,

Gross and Ryan (2008) is the only paper which addresses the issue of employment effects associated with Multinational Enterprises (MNEs)' location behavior. They mainly investigate the effect of Employment Protection Legislation (EPL) for both regular and temporary workers on Japanese investments in a total of fifteen Western European countries during 1985-1990 and 1995-2000. Using different measures of EPL, their empirical results reveal that job protection requirements have a significant and negative impact on employment by Japanese firms in Western Europe.

Although my study also focuses on the employment effect of FDI location choice, it differs from Gross and Ryan (2008) in several important ways. First of all, their principal attention has been given to the role of employment protection policies on Japanese FDI location choice in Western Europe. In contrast, I conduct a comprehensive investigation of all state-level business promotion policies in terms of expanding employment supported by foreign investments in U.S. Moreover, the employment level by foreign firms in a geographical area is dynamically associated with its lagged value (Barrios et al. 2006). However, econometric methods used by Gross and Ryan (2008), such as Ordinary Least Square (OLS, both Pooled and with fixed effects) and Tobit estimations, do not control for potential problems associated with the dynamically determined system.

---

employment level and fiscal policy in South Carolina counties from 1980 to 1995. They find that employment by FDI boosts local wages more than domestic firms.

Finally, none of these econometric models addresses the potential policy endogeneity. To illustrate, foreign plants may avoid locating investments in regions with strict labor protection legislations; meanwhile, they may also lead to a more strict labor protection policy because they boost real wages in host regions (Figlio and Blonigen 2000). A simple OLS or Tobit estimation cannot handle this situation. My study corrects these problems by utilizing a dynamic system Generalized Method of Moments (DSGMM) estimate, which is proposed by Blundell and Bond (1998) and then widely used among aggregate-level studies in fields like international finance and trade (e.g. Ge 2009; Barrios et al 2006; Cheng and Kwan 2000; Kemegue and Mohan 2009). The DSGMM estimate addresses the endogeneity issue by selecting the lagged values of variables (both the dependent and independent variables) as instruments and by estimating both the differenced-equation and the level equation simultaneously.

3.2.2. Literature on Investment-Promotion Policies in U.S.

Extensive studies of FDI location choices in the U.S. have considered only one or a couple of business promotion policies, such as low corporate taxation and overseas offices. For example, empirical studies that consider state corporate income tax and/or property tax include Woodward (1992), Coughlin and Segev (2000), List et al. (2004) and Fredriksson et al. (2003). The role of state-level international offices in attracting foreign investors is examined by Woodward (1992) and Coughlin and Segev (2000). However, very little attention has been currently given to any comprehensive investigation of all state-level investment incentives within the context of MNEs' locating affiliates in the United States. Head et al. (1999) is the first to provide a comprehensive examination of how state business development policies influence Japanese manufacturing plants' location decisions in U.S. Six categories of investment-promotion tools used by state and local governments are examined, namely, 1) low corporate income tax; 2) labor subsidies; 3) capital subsidies; 4) existence of investment promotion office in Japan; 5) existence of a foreign trade zone in the state and 6) unitary taxation by the state. Their statistical results indicate that different promotion policies have different effects. To be specific, the provision of lower corporate income taxes, job subsidies and Foreign-Trade Zones (FTZs) significantly help a state to attract Japanese investment.

My study extends the work of Head et al. (1999) and Woodward (1992) from the perspectives of both policy implications and empirical estimation. First, both Head et al. (1999) and Woodward (1992) limit their research to only one source of FDI by focusing on Japanese MNEs' discrete choices of locating manufacturing affiliates in U.S. states.[37] As a result, the policy implications of both papers are quite restrictive. My research, however, expands their policy application by looking at the employment effect associated with location decisions in U.S. by foreign firms from

[37] Unlike Head et al. (1999), who focus on state-level attributes and business incentives, Woodward (1992) clearly separates state-level and county-level variables. The separation of state and sub-state decisions has advantage in studying agglomeration economies. However, state-level analysis may be more reasonable for investigating investment promotion policies given that most business incentives are provided by federal and state administrative.

different countries within the context of multiple state-level investment incentives. To my knowledge, my research is the first to do this.

This paper further adds values upon Head et al. (1999) by addressing the measurement errors and policy endogeneity associated with policy variables. First, Woodward (1992) and Head et al. (1999) measure corporate income tax rate by a tax burden variable, which indicates the share of corporate tax collection in a state over its personal income. Coughlin and Segev (2000) create a tax rate variable, which actually equals state and local taxes as a percent of gross state product. However, Reed and Rogers (2006) point out that neither measure is satisfactory in terms of measuring the tax policy because changes in such measures maybe driven by non-tax sources, such as income, gross product and population. They further suggest that statutory tax parameters, such as corporate income tax rates, are better measures of tax policy (Reed and Rogers 2006, pp.422). Keeping this in mind, I use the top corporate income tax rate for each state to explain the variation directly associated with state tax policies (Bartik 1985). Meanwhile, more and more states rescinded unitary taxation since the 1990s under the huge pressure from multinationals and foreign governments. Currently, only Alaska levies unitary tax (Mold 2004).[38] Accordingly, unitary taxation is dropped from policy variables in this study.

[38] The reason for multinationals and foreign governments to protest unitary taxation in the U.S. is that it "subjected foreign firms to double taxation, required burdensome accounting procedures, and forced Transnational Corporations (TNCs) to write detailed reports on their global operations." (Mold 2004, pp. 46).

Second, only Head et al. (1999) consider the role of FTZs. Notably, they employ a rough indicator to measure the effect of FTZs. Specifically, they only consider the existence of "general-purpose" zones and use a dummy variable which equals one if a state has at least one "general-purpose" zone. I extend this by taking into consideration both "general-purpose" zones and "subzones". The key difference between the two types of FTZs is that "subzones" are specialized to individual users (normally involving manufacturing) and approved only for a specific activity.[39] Another advantage of including "subzones" is that there is larger variance in the counts of "subzones" between states and within a state over time. Accordingly, I use the sum of counts of "general-purpose" and "subzones" for each state to measure the presence of FTZs.

Third, both Woodward (1992) and Head et al. (1999) focus on attracting Japanese investors by establishing investment-promotion offices in Japan. It is worth noting that state overseas offices are established in different countries with the purpose of promoting and attracting foreign investments. There is also significant heterogeneity among states in terms of their international offices.[40] Following Coughlin and Segev (2000), I incorporate the count of foreign offices in different countries for each state. More than that, I create different dummy variables for all destination countries, and each equals one if there is at least one international office

---

[39] *Foreign Trade Zones,* Economic Development Partnership of Alabama, www.edpa.org.

[40] For a detailed discussion of the stylized facts of state offices abroad, refer to Section 1.4, "Overseas Investment-Promotion Offices", in Chapter 2 of the dissertation.

set by a U.S. state. Hopefully this would allow us to identify differential impacts of foreign offices in various countries on attracting foreign investments and creating jobs in U.S.

Finally, Head et al. (1999) express subsidies in a rate form which equals per-job subsidies divided by the state's wage. A critical concern is that a per-job subsidy rate could be endogenous to the extent that foreign plants may not only be attracted by subsidies, they may also boost subsidies through some unobserved efforts. One example of those unobserved factors is the increased bargaining power due to an FDI agglomeration effect. To address this endogeneity issue of job subsidy/grant policy, I use per-capita total subsidies paid by a state government as an instrument for state employment and capital subsidies. State total subsidies are closely correlated with job and investment subsidies but also include benefits going to other sectors, such as agricultural and housing subsidies.

3.3. Empirical Analysis

The United States is the largest recipient of world-wide FDI inflows. It has significant levels of employment by U.S. affiliates of foreign firms, among which manufacturing affiliates capture the largest share of total employment by foreign plants in U.S.[41] The question that what is the role of state investment-promotion policies in influencing the FDI-related employment is of particular interest to both policy makers and researchers. The present study mainly examines this relationship

[41] For a detailed discussion of the stylized facts and literature on U.S. inbound FDI, refer to Chapter 1.

using panel data on manufacturing FDI-related employment for the 50 U.S. states between 1999 and 2008.

3.3.1 Basic Empirical Model and Data

Two types of empirical model are widely employed in aggregate-level studies of FDI-related employment. One is the fixed effects linear panel data model that regresses a continuous measure of employment by foreign firms on a set of independent variables. For example, Fredriksson et al. (2003)[42] regress two unlogged continuous measures of FDI, namely gross value of plant, property and equipment (PP&E), and employment by foreign plants, on some covariates expressed at current values, such as state environmental stringency, the provision of public goods and other control variables. The other approach used is a variety of log-linear models which allow for measuring different elasticities associated with FDI activities (e.g. Sun et al. 2002). Gross and Ryan (2008) apply a log-linear specification to obtain a job-creation elasticity. Their dependent variable is the natural logarithm of employment by Japanese-owned firms for each Western Europe country. Independent variables are one-year lagged values of six explanatory variables.

[42] My study differs from Fredriksson et al. (2003) in a few important ways. First, they mainly focus on the impacts of state environmental regulations and bureaucratic corruption on aggregate FDI activities. My study mainly investigates the relationship between state investment-promotion policies and FDI-related employment. Second, they rely on a linear panel data model and use an instrumental variable estimation. My paper, however, relies on a dynamic log-linear specification and use a system General Methods of Moments estimator.

My baseline empirical specification is similar in spirit to Gross and Ryan (2008). It utilizes a log-linear model where estimation results could better explain elastisities of FDI-related employment. In addition, it builds off Gross and Ryan (2008) by incorporating both state dummies and time dummies. This approach mitigates the concern of biased coefficient estimates associated with omitted variables (Co 2001; Fredriksson et al. 2003). To summarize, my basic empirical specification is a two-way fixed effects log-linear panel data model for the 50 U.S. states between 1999 and 2008:

$$logMANUFEMP_{i,t} = \beta_0 PROMOT_{i,t} + \beta_1 AGGLOMERAT_{i,t} + \beta_2 MARKET_{i,t} + \beta_3 LABOR_{i,t} + \beta_4 TRANSPORT_{i,t} + \beta_5 BORDER_{i,t} + \beta_6 S_i + \beta_7 T_t + \xi_{i,t} \qquad (1)$$

where S_i is a time-invariant dummy used to control for some state-level unobserved factors that do not vary over time and T_t is a state-invariant dummy to capture unobserved shocks due to national business cycles. All other variables are selected based on the discussion below and are as described below and in Table 3.1. The statistics of state-level data on all variables are summarized in Table 3.2.

My study uses FDI-related employment as the measure of FDI activities and investigates its relationship with state-level attributes. The selection of independent variables is based on findings of previous empirical research resulting in a total of six sets of state attributes: investment-promotion policies, agglomeration effects, market size, labor conditions, transport infrastructure and border effects.

3.3.2. Dependent Variable: Measurement of FDI

The presence of foreign investment has been measured in various ways, such as the stock of investment volume (Ford et al. 2008; Sun et al. 2002), the counts of foreign-owned establishments (List 2001; List et al. 2004), U.S. affiliate sales (Blonigen et al. 2007) and the employment level by foreign plants (Gross and Ryan 2008 ; Fredriksson et al. 2003). Despite being intensively employed in the literature, the first three measures have shortcomings which are worth noting.

The stock measure of FDI presence is widely used in studying the technology spillover effect of foreign firms on domestic economy. Foreign firms bring new research and technology into host markets. But, it usually takes a long time for the new research and technology to be fully manifested in domestic firms. So, the larger the stock of foreign investment over time, the stronger the foreign control of domestic production,[43] and thus, the higher level of spillover effect on the host economy. However, the stock measure of foreign investment may not be adequate for understanding foreign firms' location choices of affiliates. Foreign plants believe that more updated market information could be obtained by observing more recent

[43] Investigating the technology spillover effect of foreign-owned firms in U.S., Ford et al. (2008) show a very strong positive correlation (above 0.9) between the stock of foreign investment and the share of US GDP produced by foreign firms.

FDI activities.[44] Therefore, they are more influenced by the recent flow of FDI when they make a location decision.

One critical disadvantage of using counts to measure FDI activity is that it does not distinguish between establishment size and activities of foreign firms (Blonigen et al. 2005). Locales with more foreign plants are assumed to have a larger volume of FDI inflows and a higher level of employment supported by foreign firms. However, this assumption is suspicious given that plant size differs substantially among establishments and average plant size is likely to be heterogeneous even at aggregate levels.[45] To illustrate how the count measure could lead to a misunderstanding of foreign firms' actual effects on the host economy, let's take a simple comparison. Under the assumption of similar technical content, the economic significance of ONE U.S. affiliate of a foreign plant with 500 employees should be far beyond the importance of TEN U.S. affiliates with only 5 employees in terms of creating jobs and transferring innovation to domestic plants. The difference between these cases is best captured with an employment measure of FDI activities.

---

[44] Using firm-level data on Japanese FDI across all foreign regions, Blonigen et al. (2005) distinguish between agglomeration effects (the stock measure) and information effects (one-year lagged flow). Their empirical investigation shows that the information effect is more significant in terms of increasing the probability of location.

[45] For example, Blonigen et al. (2005) show that the average employment level for Japanese firms varies considerably among all destination countries, ranging from the lowest of 187.4 employees per affiliate in Singapore to the highest of 434.5 in Germany. Their empirical investigation confirms that the employee measure results in better estimates.

Fredriksson et al. (2003) and Gross and Ryan (2008) use an employment outcome measure. Specifically, the former uses employment by foreign manufacturing firms in each U.S. state and the latter uses national employment by Japanese manufacturing firms in each Western European country. Notably, neither explicitly explains the advantages of this measure over alternatives. I utilize an employment measure of FDI presence similar to Fredriksson et al. (2003) to correct for aforementioned problems associated with other measures.

Another reason to rely on this measure lies in the prominent contribution by foreign firms in terms of creating U.S. jobs. Promoting employment is a central focus of federal and state governments.[46] Although local governments' principal role is to provide local public services rather than attracting investment, county-level studies of FDI location choices report that some local attributes, such as education attainment and environmental stringency, are related to FDI location decisions (e.g. Devereux et al. 2007; Woodward 1992; Barrios et al. 2006; Coughlin and Segev 2000; List 2001; List et al. 2004)

Finally, as mentioned above, foreign investment brings into the host market new research and technology. Some contributions by foreign plants in their innovative process could be measured by FDI Research and Development (R&D) expenditures, but some innovations are transferred by employing and training domestic workers, who may flow into domestic firms. Assuming a similar technical

[46] For detailed information about the business promotion policies across U.S. states, refer to Chapter 2.

content, a large foreign plant with more employees contributes more to the technical spillover effect than a small plant. Using employees of foreign firms to measure foreign presence could capture this important mechanism through which the technology spillover effect of FDI occurs.[47]

3.3.3. Business-Promotion Policies

The first set of explanatory variables captures state and local governments' efforts to encourage FDI.[48] Four investment-promotion policies are included to provide a comprehensive investigation of business incentives with regard to attracting foreign investments. These policies are low corporate income tax rates, jobs and capital subsidies/grants, foreign-trade zones and overseas offices.

Tax effects on FDI location choice have been widely examined. For example, county-level studies usually consider the property tax (e.g. List et al. 2004; List 2001; Woodward 1992; Coughlin and Segev 2000), while most state- and country-level studies utilize the corporate income taxation (Woodward 1992; Head et al. 1999; Coughlin and Segev 2000; Fredriksson et al. 2003; Desai et al 2004). It is worth noting that the measure of Corporate Income Tax (CIT) is a core issue and several measures of CIT policies are used. Some studies rely on a tax burden

[47] Ford and Rork (2010) also utilize the employment measure of FDI presence. Their focus is put on the knowledge spillover effects from foreign firms to U.S. firms at state level. The knowledge spillover effect is measured by number of patents applied by domestic firms within each U.S. state. The difference between their and my measure is that they construct a ratio which equals the employees of U.S. affiliates to total employment.

[48] Refer to Chapter 2 for a detailed discussion of the stylized facts of investment-promotion policies in U.S. states.

variable, defined as the share of government CIT revenues over personal income (e.g. Woodward 1992; Head et al. 1999). Other studies construct a tax rate variable, expressed as state CIT collection as a percent of gross state product (e.g. Coughlin and Segev 2000) or utilize the CIT per-capita variable (Fredriksson et al. 2003).

As Reed and Rogers (2006) clarify, these measures are problematic in terms of measuring CIT policies. They conclude that the typical tax burden measures lead to significant measurement error of actual policy changes, in the sense that they include changes driven by non-tax factors (Reed and Rogers 2006, pp. 406), such as income, gross product and population. They also suggest using "(s)tatutory tax parameters", such as top CIT rates, as valid instruments to address measurement errors associated with measuring tax policies (Reed and Rogers 2006, pp. 422). With their findings in mind, and following the state-level research of FDI location choices, I construct the tax policy variable ($TAXRATE_{i,t}$) as the top CIT rate for each U.S. state. Offering a competitive top CIT rate and reducing the top rate are viewed as efforts by a state to promote business development.

Governments also offer grants or subsidies out of tax revenues to investors as an inducement for attracting investment. Some firm-level empirical studies investigate the role played by subsidies or grants in MNEs' location decision. For example, Devereux et al. (2007) take advantage of the British data on grant received by each plant,[49] while Girma et al. (2007) utilize a dummy variable indicating whether or not a firm received a grant.[50] However, firm-level grant data are unavailable in the U.S. Therefore, firm-level research of FDI location choice in the U.S. rarely incorporates factor subsidies/grants. Head et al. (1999) were first to explicitly include factor subsidies into their investigation of Japanese MNEs' location decisions in the U.S. They construct the subsidy variable in a rate form by dividing per-job subsidies by the state's wage.

A core issue associated with using jobs (capital) subsidies/grants is the policy endogeneity. The root for endogeneity in this case is that not only are foreign plants attracted by subsidies/grants, they could also boost subsidies if they have an increased bargaining power due to an agglomeration effect. Accordingly, instruments are used by this paper to address this potential source of estimation errors. One reasonable candidate is per-capita total expenditure on subsidies by a state government ($SUBSIDY_{i,t}$). State total expenditure on subsidies contains items that are not significantly affected by the stock of foreign investment, such as housing and agricultural subsidies. As shown by Figure 3.1, U.S. states vary significantly in terms of per-capita government spending on subsidies. From 1999 to 2008, West Virginia

[49] Devereux et al. (2007) focus on MNEs' location decision in British counties and find that, although government grants have little effect in attracting foreign plants, they are less effective than the agglomeration effect.
[50] Girma et al. (2007) report that discretionary grants have a positive impact on births of new manufacturing plants in Ireland between the years 1973 and 1998.

had the lowest average annual per-capita subsidy expenditure ($63.3), while South Dakota had the largest amount of $403.3.[51]

Foreign-Trade Zones (FTZs) are special economic regions designed to lower tariff costs of imported intermediate goods via three mechanisms: payment delay, re-export, and reclassification. Although FTZs have been widely distributed among U.S. states, few studies have investigated its role in attracting foreign development. Head et al. (1999) were the first to take into account the impact of FTZs using a dummy variable to indicate the presence of at least one general-purpose zone in each state. One critical drawback associated with using general-purpose zones is that the count of these zones rarely changes over time for each state. However, differences and changes in state subzones are more substantial. Meanwhile, subzones are normally specialized to individual manufacturing users. Accordingly, I measure a state's effort at providing FTZs ($FTZ_{i,t}$) as the sum of counts of both general-purpose zones and subzones.

A common practice by U.S. states to promote foreign investments is establishing investment-promotion offices or employing official trade representatives abroad. Given the prominent existence of Japanese-owned firms in the U.S., state-level efforts to open overseas offices in Japan have been examined by several studies (e.g. Woodward 1992; Head et al. 1999). Coughlin and Segev (2000) extend the analysis of this policy by investigating ALL international offices abroad for each

[51]Data source: *State and Local Government Finance*, 1999-2008, U.S. Census Bureau.

state. Following Coughlin and Segev (2000), I utilize the counts of all overseas offices for each state ($OFFICE_{i,t}$) to measure the state's effort at opening offices abroad. In addition, I build off of Coughlin and Segev (2000) by creating separate dummy variables for all host countries (refer to Appendix 3.A for the country list and detailed information). They are employed to test the differential roles of offices in various host countries in promoting U.S. employment. The validity of using instruments to identify these dummies in a dynamic system GMM estimation is reported by SARGAN test results.

3.3.4. Agglomeration Explanatory Variables

The literature on agglomeration claims that foreign firms in the same industry cluster within a region to utilize the convenience from information sharing and labor pooling and to strengthen their bargaining power against domestic governments (Du et al, 2008; Blonigen et al, 2005; Head et al, 1999; List, 2001; etc). Various measures of FDI agglomeration have been employed in the literature. For instance, cumulative FDI stock has been widely considered in aggregate-level studies (see for reference, Baltagi et al. 2007; Cheng and Kwan 2000; Desai et al. 2004; Ge 2009; Hajazi 2009; Kemegue & Mohan 2009; Kolstad & Vilanger 2008; Sun et al. 2002). Most micro-level papers, on the other hand, utilize the cumulative count of foreign plants (e.g. Devereux et al. 2007; Du et al. 2008a,b; Head et al. 1999; Levinson 1996; List and Co 2000; Woodward 1992; Lee et al. 2007).[52] However, the employment measure of

[52] Although they all use the count of foreign firms to measure FDI clustering, they construct different variables. For example, both focusing on foreign firms' location

FDI clustering has been used in only a few studies (Blonigen et al. 2005; Barrios et al. 2006). To better capture the dynamic feature of employment outcomes, my study follows Blonigen et al. (2005) using one-year lagged employment levels to measure FDI agglomeration effects. Specifically, I incorporate two different dimensions of FDI clustering.

Intra-industry (Within-state) Agglomeration. This dimension of FDI clustering has been the most intensively examined in the literature of FDI location choices (Arauzo-Carod et al. 2010). I use one-year lagged employment level of U.S. manufacturing affiliates in state i ($MANUFEMP_{i,t-1}$) to capture this dimension of agglomeration. A similar measure is used by Blonigen et al. (2005). They distinguish between the "information" effect (one-year lagged level of employment by foreign manufacturing firms) and the "agglomeration" effect (summation of employees by foreign manufacturing firms over all previous years). I do not include the cumulative employment measure of FDI agglomeration for two reasons. First, Blonigen et al. (2005) report that only one-year lagged FDI-related employment plays a significant role in attracting Japanese firms. This result suggests that recent FDI activities could reflect more updated market situation and thus are more important to foreign

---

decision in U.S. and utilizing a Logit model, Head et al. (1999) use the previous year' count of foreign manufacturing plants in a state to measure within-industry FDI clustering, while List (2001) employs the summation of the count of all foreign establishments in the period 1974-1982 for each county to measure cross-industry FDI agglomeration economies. Du et al. (2008a, b) study the location choices by foreign plants in China and measure FDI agglomeration effect in a province by its share of the count of foreign manufacturing firms over the national level.

investments. Second, in contrast to their conditional Logit specification, my dependent variable is the employment by foreign manufacturing plants. If I followed Blonigen et al. (2005), then there would be a significant problem of colinearity between three employment variables, namely, the current-year employment by foreign firms, the previous–year FDI-related employment and the accumulation of FDI employment for all previous years. As a result, only last year's employment by U.S. manufacturing affiliates in state i ($MANUFEMP_{i,t-1}$) is used to capture the intra-industry (within-state) agglomeration effect.

All-industry (Cross-state) Agglomeration. FDI location decisions across multiple regions are not independent. They may depend on FDI in proximate locales (Head et al. 1995). I include a variable to measure the cross-state FDI agglomeration effects ($\sum_{j\neq i} ALLEMP_{i,j,t}$), which is the sum of employment by foreign plants in all industries over all adjacent states. Evidence of FDI spatial correlation between countries is rich. For example, micro-level studies, such as Head et al. (1995) and Head and Mayer (2004), allow for the potential third-country effect by incorporating individual firms' location decisions among all destination countries into a conditional-logit specification. Aggregate-level empirical research on this spatial correlation between FDI into adjacent markets, however, is sparse. To my knowledge, the study by Blonigen et al. (2007) is the only one that considers the spatial interaction of FDI using a cross-country sample. Their results suggest that U.S. multinationals tend to locate their affiliates in countries with FDI-rich neighbors.

Importantly, the spatial interaction of FDI becomes more significant for investigations that rely on smaller territorial units, such as states and counties (Arauzo-Carod 2010). Head et al. (1999) calculate for each state a measure of adjacent states' FDI agglomeration in the formula $\sum_{j \neq i} D_j FDI_j$, where FDI_j is the count of foreign plants in state j and D_j is a dummy variable which equals one if state j is adjacent to state i. The problem associated with discrete choice models is that it assumes strict restrictions on the data, e.g., the assumption of the independence of irrelevant alternatives (IIA).

My aggregate-level study uses a measure which is similar to the one used by Head et al. (1999) except that employment is used instead of the count measure. There are two reasons for including this inter-industry dimension of FDI agglomeration concerning the spatial interaction between neighboring states. First, the agglomeration effect could be spillovers from neighboring states when foreign-owned firms are located in the bordering areas. Second, adjacent states may compete for FDI to stimulate domestic economy by offering aggressive promotion policies. When the latter effect is stronger than the former, then FDI located in one state may "crowd-out" foreign investment in adjacent states. From the estimated coefficient on this interstate agglomeration variable, we can infer whether the crowd-out effect (indicated by a negative sign) dominates the agglomeration effect (indicated by a positive sign).

3.3.5. Market Size Variables

This set of explanatory variables describes the market potential for each state. Gravity theory is widely used in international trade field to explain both MNE activity and trade flows. It predicts that the larger the sum of host and home countries' economic size, the larger the involved trade flows.[53] Conventional empirical studies of FDI location choice are also based on gravity type models (Ng and Tuan 2001, 2003, 2006, 2007; Broaconier et al. 2005; etc). A strict implementation of the gravity model requires specific information on distance and direction of each trade flow between two trade partners. Notably, the importance of distance between host and home regions for foreign investors is not as prominent as it is to trade flows (Markusen 1984). Correspondingly, many empirical FDI location studies that rely on other empirical approaches have dropped the distance variable but kept the market size variable.

Two general approaches are employed in the literature to measure market potential. One uses a population measure. For example, Gross and Ryan (2008) use total population to measure the local market size for each Western Europe country, while List (2001) and Woodward (1992) measure market size and accessibility for each U.S. county by population density (population/land area). The other approach uses an income measure. For instance, in their examination of the difference in

[53] The theoretical model for trade flows between regions i and j takes the form of $F_{i,j} = G\frac{M_i M_j}{D_{i,j}}$, where M is the economic size of each region, D is the distance and G is a constant. The model was first used by Tinbergen (1962).

business location decisions between foreign and domestic firms, List et al. (2004) include county per-capita income as a measure for host market potential. The same measure is also used by Head et al. (1999) and Woodward (1992) for each U.S. state and by Coughlin and Segev (2000) for each U.S. economic area.

I follow the second approach and use state-level per-capita personal income ($INCOME_{i,t}$) to measure host market demand and capacity. The income measure outperforms the population measure in the sense that personal income could better reflect buying power in a market. The larger the buying power of a domestic market, the larger the U.S. FDI inflows with a "market-seeking" purpose. However, a larger domestic market size may also reflect a stronger power of domestic firms, which could discourage foreign-owned firms. Accordingly, the expected sign associated with the variable $INCOME_{i,t}$ may be ambiguous.

To control for the potential spatial interaction in market demand between states, I construct a variable, the sum of all adjacent states' per-capita income($\sum_{j \neq i} INCOME_{i,j,t}$). This variable captures the effect of demand in contiguous states on foreign firms' location decisions (Head et al. 1999). This dimension of market potential is quite important for MNEs following the model of "horizontal FDI", because those multinationals invest and produce in one region and then sell products to surrounding regions of the host market.

3.3.6. Labor Conditions Variables

The fourth set of independent variables reflects the labor cost and quality for each U.S. state.

Labor cost. Among all human capital characteristics, wage has been the most extensively investigated in FDI literature. I incorporate a variable $COMPENSATION_{i,t}$, which is the average annual compensation per manufacturing worker in a state. A similar measure, average annual wage per manufacturing worker, has been used by studies such as Broaconier et al. (2005), McConnell and Schwab (1990), List et al. (2004) and List (2001). Other studies such as Woodward (1992), Fredriksson et al. (2003), and Coughlin and Segev (2000) use the average manufacturing hourly wage rate. Compensation paid per manufacturing worker includes supplements to wages and salaries. Therefore, it is a more accurate measurement for the actual costs associated with hiring one employee.

Labor market. The effect of state unemployment variation on a foreign firm's location decision is ambiguous (Coughlin and Segev 2000). For one thing, a high jobless rate may indicate the availability of labor. Following this logic, a state with a higher unemployment rate may attract more foreign plants due to its larger job applicant pool (Head et al. 1999). On the other hand, a high unemployment rate may not be attractive for expanding FDI because it could indicate a lower labor turnover and a lower availability of efficient workers. This would be true if the unemployment was induced by efficiency wages (Shapiro and Stiglitz 1984; Basu and Felkey 2008). In that case, foreign investment may be discouraged due to the larger labor cost.

Alternatively, a high unemployment rate could boost current workers' effort by warning them of a surplus in the labor market. The higher the unemployment rate, the larger the probability of being fired for shirking. For another reason, foreign firms may avoid locating their affiliates in high unemployment regions if they treat high jobless rates as a warning of "(l)ess-competitive industrial conditions and a lower quality of life" (Woodward 1992, pp. 700).

Labor quality. In their survey paper, Arauzo-Carod et al. (2010) demonstrate a general conclusion that a higher level of educational attainment in the working population is conducive to attracting foreign investments. Following Coughlin and Segev (2000), I use the share of population over 25 years old with at least a high school diploma for each state, $EDU_{i,t}$, to measure state labor force quality. Woodward (1992) utilizes the median year of school completed for the working population in each U.S. county. Some other researchers have used government expenditures on education (e.g. McConnell and Schwab 1990; Gabe and Bell 2004). However, my measure reflects the actual average performance of working population in education attainment. This seems to be what actually matters to foreign investors.

3.3.7. Transport Infrastructure Variables

A better transportation system could facilitate firms in their activities of transporting inputs and outputs. In addition, better transport infrastructures could reduce workers' commuting cost. As a result, extensive studies have hypothesized a better transport infrastructure as a positive determinant for industrial location decision (Arauzo-Carod et al. 2010). Previous studies differ in the measures of transport infrastructure. List et al. (2004) use total highway expenditures to measure a local government's effort to provide a better transportation system for each U.S. county. Coughlin and Segev (2000) utilize a dummy variable which equals one for counties with at least one interstate highway. Fredriksson et al. (2003) employ state total highway mileages without normalizing. I employ state per square mile highway mileages ($HIGHWAY_{i,t}$)to measure the accessibility to transport infrastructure for U.S. states. My measure of state transport infrastructure reflects the actual existing situation of transportation system. Normalizing state total highway mileages by square miles controls for the measurement errors associated with state geographical area.

3.3.8. Border Effects Variables

When it comes to analyzing location decisions by foreign plants, border effects are a concern. Foreign investors may find it convenient to establish a business in border areas to serve both the local market and a third-country that share borders with the host market (Arauzo-Carod et al. 2010). Regarding FDI location choices in Europe, border effects have been examined by Cieślik (2005). He focuses on the location behavior of world-wide foreign investments in Poland in the 1990s. His result suggests significant border effects by showing that Polish regions that share borders with EU countries are more attractive to foreign investors than their counterparts which share borders with Eastern non-EU countries.

Notably, very little attention has been paid to border effects on FDI location decisions in the U.S. The U.S. borders only two countries: four U.S. states (California, Arizona, New Mexico and Texas) borders Mexico,[54] and twelve (Alaska, Washington, Idaho, Montana, North Dakota, Minnesota, Michigan, Ohio, New York, Vermont, New Hampshire and Maine) share borders with Canada.[55] Trade statistics suggest that there exists potential border effects regarding states adjacent to Mexico and Canada when foreign plants make location decisions in the U.S. Canada has been the largest trade partner with the U.S. for a long time, and Mexico has been the 3rd largest. In 2009, the total value of imports and exports between Canada (Mexico) and the U.S. was $429.64 billion ($305.53 billion).[56] To reflect the importance of border effects, I construct two dummy variables, MEX_i and CAN_i, which are set equal to one for states that share borders with Mexico and Canada, respectively. The resulting estimate of coefficients on these dummies may indicate whether or not border states are more attractive to foreign investors and thus have a higher level of FDI-related employment.

3.4. Econometric Framework

Because FDI-related employment in a state is dynamically correlated with its lagged value, I employ the Blundell-Bond (1998) Dynamic System GMM Estimation

[54] *Map of Border Governments*, U.S. - Mexico Border Field Office **of the** Pan American Health Organization**,** http://www.fep.paho.org/bcmap.asp**.**
[55] *The Canada-U.S. Border Map*, the Canada - United States Transportation Border Working Group, http://www.thetbwg.org/map_e.htm.
[56] Data source: *Top Trading Partners - Surplus, Deficit, Total Trade*, Foreign Trade Statistics, the U.S. Census Bureau, http://www.census.gov/foreign-trade/top/index.html#1998.

(DSGMM) to control for potential problems associated with the dynamically determined system (Barrios et al. 2006; Cheng and Kwan 2000; Ge 2009; Kemegue and Mohan 2009; Sun et al. 2002). The discussion below demonstrates how the DSGMM approach works in solving some critical econometric issues associated with my empirical specification.

3.4.1. Econometric Issues

For the sake of analytic convenience, Equation (1) can be re-written in a more general form:

$$y_{i,t} = \alpha y_{i,t-1} + \beta' x_{i,t} + \mu_{i,t} \,,$$

$$\mu_{i,t} = S_i \; + \; T_t \; + \; \xi_{i,t} \,, \qquad i = 1,2, \dots, N, \;\; t = 2, \dots, T. \qquad (2)$$

Equation (2) is a two-way fixed effects dynamic panel regression with a lagged dependent variable on the right-hand side. Assuming that the fixed effect components of error terms, $S_i \; and \; \xi_{i,t}$, are independently distributed across i and have the standard assumptions that

$$E(S_i) = 0, E\left(\xi_{i,t}\right) = 0 \; and \; E\left(\xi_{i,t} S_i\right) = 0,$$

$$\text{for } i = 1,2, \dots, N \text{ and } t = 2, \dots, T \qquad (2.1)$$

$$E\left(\xi_{i,t}\xi_{i,s}\right) = 0, \qquad \text{for } i = 1,2, \dots, N \text{ and } t \neq s \qquad (2.2)$$

In addition to assumptions on error terms, there is also a standard assumption on initial conditions $y_{i,1}$ (Blundell and Bond 1998),

$$E(y_{i,1}\xi_{i,t}) = 0, \qquad \text{for } i = 1,2,\dots,N \text{ and } t = 2,\dots,T. \tag{2.3}$$

Conditions (2.1) through (2.3) necessitate corresponding specification tests described in Section 4.4.

Several econometric issues may arise from estimating Equation (2).[57] First, some explanatory variables, such as investment-promotion policies, manufacturing compensation and per-capita personal income etc, are assumed to be endogenous. However, endogeneity may run in both directions (Cheng and Kwan 2000), causing these regressors to be correlated with disturbances. Second, some state-level unobserved geographical and demographical characteristics (i.e. fixed effects, S_i, and observation-specific errors, $\xi_{i,t}$) are time-invariant and may be correlated with other explanatory variables (Cameron and Trivedi 2005, pp. 764). Third, the presence of the lagged dependent variable, $y_{i,t-1}$, may result in serial autocorrelation in error terms (Cameron and Trivedi 2005, pp.763). Finally, my panel dataset contains a short time period (T=10) and a larger state dimension (N=50). In panels with a long enough time span, shocks associated with states' fixed effects will decline with time. However, with a panel that has a small-T large-N dimension, it becomes more

[57] For a detailed discussion of why standard panel estimators, such as OLS, fixed/random effects and 1st-differenced OLS, are inconsistent when the regressors include lagged dependent variables, please refer to Cameron and Trivedi (2005), pp. 764 - pp. 765.

important to address this potential bias in a dynamic setting (Blundell and Bond 1998).

The aforementioned econometric issues provide significant implications for specifying an appropriate model estimation. To solve these problems, I follow Blundell and Bond (1998) and utilize a system Generalized Method of Moments (GMM) framework. It starts with the Arellano and Bond (1991) differenced GMM estimation. It then augments the first-differenced moment conditions by using the level moment conditions. This augmentation process is conducted by incorporating the level equation to obtain a system of equations: one in differenced and one in levels.

3.4.2. First-Differenced GMM: Arellano and Bond (1991)

Following Arellano and Bond (1991), my GMM approach begins with estimating the first-differenced version of Equation (2):

$$\Delta y_{i,t} = \alpha \Delta y_{i,t-1} + \beta' \Delta x_{i,t} + \Delta \mu_{i,t} \ ,$$

$$\Delta \mu_{i,t} = (S_i - S_i) + \Delta T_t + \Delta \xi_{i,t} \ , \quad \text{for } i = 1,2, \dots, N \text{ and } t = 2, \dots, T \qquad (3)$$

in which, the state-specific effects are removed by the differencing operation. Assuming away the serial correlation in level error terms $\mu_{i,t}$, two-year or longer lagged values of y are qualified as instruments for $\Delta y_{i,t-1}$in the first-differenced system (Cameron and Trivedi 2005, pp. 765).

This implies the following moment conditions:

$$E(y_{i,t-s}\,\Delta\mu_{i,t}) = 0 \quad \text{for } t = 3,4,\dots,T \text{ and } s \geq 2 \tag{4}$$

The GMM estimator makes use of lagged values of independent variables as additional instruments (Cameron and Trivedi 2005, pp. 766). If explanatory variables were strictly exogenous, then current, past and future values of Δx could be valid instruments (Cameron and Trivedi 2005, pp. 749):

$$E(\Delta x_{i,t-s}\;\Delta\mu_{i,t}) = 0 \quad \text{for } t = 3,4,\dots,T \text{ and } all\ s. \tag{5}$$

However, given the potential endogeneity issue due to reverse causality of some covariates, current and one-year lagged explanatory variables may be correlated with error terms and thus are endogenous:

$$E(x_{i,r}\;\mu_{i,t}) \neq 0 \quad \text{for } r \geq t. \tag{6}$$

To address this issue, I assume weak exogeneity of independent variables (Cameron and Trivedi 2005, pp. 749):

$$E(x_{i,r}\;\mu_{i,t}) = 0 \quad \text{for } r < t. \tag{7}$$

Equation (7) implies that only a subset of Equation (5) could be used as additional moment conditions (Arellano and Bond 1991):

$$E(\Delta x_{i,t-s}\;\Delta\mu_{i,t}) = 0 \quad \text{for } t = 3,4,\dots,T \text{ and } s \geq 2. \tag{8}$$

3.4.3. System GMM: Blundell and Bond (1998)

The first-differenced GMM approach estimates Equation (3) by utilizing moment conditions given by Equations (4) and (8). It is worth noting that sometimes lagged regressors, particularly the time-invariant explanatory variables, are poor instruments for the first-differenced model. This occurs because they are eliminated by the first-differencing operation. This induces problems in my study because some policy variables of interest are nearly constant for some states over time, such as state top CIT rates (TAXRATE), host country dummies in which each equals one if a state has office(s) in that country (HOST), the number of overseas offices (OFFICE), and border effects dummies for two countries (Canada and Mexico). The first-differences of these variables are relatively uninformative.

The aforementioned problems associated with the first-differenced GMM could be addressed by using a Dynamic System GMM estimator provided by Blundell and Bond (1998). Their model builds off the first-differenced GMM model by utilizing more moment conditions that are based on the level equation. Therefore, variables in the level equation are instrumented with their own first differences (Cheng and Kwan 2000; Cameron and Trivedi 2005, pp. 766).

Following Blundell and Bond (1998), I expand the first-differenced GMM by adding the level equation, Equation (2), into the system:

$$y_{i,t} = \alpha y_{i,t-1} + \beta' x_{i,t} + \mu_{i,t} ,$$

$$\mu_{i,t} = S_i + T_t + \xi_{i,t}\ , \text{ for } i = 1,2,\dots,N \text{ and } t = 2,\dots,T. \quad (2)$$

The lagged differences of y, $\Delta y_{i,t-1}$, could be used as instruments in the level Equation (2), which implies the following moment conditions (Arellano and Bover 1995; Blundell and Bond 1998):

$$E(\Delta y_{i,t-1}\ \mu_{i,t}) = 0 \text{ for t} = 3,4,\dots,T \text{ and } i = 1,2,\dots N. \quad (9)$$

The lagged differences of x, $\Delta x_{i,t-s}$, could also be used as instruments based on the assumption of a strict exogeneity for explanatory variables (see Equation(6)). However, considering the possibility of endogenous covariates due to the reverse causality, I assume that weak exogeneity exists (see Equation (7)). This assumption leads to additional moment conditions for estimating the level equation (Cameron and Trivedi 2005, pp.749 and pp.766):

$$E(\Delta x_{i,t-s}\ \mu_{i,t}) = 0 \text{ for } t = 3,4,\dots,T \text{ and } s \geq 1. \quad (10)$$

The system GMM estimator could increase efficiency over Arellano and Bond (1991) by employing more moment conditions (Cheng and Kwan 2000).[58] However, in addition to assumptions used for estimating the 1st-differenced equation, this efficiency gain comes with the cost of additional assumptions that the first-

[58] Built off the Arellano-Bond (1991) estimator, various more efficient estimators are obtained by using different additional moment conditions. For example, Ahn and Schmidt (1995) use the moment conditions $E(\mu_{i,T}\ \mu_{i,t)} = 0$; Arellano and Bover (1995) add the moment conditions $E(\Delta y_{i,t-1}\ \mu_{i,t}) = 0$, etc. For a detailed discussion of what additional assumptions are added on Arellano-Bond (1991) estimation to increase the efficiency, refer to Cameron and Trivedi (2005), pp.766.

differenced instruments for variables in the level equation are not correlated with unobserved region effects (Blundell and Bond 1998). To justify these assumptions, I conduct some specification tests which are explained in detail in the next section.

3.4.4. Specification Tests for System GMM: AR(1), AR(2) and SARGAN Tests

My study relies on the Blundell-Bond system GMM estimator which estimates simultaneously the first-differenced and the level equation. Equations (4)-(8) and Equations (9)-(10) imply two sets of linear moment conditions for estimating the differenced and the level equation, respectively. The consistency of the GMM estimator depends on the validity of these moment conditions. To apply these moments, two critical assumptions are made: one is that of auto-correlation on level residuals; the other is that of the exogeneity of instruments. Therefore, it is important to investigate the validity of these assumptions.

The results of a Sargan/Hansen's J test proposed by Sargan (1958) and Hansen (1982) indicate the overall validity of selected instruments (Blundel and Bond 1998; Cheng and Kwan 2000; Ge 2009). Its null hypothesis is that the instruments are exogenous as a group. It compares the value given by the minimized GMM criterion function with the critical values from a χ^2 distribution whose degree of freedom equals the difference between the number of moment conditions and number of parameters. If the former is smaller, then the null hypothesis cannot be rejected. Accordingly, the larger the p-value of the SARGAN statistic, the stronger the instruments.[59] The SARGAN test is applied to both the first-differenced equation and the level equation.

Because a lagged dependent variable is included on the right-hand-side of the regression, the consistency of estimates depends critically on the lack of second-order serial correlation. Accordingly, the AR(1) and AR(2) tests are conducted to test the null hypothesis of zero first-order and second-order autocorrelation, respectively, between the differenced residuals (Ge 2009; Barrios et al. 2006). Given that the first-order autocorrelation in differenced residuals is obvious by construction, the AR(1) test usually rejects the null hypothesis.[60] The test for AR(2) in differenced residuals is more informative. A high reported p-value in AR(2) test indicates that the moment conditions are valid due to the lack of second order serial correlation in level residuals.[61]

3.5. Results

Column (1) of Table 3.3 reports the regression results for the basic Blundell-Bond (1998) Dynamic System GMM (DSGMM) estimation. The sample for the basic model includes all 50 states during the period 1999-2008. In the base model, two-year lagged values of state domestic independent variables are used as

---

[59] Readers are referred to Cameron and Trivedi (2005), pp.277, for a detailed discussion of the relevant formulae and the statistical distribution of SARGAN test.

[60] To illustrate, $\Delta\mu_{i,t} = \mu_{i,t} - \mu_{i,t-1}$ and $\Delta\mu_{i,t-1} = \mu_{i,t-1} - \mu_{i,t-2}$ both contain $\mu_{i,t-1}$.

[61] For a detailed introduction of AR(1) and AR(2) processes, readers are referred to Hamilton (1994), pp.53 – pp.58. The book also provides a detailed discussion of the maximum likelihood estimation for the Gaussian AR(1) and AR(2) processes on pp.118 – pp.126.

instruments. Specifically, $y_{i,t-2}$ and $\Delta x_{i,t-2}$ are used as instruments in the first-differenced equation; while, $\Delta y_{i,t-1}$ and $\Delta x_{i,t-2}$ are instruments for the level equation. The reported AR(1) and AR(2) tests indicate that with the lag of two years there is no significant autocorrelation in error terms. The reported P-value of Sargan/Hansen test supports the validity of selected instruments.

The estimated coefficient on corporate income tax ($TAXRATE_{i,t}$) is found to be positive and statistically significant. This result diverges from previous studies that find either a negative effect of income tax (Bartik 1985; Head et al. 1999; Woodward 1992; Coughlin and Segev 2000) or an insignificant income tax effect (Levinson 1996; Blonigen & Davies 2004).[62] It is worth noting that among these studies, Bartik (1985), Levinson (1996), and Coughlin and Segev (2000) do not control for benefits of government spending other than the transport infrastructure; while Head et al. (1999), Woodward (1992) and Blonigen and Davies (2004) do not include any benefits of public spending. Ignoring the benefits of government spending financed by taxes may result in a biased estimation of tax effects on business activities (Gabe and Bell 2004). To address this potential measurement error, I incorporate the government spending on subsidies/grants to measure the benefits associated with tax collections.

[62] Studies that rely on property tax tend to report an insignificant effect of property tax on FDI location choices. For example, Bartik (1985), Carlton (1983), Woodward (1992) and List (2001) both report an insignificant property tax effect on FDI location choices in U.S. counties. However, studies that use the overall tax collection to measure the tax burden tend to find a negative effect of total tax collection on local attractiveness. For reference of such evidence in U.S. states, see List and Co (2001) and Fredriksson et al. (2003).

The estimated coefficient on governmental subsidies/grants for production factors ($SUBSIDY_{i,t}$) suggests that a 10 percent increase in per-capita total subsidies is correlated with 0.5 percent higher employment by foreign manufacturing plants. The reported positive relationship is consistent with the study by Head et al. (1999). Although this estimated coefficient is statistically insignificant, its economic significance is worth noting. Take California as an example. In 2008, per-capita government spending on total subsidies/grants in California was $216.19; per-capita government spending on job-training (labor) and housing-and-urban-development (capital) subsidies was $15.28 and $29.76, respectively. The employment by foreign manufacturing plants was 193,300. So, per-capita labor and capital subsidy spending accounted for 20.83% of total subsidies per-capita. According to the estimated coefficient, a 2 percent increase in per-capita government spending on job and capita subsidies (i.e. $45.04 * 0.02 = $0.9 per capita) is associated with an estimated 0.5 percent more employment by foreign manufacturing plants (i.e. 193,300 * 0.5% = 966.5 employees).[63]

Foreign Trade Zones, both “general-purpose” zones and subzones together, have a predicted significant and positive impact on the FDI-related employment level. The estimates suggest that a 10 percent increase in the count of FTZs is associated with 3.2 percent more employment supported by foreign manufacturing firms. The same positive effect of FTZs on FDI location choices is reported by Head

[63] The data for these calculations are from *Stimulus Spending by State*, the Wall Street Journal, August 6, 2009.

et al. (1999). Note that, their study examines only one type of FTZs, namely the "general-purpose" zones. Because the count of such zones rarely varies over time, they employ a dummy variable which equals one for states with at least one "general-purpose" zone. This measure, however, cannot be applied to my sample in the sense that between 1999 and 2008 all states have such zones.

Studies by Head et al. (1999), Woodward (1992) and Coughlin and Segev (2000) all report that the opening of investment-promotion offices in Japan could attract more Japanese firms. The estimate results for $OFFICE_{i,t}$ suggest that the total number of state trade offices abroad has a predicted small and insignificant negative effect on the employment by foreign firms. Moreover, the selection of host countries is quite notable. The estimation results of coefficients on all host country dummy variables suggest that having international offices in a combination of countries, including Austria, China, Egypt, Ghana, Israel, Japan, Korea, Malaysia, Spain, Mexico, Singapore and Turkey, is correlated with 4.2 percent more employees in foreign manufacturing firms in the U.S. On average, opening one more trade office in these countries is correlated with a 0.35 percent increase in U.S. manufacturing FDI-related employment.[64] However, holding overseas offices in some other

[64] Appendix 3.B describes the results of coefficients for all host country dummies. The role of international offices in promoting FDI-related employment deserves a more in-depth investigation. Most previous studies of FDI location choices in the U.S. have been focusing on such offices in one or a couple of countries, e.g. Japan. To my knowledge, no study currently conducts a systematic and comprehensive analysis of overseas offices. An investigation by employing country dummy variables is rough and tentative. One interesting extension could be conducting a

countries, such as Brazil, Chile, Germany, Russia, South Africa, Taiwan, Vietnam, etc, is correlated with less employment by foreign firms in U.S. states.

Consistent with the literature on FDI agglomeration, the estimated coefficients on both intra-industry-within-state agglomeration ($MANUFEMP_{i,t-1}$) and all-industry-cross-state FDI clustering ($\sum_{j\neq i} ALLEMP_{i,j,t}$) are positive and significant at 1% and 10% level, respectively (Devereux et al. 2007; Woodward 1992; Coughlin and Segev 2000; List 2001; Head et al. 1999).[65] The former result suggests that foreign manufacturing firms in the U.S. tend to cluster within one state. The latter suggests that FDI between contiguous states is not crowding out each other. Instead, foreign manufacturing plants are more likely to operate businesses in a region where neighbors have more FDI in all industries. One explanation for the significant all-industry, cross-state agglomeration effect is that FDI in adjacent states could indicate the proximity to nearby specialized inputs.

The estimated coefficient on the host market size ($INCOME_{i,t}$), although positive, is statistically insignificant. Moreover, adjacent market demand ($\sum_{j\neq i} INCOME_{i,j,t}$) is estimated to be negatively correlated with FDI activity at 5% significance level. Most extant studies report a positive relationship between market potential and FDI activities (Gross and Ryan 2008; Head et al. 1999; List et al. 2004;

"benefit vs. cost" analysis by incorporating the state governmental spending associated with holding international offices

[65] A few studies report that the agglomeration has negative effect on FDI location decisions, for reference, see List et al. (2004) and Sun et al. (2002).

Sun et al. 2002; etc). At first glance my result conflicts with the theoretical expectation that a larger domestic economy may attract more FDI. The expectation above, however, could merely reflect the behavior of "horizontal" FDI with a purpose of market-seeking (Markusen 1984). An alternative model of FDI behavior is the "vertical" FDI which predicts that foreign investors, especially the European and Japanese investors, produce goods in U.S. affiliates and then re-import a large portion of the products back to Europe and Japan or export them to other countries (Helpman and Krugman 1985). From this perspective, a larger U.S. state market size may not result in more FDI. On the contrary, foreign manufacturing firms may like to locate in states with a lower per-capita income to utilize lower production costs. This interpretation is consistent with the study by Braconier et al. (2005) which concludes that MNEs with headquarters in skill-intensive countries (e.g. Europe and Japan) tend to invest more in regions where unskilled labor is relatively cheap. This negative effect of the host market size is also reported in a study of U.S. inbound FDI by Fredriksson et al. (2003).

The coefficient on manufacturing annual per-employee compensation ($COMPENSATION_{i,t}$) is estimated to be positive but statistically insignificant. This result is weakly consistent with some other empirical studies of U.S. inbound FDI which find evidence that foreign plants tend to pay higher wages (Head et al. 1999; Broaconier et al 2005; List et al. 2004). State unemployment rate ($UNEMPLOY_{i,t}$) has an estimated significant and negative impact on the FDI-related employment. One explanation is that foreign firms treat a high jobless rate as a signal of economic downturn and a lower quality of life. As a result, they avoid locating affiliates in such regions (Woodward 1992; Fredriksson et al. 2003). The estimated coefficient on the educational attainment variable ($EDU_{i,t}$) is negative and statistically significant. This is inconsistent with most studies that report a positive effect of education attainment on business location choices (Coughlin and Segev 2000; Woodward 1992). However, considering that the level of education is a "(p)lausible exogenous determinant of wages", the negative effect of this education variable on FDI-related employment may actually come from some unobserved negative effects of wages (Bartik 1985, pp.21).

Consistent with most studies of FDI location choices (e.g. Bartik 1985; Levinson 1996; Coughlin and Segev 2000; List 2001; Fredriksson et al. 2003), the coefficient on transportation system variable ($HIGHWAY_{i,t}$) is estimated to be positive and statistically significant at one percent level of significance: a 10 percent increase in state highway mileages leads to a predicted 2.5 percent growth in employment by foreign manufacturing plants. This result, combined with the estimated positive tax effect, indicates that foreign manufacturing firms tend to operate in regions with better infrastructures, even though these come with a larger tax burden.

My results also show evidence of a positive and significant Canadian border effect: states that neighbor Canada are predicted to have 0.2 percent more employment supported by manufacturing MNEs on average. However, the Mexican border effect is estimated to be a small negative amount, and is statistically insignificant. Empirical research of FDI location choices that investigates the border effects in the U.S. is sparse. Therefore, to my knowledge, there is no exiting result with which to compare. A similar finding is reported by Cieslik (2005). He concludes that Polish regions along EU countries are more attractive to foreign investors than their counterparts sharing borders with Eastern non-EU countries.

3.6. Robustness Check

As the first sensitivity test, I run the same Blundell and Bond (1998) dynamic system GMM (DSGMM) estimation with the basic model for all 50 states except for using 3-year lagged values as instruments. To be specific, $y_{i,t-3}$ and $\Delta x_{i,t-3}$ are used as instruments in the first-differenced equation; while, $\Delta y_{i,t-1}$ and $\Delta x_{i,t-3}$ are instruments for the level equation. Given that the AR(2) test only tests for autocorrelation at exactly the second-order lag, the AR(3) test is employed to investigate the potential for third-order autocorrelation. The regression results are reported in Column (2) of Table 3.3. The reported P-value of the AR(3) test indicates that there is no significant autocorrelation in error terms with 3-year lags. When we use the past information implied by deeper lags as instruments, the Sargan/Hansen test indicates an increase in the validity of selected instruments (P-value goes up from 0.1395 to 0.6612).

Compared with the coefficient estimates in the basic model, most coefficients are estimated to have same signs and similar magnitudes. One difference is that the coefficient on the cross-state, all-industry agglomeration effect becomes much smaller and insignificant. One other important difference appears in the estimated coefficient on the tax variable. The estimated tax effect drops by half from 0.802 to 0.445 and becomes insignificant. Lastly, the estimated coefficients on host country dummy variables change. As shown by Column (2) of Appendix 3.B, the coefficients for Mexico, Singapore and Turkey are no longer significantly positive and having state offices in the EU is no longer correlated with less employment by foreign manufacturing plants in the U.S. Having international offices in the suggested combination of host countries, as a whole, is predicted to be correlated with 3.0% more manufacturing FDI-related employment.

This study also investigates the spatial interaction of FDI-related employment between adjacent states. In another robustness check, I exclude observations for Alaska and Hawaii, which have no neighboring U.S states, and then run the DSGMM model using this subsample. Regression results for the subsample with 2-year and 3-year lagged variables as instruments, are reported in Column (3) and Column (4) of Table 3.3, respectively. Compared with the estimation results of the basic model, the cross-state, all-industry agglomeration effect is strengthened: not only does the coefficient increase from 0.132 to 0.265, the significance level also increases to 1 percent. The positive corporate income tax effect is also increased to 1 percent significance level with a larger magnitude of 1.124. Meanwhile, differences are found in the coefficients for host country dummies. State offices in more countries are now estimated to be positively associated with FDI-related employment in the U.S. (see Column (3) and (4) of Appendix 3.B for detailed information of all coefficients).

As Figure 3.2 shows, the manufacturing FDI-related employment is distributed unevenly among U.S. states. California has the largest average share (8.95%), while Hawaii has the lowest average share (0.06%). I define a state as FDI-rich if it captures more than 5 percent of the national manufacturing FDI-related employment. Accordingly, a total of six states are defined as FDI-rich and treated as large outliers: California (8.95%), Texas (6.52%), Ohio (5.99%), Michigan (5.24%), Pennsylvania (5.10%) and Indiana (5.09%).[66] As a whole, they account for 36.89% of overall employment by foreign manufacturing firms between 1999 and 2008. To exclude one source of unobservable determinants associated with FDI-rich states, I remove them from the sample.

Column (5) and (6) of Table 3.3 report the DSGMM regression results for this subsample with 2-year and 3-year lagged variables as instruments, respectively. Compared with regression results for the full sample, some important patterns of FDI activities for states in lower tiers (in terms of FDI-related employment) are notable. First, states in lower tiers are more sensitive to neighbors. To illustrate, the inter-state, all-industry agglomeration effect is more significant to FDI in lower-tier states: a 10 percent increase in FDI-related employment in neighboring states is associated

[66] Percentage in parentheses is the manufacturing FDI-related employment share for each state over the overall U.S foreign manufacturing employment during the period 1999-2008.

with 2.56 percent more employment by in-state foreign manufacturing firms. Meanwhile, the negative coefficient on the adjacent-state market size variable becomes larger in magnitude and raises its significance level.

Second, investment-promotion policies are more important for states in lower tiers. Corporate income taxes have a positive effect that is larger in magnitude and significant at a higher level of significance: a one percentage point increase in top tax rate is correlated with a 1.8 percent increase in FDI-related employment. Finally, the estimated coefficients on some host countries, such as Canada, India, Netherlands, and Latin American countries, are no longer insignificant in terms of promoting FDI-related employment for the full sample; instead, they become significantly positive. Meanwhile, having overseas offices in some other host countries, such as the United Kingdom, Hong Kong and Ukraine, ends up with having a negative association with FDI-related employment. Correspondingly, the suggested combination of host countries varies (refer to Column (5) and (6) of Appendix 3.B for detailed information).

To demonstrate the importance of investigating different investment-promotion policies simultaneously, I re-run DSGMM estimates for the 50 states and each time only one policy variable was incorporated. Results are reported by Columns (7) through (10) of Table 3.3 and are compared with Column (1). The comparison is quite worth noting. When the government spending is not considered, the corporate income tax effect becomes very small (although positive) and statistically insignificant. When only the government spending is included, its coefficient is estimated to be approaching zero (-0.004) and statistically insignificant. More importantly, the estimated coefficient on FTZ changes from being positive and significant (0.323) to being negative and significant (-0.024).

Under the three aforementioned circumstances, some similar results are also observed. First, the coefficient on cross-state, all-industry agglomeration drops substantially in magnitude and becomes insignificant. Second, the manufacturing compensation effect becomes significant and positive. Third, the coefficient on state highway mileage drops by half in magnitude. Lastly, instead of a positive Canadian border effect, we now observe a negative Mexican border effect.

When only the state policy of overseas office is investigated, as shown by Column (10), the coefficient on the sum of state international offices becomes statistically significant, although negative. Departing from previous estimation results, having offices in the United Kingdom is now estimated be positively associated with FDI-related employment while having offices in Netherland becomes a negative effect (refer to Column (10) of Appendix 3.B for detailed information of coefficients on all host country dummies). The reported P-value of Sargan/Hansen test indicates a drop in the validity of instruments. All the aforementioned differences in results between Columns (7) through (10) and Column (1) of Table 3.3 suggest that it is important to have all policy variables under the investigation.

In the last robustness check, I present the estimation results for OLS estimates with random-effect and fixed-effect in Column (11) and (12), respectively. Compared with the DSGMM estimate, the estimated coefficient on top CIT rate becomes negative and insignificant. The coefficient on governmental subsidy spending is now positive and significant. The role of FTZ in promoting FDI-related employment loses its significance and the host countries suggested by OLS estimation (Chile, Germany and Ireland) are all estimated to be negatively associated with FDI-related employment using DSGMM estimation (see Columns (1) and (11) of Appendix 3.B for the comparison of coefficients on all host country dummy variables). Moreover, only two non-policy variables are estimated to have a statistically significant coefficient now: a positive coefficient on manufacturing compensation variable and a negative Canadian border effect.

3.7. Conclusions and Policy Implications

This study investigates the relationship between state-level attributes and employment by foreign manufacturing plants in U.S states. Particular attention is given to the role of state-level business incentives in influencing the employment decisions of foreign manufacturing firms. Specifically, U.S. inbound manufacturing FDI for 50 states during the period 1999 – 2008 is empirically investigated using a two-way fixed effects panel data framework. To address the econometric issues associated with the dynamic features of employment outcomes, this research employs the Blundell and Bond (1998) system GMM approach. My contributions are twofold. First, I measure the size of FDI in terms of employment level, rather than the counts of establishments or the stock of foreign assets, to uncover the employment contribution of FDI on a local economy. Second, by correcting for the measurement errors and addressing policy endogeneity, this research attempts to provide valid advice to policy makers on the role of business incentives in promoting employment.

The top priority is given to the policy implications. The estimated coefficients on investment-promotion policies and infrastructure suggest that state and local governments could play an important role in FDI-related employment outcomes. First, combining the positive coefficient on government subsidy spending and the strong positive effect of state highway mileages, my interpretation for the aforementioned positive income tax effect coincides with the trade-off story between taxes and the provision of public goods suggested by Gabe and Bell (2004): regions with high taxes are on average more attractive to investors as long as those regions spend more tax revenues on providing public goods and services. Take New York State in 2008 for example. Based on my estimation, holding other conditions constant, a one percentage point increase in New York's top corporate income tax rate (from 9% to 10%), plus a one percent increase in state highway mileage (i.e. 114,471 * 1% = 1,144.7 miles), is correlated with 1.05 percent (or 73,500 * 1.05% = 771.75 jobs) more U.S. employment by foreign manufacturing firms.

The provision of FTZs (both general-purpose zones and subzones) has a significant and positive effect on employment by foreign firms. Ceteris Paribus, the state of New York is predicted to increase its FDI-related employment in manufacturing industry by 3.2 percent (or 73,500 * 3.2% = 2,352 jobs) when it provides 10 percent (or 22 * 10% = 2.2) more FTZs for investors.

Most previous studies report that having state offices in Japan is helpful to attract Japanese firms (Head et al. 1999; Woodward 1992). The present research extends the literature by reporting that opening more trade offices abroad does not necessarily help to expand a state's employment by foreign firms; what actually matters is a state's selection of host countries. According to estimated coefficients on different host country dummies, some host countries of U.S. state overseas offices, such as China, Egypt, Israel, Japan and Turkey, are associated with a higher level of employment by foreign firms. While, foreign offices in some host countries, such as Brazil, Chile, Germany, South Africa, Switzerland and Taiwan, are estimated to be negatively associated with U.S. employment by foreign firms. According to the estimation results of the baseline model, the suggested combination of host countries contains Austria, China, Egypt, Ghana, Israel, Japan, Korea, Malaysia, Spain, Mexico, Singapore and Turkey. Having state offices in all these countries is correlated with 4.2 percent (or 73,500 * 4.2% = 3,087 jobs) more employees in foreign manufacturing firms in New York.

Some other important results are summarized as follows. First, both intra-industry, within-state FDI agglomeration and all-industry, cross-state FDI clustering are significant. This result is consistent with the existing literature (e.g. Devereux et al. 2007; Woodward 1992; Coughlin and Segev 2000; List 2001). One possible explanation is that foreign manufacturing firms tend to cluster in a state to capture the convenience of sharing information, labor pooling and increased bargaining power relative to domestic firms. Meanwhile, foreign firms tend to treat FDI in adjacent regions as close sources of specialized inputs and may would like to expand their business in such an environment (Head et al. 1999).

Second, the estimated coefficient on host market size is insignificant and the coefficient on adjacent market potential is significant and negative. One possible interpretation is that manufacturing FDI in the U.S. is consistent with a "vertical" model provided by Helpman and Krugman (1985). To be specific, foreign investors, especially European and Japanese investors, produce goods in U.S. states with low per-capita income to utilize low production costs, and then re-import a large portion of the products back to Europe and Japan or export them to other countries (Braconier et al. 2005).

Third, foreign manufacturing firms in the U.S. avoid operating in states with a high jobless rate. One interpretation is that high unemployment rates may indicate less competitive market conditions and lower level of life quality (Woodward 1992). The U.S. employment by foreign firms tends to be positively associated with the level of manufacturing compensation paid per employee. However, to the extent that some unobservable negative effects of compensation may be captured by the educational attainment, no strong conclusion can be drawn from estimates of these two variables.

Lastly, this study finds a significantly positive Canadian border effect. Given other conditions identical, states that are geographically adjacent to Canada have on average 0.2 percent more employment by foreign manufacturing firms. For instance, if New York was not adjacent to Canada, then it would be predicted to have 147 (73,500 * 0.2% = 147) fewer jobs supported by foreign manufacturing firms in 2008, ceteris paribus. The border effect for Mexico, however, is estimated to be very small in magnitude and statistically insignificant. This result suggests that states adjacent to Canada are more attractive to foreign manufacturing investors. Combining the results for coefficients on market potentials, one possible interpretation for this policy implication is consistent with Helpman and Krugman's (1985) "vertical" model of FDI: given that locating in states neighboring Canada could better serve the Canadian market, these states are thus more attractive to foreign investors.[67]

[67] To the extent that multiple reasons could explain why border effects exist, such as political barriers, cultural proximity, transportation access, etc (Arauzo-Carod et al. 2010), in this study I only offer one tentative possibility for the Canadian border effect because this possibility could be supported by the theory. One of many further extensions could be made by checking the shipping access effect associated with the St. Lawrence waterway. This channel connects the Great Lakes to the Atlantic Ocean and thus facilitates low transportation cost between foreign markets and the U.S.

Table 3.1: Description of Variables

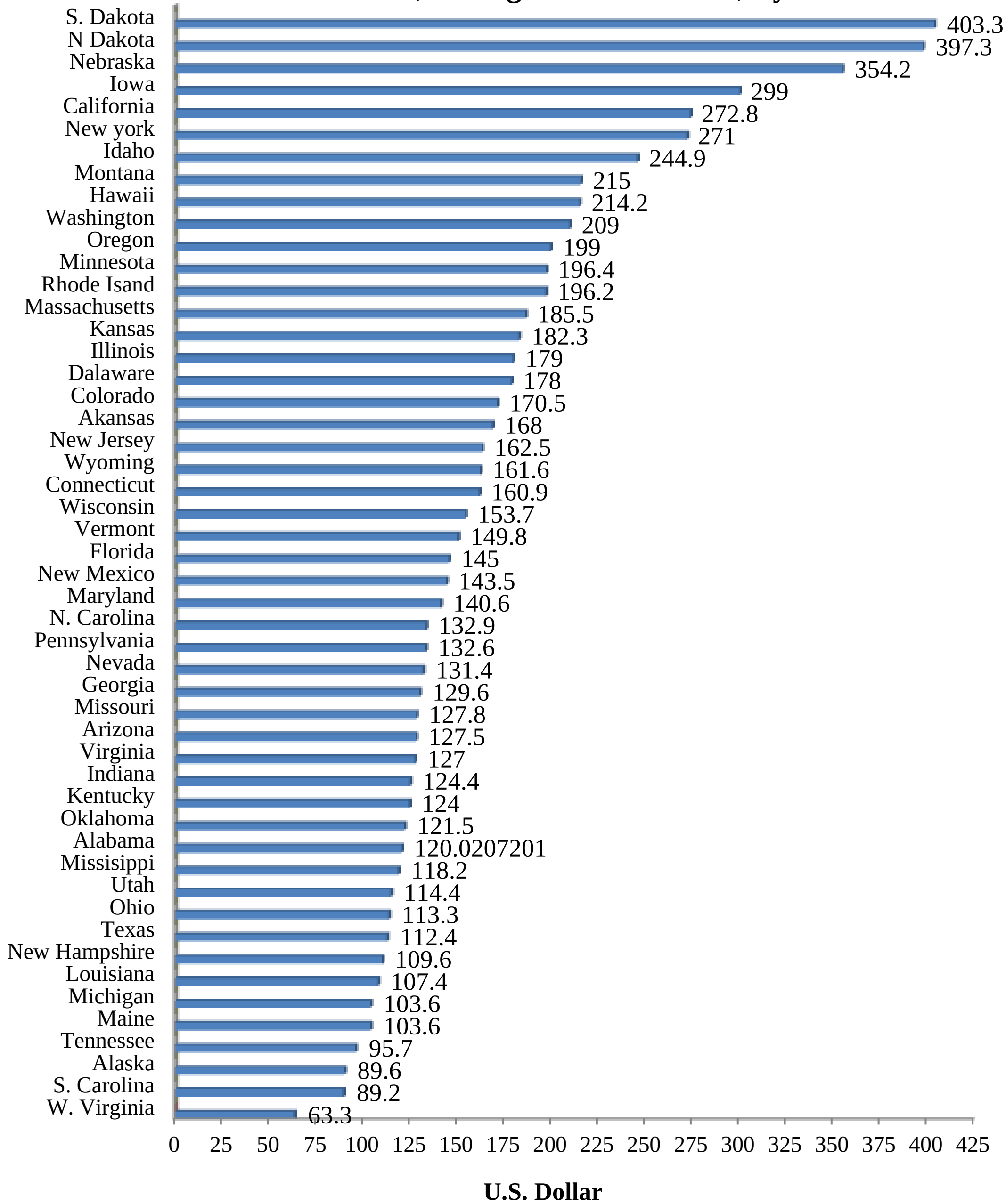
Variables	Description	Expected Sign	Data Source
Dependent: $MANUFEMP_{i,t}$	employment by U.S. affiliates of **foreign manufacturing** firms in state i and year t		*Employment and Manufacturing Employment of All Nonbank U.S. Affiliates, by State, 1999-2008*, BEA.
Independent:			
$MANUFEMP_{i,t-1}$	Intra-Industry Agglomeration, state employment by U.S. affiliates of **foreign manufacturing** firms in the previous year	+	*Ibid.*
$\sum_{j \neq i} ALLEMP_{i,j,t}$	FDI spatial interaction, employment by U.S. affiliates of **ALL foreign firms** in all neighboring states of state i in year t	?	*Ibid.*
$INCOME_{i,t}$	Local market demand and capacity, per-capita personal income in state i and year t	+	*Personal current taxes,* Regional Economic Information System, BEA.
$\sum_{j \neq i} INCOME_{i,j,t}$	Spatial effect on the demand side, sum of all adjacent states' per-capita personal income	+	*Ibid.*
$COMPENSATION_{i,t}$	Labor cost, annual manufacturing compensation divided by manufacturing employees by state	–	*Compensation of employees by NAICS industry*, Regional Economic Information System, BEA
$UNEMPLOY_{i,t}$	Labor condition, state i's unemployment rate in year t. High unemployment could reflect low labor cost due to low demand or excess supply	?	*Local Area Unemployment Statistics*, BLS
$EDU_{i,t}$	Education attainment, share of population over 25 years old with at least a high school diploma for each state	+	*Educational Attainment by State: 1990 to 2009*, FactFinder, U.S. Census Bureau. *50 State Comparison - Fiscal, Economics, and Population Table,* Postsecondary Education Commission of California.
$TAXRATE_{i,t}$	Tax policy, state top corporate income tax rate	-	*State Corporate Income Tax Rates*, various years, Tax Foundation

Table 3.1: Continued			
Variables	**Description**	**Expected Sign**	**Data Source**
$SUBSIDY_{i,t}$	Non-tax direct financial support, state total subsidy spending divided by population	+	*Gross Domestic Product by State*, Regional Economic Information System, BEA (1999-2008)
$FTZ_{i,t}$	Foreign Trade Zones, sum of counts of both "general-purpose" and subzones	+	*Annual Report of the FTZ Board to the Congress of the United States* , various years, U.S. Department of Commerce
$OFFICE_{i,t}$	State effort to attract foreign investments by opening overseas office, sum of all overseas offices	+	*Directory of Incentives for Business Investment and Development in the United States: A State-by-State Guide, 1991,* National Association of State Development Agencies (NASDA). *State Official's Guide to International Affairs,* by Chris Whatley**,** the Council of State Governments.
$HOST_{i,t}$	Host countries, a set of dummy variables and each equals one if a state has office(s) in that country (see Appendix 3.A for the country list)	+	*Ibid.*
$HIGHWAY_{i,t}$	Transports infrastructure, high way mileages per square mile in each state	+	*Highway Statistics*, various years, U.S. Federal Highway Administration. *U.S. States Area and Ranking*, EnchantedLearning.com.
$MEX_{i,t}, CAN_{i,t}$	Border effects, each dummy equals one for states that share borders with Mexico and Canada, respectively	+	*Map of Border Governments***,** U.S. - Mexico Border Field Office **of the** Pan American Health Organization**.** *The Canada-U.S. Border Map*, the Canada-United States Transportation Border Working Group.

Table 3.2: Summary Statistics (1999 - 2008, by State)

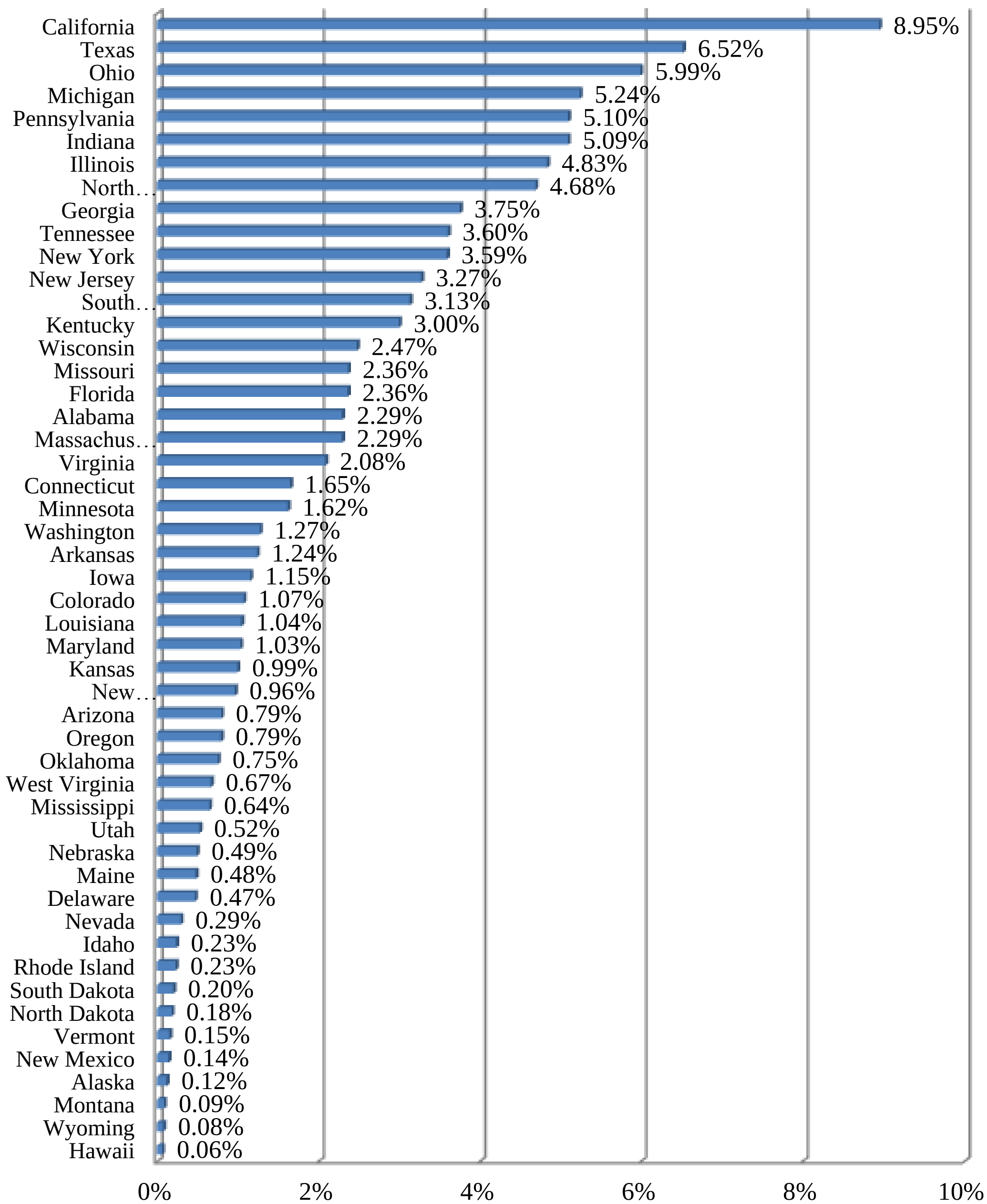
Variable	Observation	Mean (S.D.)	Min	Max
FDI Employment: Manufacturing (1000s)	450	37.84 (39.45)	0.5	208.2
FDI Employment: All Industries (1000s)	450	112.42 (129.22)	5.6	749.4
Per-capita Personal Income (Current U.S. Dollars)	500	33,009.66 (6,205.71)	20,555	56,245
Per-employee Annual Compensation: Manufacturing (Current U.S. Dollars)	499	57,022.19 (11,376.38)	33,528.03	92,279.29
Unemployment Rate (Percentage)	500	5.07 (1.65)	2.3	13.6
Population over 25 years old with at least a high school diploma (Percentage)	500	85.18 (4.07)	72.9	92.8
State Top Corporate Income Rate (Percentage)	500	6.73 (2.77)	0	12
Per-capita State Total Subsidies (Current U.S. Dollars)	500	150.15 (79.66)	22.84	624.32
Count of FTZs: General-purpose Zones and Subzones	500	14.05 (16)	1	104
Count of Overseas Offices	500	4.32 (4.21)	0	23
Host-country dummies of state overseas offices	2378 foreign offices between 43 countries	55.3 offices per Host-country	0	1
Highway Mileages (Miles): Total	500	79,590.27 (52,361.5)	4,251.08	306,404
Highway Mileages (Miles): Per Square Mile	500	1.65 (0.97)	0.02	4.50
Geographical Area (Square Miles)	500	75,736.32 (95,354)	1,545	656,425
Border Effect: Dummies for Mexico and Canada	500	4 states share borders with Mexico; 12 with Canada	0	1

Figure 3.1: Annual Per-capita State Government Expenditure on Subsidies in U.S., Average over 1999-2008, By State



Data source: *Gross Domestic Product by State*, 1999-2008, Regional Economic Information System, BEA http://www.bea.gov/regional/gsp/.

Figure 3.2: Manufacturing FDI-Related Employment Share by State, Average over 1999-2008



Data Source: *Employment and Manufacturing Employment of Nonbank U.S. Affiliates, by State*, various years, BEA.

TABLE 3.3 Empirical Results, Dependent Variable: Logarithm of State Employment by Foreign Manufacturing Firms in U.S.

Independent Variables [a]	Base Model [b]	Robustness Check										
	1	2	3	4	5	6	7	8	9	10	11	12
Investment-Promotion Policies												
$TAXRATE_{i,t}$	0.802	0.445	1.124	0.807	1.813	1.561	0.167				-0.856	-0.856
	[.455]*	[.561]	[.452]***	[.595]	[.571]***	[.661]**	[.116]				[.828]	[.774]
$logSUBSIDY_{i,t}$	0.048	0.044	0.058	0.062	0.046	0.045		-0.004			0.083	0.083
	[.054]	[.088]	[.050]	[.081]	[.050]	[.086]		[.033]			[.048]*	[.046]*
$logFTZ_{i,t}$	0.323	0.218	0.533	0.351	0.526	0.405			-0.024		0.156	0.156
	[.119]***	[.094]**	[.149]***	[.134]***	[.154]***	[.140]***			[.013]*		[.166]	[.188]
$\log(OFFICE + 1)_{i,t}$	-0.059	-0.089	-0.06	-0.109	-0.034	-0.053				-0.074	0.029	0.029
	[.048]	[.056]	[.054]	[.061]*	[.055]	[.068]				[.043]*	[.026]	[.030]
$HOST_{i,t}$												
Positive and Significant [c]	AR CN EG GN IR JP KO ML MX SG SP TK	AR CN EG GN IR JP KO ML SP	AT AR CZ DB FR GR GN IR JP KO ML MX SG TK	AT AR CZ GR GN IR JP KO ML TK	AR CA CN EG GN IN IR IT JP KO LA ML MX NL SG TK	AR CA CN EG GN IN IR JP KO LA ML MX NL				CN DB GN IR JP SD UK	CH GM IL	
Negative and Significant	BZ CH EU GM KZ RS SA SL TW VN VZ	BZ CH GM KZ RS SA SL TW VN VZ	BZ CH EU GM IL IN LA SA SL TW UR VN	BZ CH GM IN LA SA SL TW UR VN	AT BZ CH FR GM HK RS SA SL TW UK UR VN	BZ CH GM HK RS SL TW UK UR VN				CH NL QT RS SA TW VN		
Within-State Intra-Industry Aggl.												
$logMANUFEMP_{i,t-1}$	0.514	0.587	0.404	0.507	0.303	0.408	0.902	0.906	0.906	0.683	0.134	0.134
	[.122]***	[.105]***	[.134]***	[.115]***	[.145]**	[.131]***	[.025]***	[.024]***	[.024]***	[.102]***	[.099]	[.073]*
Cross-State Inter-Industry Aggl.												
$log\sum_{j\neq i} ALLEMP_{i,j,t}$	0.132	0.078	0.265	0.1620	0.256	0.187	0.014	0.024	0.031	0.108	0.009	0.009
	[.075]*	[.074]	[.103]***	[.095]*	[.086]***	[.093]**	[.019]	[.020]	[.19]	[.057]**	[.300]	[.309]
Market Size												
$logINCOME_{i,t}$	0.058	0.081	-0.174	-0.047	-0.035	0.125	0.067	0.079	0.076	-0.368	0.674	0.674
	[.600]	[.657]	[.545]	[.650]	[.605]	[.684]	[.120]	[.132]	[.117]	[.603]	[.709]	[.899]
$log\sum_{j\neq i} INCOME_{i,j,t}$	-0.182	-0.129	-0.094	-0.07	-0.295	-0.229	-0.047	-0.058	-0.068	-0.193	-1.063	-1.063
	[.095]**	[.098]	[.087]	[.089]	[.101]***	[.118]**	[.023]**	[.025]**	[.023]***	[.081]**	[.675]	[.622]*

TABLE 3.3: Continued

Independent Variables	Base Model	Robustness Check										
	1	2	3	4	5	6	7	8	9	10	11	12
Labor Conditions												
$logCOMPENSATION_{i,t}$	0.757	0.908	0.684	0.882	0.445	0.491	0.726	0.713	0.761	1.663	1.712	1.712
	[.772]	[.878]	[.709]	[.896]	[.785]	[.926]	[.197]***	[.201]***	[.197]**	[.758]**	[.482]***	[.503]***
$UNEMPLOY_{i,t}$	-3.293	-2.554	-2.978	-1.932	-4.72	-3.716	-3.414	-3.458	-3.402	-3.625	-1.934	-1.934
	[1.192]***	[1.316]**	[1.115]***	[1.321]	[1.568]***	[1.712]**	[.435]***	[.448]***	[.457]***	[1.157]***	[1.470]	[1.572]
$EDU_{i,t}$	-2.087	-2.081	-2.346	-2.499	-1.547	-1.828	-0.812	-0.761	-0.863	-2.069	0.562	0.562
	[.635]***	[.783]***	[.669]***	[.764]***	[.606]***	[.770]**	[.268]***	[.271]***	[.260]***	[.668]***	[.900]	[.856]
Transport Infrastructures												
$logHIGHWAY_{i,t}$	0.247	0.235	0.266	0.245	0.259	0.242	0.127	0.127	0.141	0.257	0.66	0.66
	[.075]***	[.075]***	[.081]***	[.078]***	[.072]***	[.093]***	[.029]***	[.029]***	[.032]***	[.076]***	[.728]	[.936]
Border Effects												
MEX_i	-0.016	-0.021	0.021	-0.004	-0.017	-0.022	-0.073	-0.065	-0.068	-0.062	-0.222	
	[.038]	[.033]	[.032]	[.029]	[.045]	[.046]	[.031]**	[.030]**	[.028]**	[.039]*	[.273]	
CAN_i	0.168	0.129	0.368	0.276	0.206	0.176	-0.012	-0.004	-0.001	0.11	-0.473	
	[.073]**	[.078]*	[.122]***	[.113]***	[.064]***	[.072]**	[.011]	[.010]	[.010]	[.058]**	[.223]**	
Instrument Set												
1st-Differenced Equation	$y_{t-2}, \Delta x_{t-2}$	$y_{t-3}, \Delta x_{t-3}$	$y_{t-2}, \Delta x_{t-2}$	$y_{t-3}, \Delta x_{t-3}$	$y_{t-2}, \Delta x_{t-2}$	$y_{t-3}, \Delta x_{t-3}$	$y_{t-2}, \Delta x_{t-2}$	$y_{t-2}, \Delta x_{t-2}$	$y_{t-2}, \Delta x_{t-2}$	$y_{t-2}, \Delta x_{t-2}$		
Level Equation	$\Delta y_{t-1}, \Delta x_{t-2}$	$\Delta y_{t-1}, \Delta x_{t-3}$	$\Delta y_{t-1}, \Delta x_{t-2}$	$\Delta y_{t-1}, \Delta x_{t-3}$	$\Delta y_{t-1}, \Delta x_{t-2}$	$\Delta y_{t-1}, \Delta x_{t-3}$	$\Delta y_{t-1}, \Delta x_{t-2}$	$\Delta y_{t-1}, \Delta x_{t-2}$	$\Delta y_{t-1}, \Delta x_{t-2}$	$\Delta y_{t-1}, \Delta x_{t-2}$		
Hansen's J Test	p=0.1395	p=0.6612	p=0.1712	p=0.5800	p=0.1468	p=0.5514	p=0.3879	p=0.3338	p=0.3168	p=0.1188		
AR(1)	p=0.0006	p=0.0012	p=0.0005	p=0.0017	p=0.0002	p=0.0008	p=0.0097	p=0.0099	p=0.0098	p=0.0015		
AR(2)	p=0.5548	p=0.5144	p=0.9063	p=0.8030	p=0.8346	p=0.6433	p=0.3928	p=0.3907	p=0.3934	p=0.4330		
AR(3)	p=0.8063	p=0.9110	p=0.7662	p=0.6139	p=0.5812	p=0.7313	p=0.9525	p=0.9579	p=0.9649	p=0.9024		
Num. of Obs.	375	375	359	359	335	335	399	399	399	375	375	375
N. of Group	47	47	45	45	42	42	50	50	50	47	47	47

[a] Robust standard errors are in parentheses. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 level, respectively.
[b] Year and state dummies are included in all specifications.
[c] Key Abbreviation: AG-Argentina; AT-Australia; AR-Austria; BZ-Brazil; CA-Canada; CH-Chile; CN-China; CZ-Czech Republic; DB-Dubai; EG-Egypt; EU-Europe Union; FR-France; GM-Germany; GN-Ghana; GR-Greece; HK-Hongkong; IL-Ireland; IN-India; IR-Israel; IT-Italy; JP-Japan; KO-Korea; KZ-Kazakhstan; LA-Latin American; ML-Malaysia; MT-Montenegro; MX-Mexico; NL-Netherlands; PL-Poland; QT-Qatar; RS-Russia; SA-South Africa; SB-Saudi Arabia; SD-Scandinavia; SG-Singapore; SL-Switzerland; SP-Spain; TK-Turkey; TW-Tai Wan; UK-United Kingdom; UR-Ukraine; VN-Vietnam; VZ-Venezuela.

Appendix 3.A: U.S. Overseas Offices by States in 1991, 2002 and 2009

State	Year	#	Host Countries																																									
			AG	AT	AR	BZ	CA	CH	CN	CZ	DB	EG	EU	FR	GM	GN	GR	HK	IL	IN	IR	IT	JP	KO	KZ	LA	ML	MT	MX	NL	PL	QT	RS	SA	SB	SD	SG	SL	SP	TK	TW	UK	UR	VN	VZ
Alabama	'91	4																x					x	x														x							
	'02	2													x								x																						
	'09	4																x					x	x														x							
Alaska	'91	0																																											
	'02	5							x														x	x									x								x				
	'09	3																					x	x																	x				
Arizona	'91	0																																											
	'02	4																					x						x												x	x			
	'09	4					x																x						xx																
Arkansas	'91	3											x										x																		x				
	'02	4											x										x				x		x																
	'09	2							x														x																						
California	'91	0																																											
	'02	12	x						x						x			x			x		x	x					x					x			x				x	x			
	'09	0																																											
Colorado	'91	0																																											
	'02	3													x								x						x																
	'09	3													x								x						x																
Connecticu	'91	2													x								x																						
	'02	7	x			x			x												x								x					x						x					
	'09	7	x			x			x												x								x					x						x					

continued

State	Year	#	AG	AT	AR	BZ	CA	CH	CN	CZ	DB	EG	EU	FR	GM	GN	GR	HK	IL	IN	IR	IT	JP	KO	KZ	LA	ML	MT	MX	NL	PL	QT	RS	SA	SB	SD	SG	SL	SP	TK	TW	UK	UR	VN	VZ
Delaware	'91	4							x												x		x																		x				
	'02	0																																											
	'09	4							x												x		x																		x				
Florida	'91	3											x													x																x			
	'02	14				x	x		x	x					x						x		x	x					x					x					x		x	x			x
	'09	13					x		xx	x				x	x						x		x						x					x					x		x	x			
Georgia	'91	4					x						x										x	x																					
	'02	9				x	x						x								x		x	x					x					x								x			
	'09	10				x	x	x	x				x								x		x	x					x													x			
Hawaii	'91	0																																											
	'02	2							x																																x				
	'09	2							x																																x				
Idaho	'91	0																																											
	'02	4							x															x					x												x				
	'09	3							x																				x												x				
Illinois	'91	7				x			x				x					x					xx										x												
	'02	8					x		x				x								x		x						x		x			x											
	'09	9				x	x		x				x					x			x		x						x		x														
Indiana	'91	5							x				x										x	x																	x				
	'02	15	x	x		x	x	x	x											x	x		x	x					x	x				x			x				x				
	'09	6		x					x				x										x																		x	x			
Iowa	'91	3													x			x					x																						
	'02	4													x			x					x						x																
	'09	4							x				x										x						x																

continu

State	Year	#	Host Countries																																										
			AG	AT	AR	BZ	CA	CH	CN	CZ	DB	EG	EU	FR	GM	GN	GR	HK	IL	IN	IR	IT	JP	KO	KZ	LA	ML	MT	MX	NL	PL	QT	RS	SA	SB	SD	SG	SL	SP	TK	TW	UK	UR	VN	VZ
Kansas	'91	0																																											
	'02	7		x		x		x					x										x	x					x																
	'09	3							x														x						x																
Kentucky	'91	0																																											
	'02	4						x					x										x						x																
	'09	3							x														x						x																
Louisiana	'91	0																																											
	'02	1																																							x				
	'09	1																											x																
Maine	'91	0																																											
	'02	1													x																														
	'09	0																																											
Maryland	'91	4											x					x					x																		x				
	'02	10				x		x	x												x		x						x	x				x			x				x				
	'09	9				x	x													x			x	x				x						x		x								x	
Massachusetts	'91	0																																											
	'02	2							x				x																																
	'09	4				x			x				x																x																
Michigan	'91	0																																											
	'02	5					x		x														x						x					x											
	'09	3					x								x								x																						
Minnesota	'91	0																																											
	'02	1													x																														
	'09	1							x																																				

continued

State	Year	#	Host Countries																																										
			AG	AT	AR	BZ	CA	CH	CN	CZ	DB	EG	EU	FR	GM	GN	GR	HK	IL	IN	IR	IT	JP	KO	KZ	LA	ML	MT	MX	NL	PL	QT	RS	SA	SB	SD	SG	SL	SP	TK	TW	UK	UR	VN	VZ
Mississippi	'91	5						xx															x														x					x			
	'02	0																																											
	'09	5						x	x				x		x								x																						
Missouri	'91	3													x								x	x																					
	'02	10				x							x		x	x					x		x	x					x					x								x			
	'09	6						x															x	x					x												x	x			
Montana	'91	2																					x																		x				
	'02	2																					x																		x				
	'09	2																					x																		x				
Nebraska	'91	0																																											
	'02	0																																											
	'09	2				x																	x																						
Nevada	'91	0																																											
	'02	0																																											
	'09	6				x			xx						x			x				x																							
New Hampshire	'91	0																																											
	'02	0																																											
	'09	1																	x																										
New Jersey	'91	0																																											
	'02	9				x			x			x					x				x		x	x					x													x			
	'09	12				x			x			x	x		x		x				x		x	x					x												x	x			
New Mexico	'91	0																																											
	'02	2																											x												x				
	'09	2																											x												x				

continued

State	Year	#	AG	AT	AR	BZ	CA	CH	CN	CZ	DB	EG	EU	FR	GM	GN	GR	HK	IL	IN	IR	IT	JP	KO	KZ	LA	ML	MT	MX	NL	PL	QT	RS	SA	SB	SD	SG	SL	SP	TK	TW	UK	UR	VN	VZ
			Host Countries																																										
New York	'91	6					xx								x			x					x																			x			
	'02	8	x			x	x	x													x		x											x								x			
	'09	14		x		x	xx	x	x					x	x					x	x								x					x						x		x			
North Carolina	'91	4													x			x					x	x																					
	'02	6					x								x			x					x	x					x																
	'09	7					x		x				x					x					x	x					x																
North Dakota	'91	1																					x																						
	'02	1																					x																						
	'09	5																x						x	x															x			x		
Ohio	'91	2											x										x																						
	'02	10	x			x	x	x	x				x								x		x						x					x											
	'09	11				x	x	x	x				x							x	x		x				x		x					x											
Oklahoma	'91	0																																											
	'02	4							x												x								x															x	
	'09	4							x												x								x															x	
Oregon	'91	0																																											
	'02	6							x														x	x					x												x	x			
	'09	4							x				x										x	x																					
Pennsylvania	'91	3											x		x								x																						
	'02	18	x	x		x	x	x	x	x			x		x					x	x		x	x					x					x			x					xx			
	'09	23		x		x	x	x	xx	x	x			x	x					x	x		x	x					x	x				x	x		x		x		x	xx		x	

continued

State	Year	#	Host Countries																																									
			AG	AT	AR	BZ	CA	CH	CN	CZ	DB	EG	EU	FR	GM	GN	GR	HK	IL	IN	IR	IT	JP	KO	KZ	LA	ML	MT	MX	NL	PL	QT	RS	SA	SB	SD	SG	SL	SP	TK	TW	UK	UR	VN	VZ
Rhode Island	'91	0																																											
	'02	0																																											
	'09	0																																											
South Carolina	'91	2													x								x																						
	'02	1													x								x																						
	'09	2							x						x																														
South Dakota	'91	0																																											
	'02	1																												x															
	'09	7							x					x	x							x	x							x												x			
Tennessee	'91	0																																											
	'02	3					x																x																			x			
	'09	4					x		x						x								x																						
Texas	'91	3																					x						x												x				
	'02	1																											x																
	'09	8	x			x	x		x		x			x															x			x													
Utah	'91	0																																											
	'02	13			x	x		x	x				x		x							x	x	x					x							x	x					x			
	'09	0																																											
Vermont	'91	0																																											
	'02	0																																											
	'09	2							x																																x				

continued

State	Year	#	AG	AT	AR	BZ	CA	CH	CN	CZ	DB	EG	EU	FR	GM	GN	GR	HK	IL	IN	IR	IT	JP	KO	KZ	LA	ML	MT	MX	NL	PL	QT	RS	SA	SB	SD	SG	SL	SP	TK	TW	UK	UR	VN	VZ
			Host Countries																																										
Virginia	'91	2											x										x																						
	'02	6				x			x						x								x	x					x																
	'09	3											x					x					x																						
Washington	'91	0																																											
	'02	5							x					x									x	x																	x				
	'09	6							x				x										x						x												x				
West Virginia	'91	0																																											
	'02	3													x								x																		x				
	'09	2													x								x																						
Wisconsin	'91	4													x			x					x	x																					
	'02	3				x	x																						x																
	'09	4				x	x		x																				x																
Wyoming	'91	0																																											
	'02	0																																											
	'09	0																																											

Data

1. "*Directory of Incentives for Business Investment and Development in the United States: A State-by-State Guide, 1991* ", by *National Association of State Developmer*

2. Appendix A (pp. 49 - pp.51) of "State *Official's Guide to International Affairs*" 2003, by Chris Whatley, the Council of State Governments.

3. Websites of economic development authorities for all states, such as the department of commerce.

Key Abbreviation:

AG-Argentina; AT-Australia; AR-Austria; BZ-Brazil; CA-Canada; CH-Chile; CN-China; CZ-Czech Republic; DB-Dubai; EG-Egypt; EU-Europe Union; FR-France; GM-Germany; GN-Ghana; GR-Greece; HK-Hongkong; IL-Ireland; IN-India; IR-Israel; IT-Italy; JP-Japan; KO-Korea; KZ-Kazakhstan; LA-Latin American; ML-Malaysia; MT-Montenegro; MX-Mexico; NL-Netherlands; PL-Poland; QT-Qatar; RS-Russia; SA-South Africa; SB-Saudi Arabia; SD-Scandinavia; SG-Singapore; SL-Switzerland; SP-Spain; TK-Turkey; TW-Tai Wan; UK-United Kingdom; UR-Ukraine; VN-Vietnam; VZ-Venezuela.

Appendix 3.B: Estimation Results of Coefficients on Host Country Dummy Variables

Host Country Dummies	Base Model	Robustness Check						
	1	2	3	4	5	6	10	11
AG	-0.009	0.011	-0.092	-0.029			0.095	0.185
	[.075]	[.088]	[.075]	[.082]			[.087]	[.339]
AT	0.053	0.037	0.144	0.101	-0.078	-0.043	0.05	-0.565
	[.044]	[.041]	[.054]***	[.053]**	[.037]**	[.033]	[.038]	[.483]
AR	0.515	0.418	0.723	0.569	0.376	0.345		
	[.175]***	[.157]***	[.218]***	[.186]***	[.123]***	[.132]***		
BZ	-0.164	-0.097	-0.281	-0.152	-0.267	-0.187	0.013	-0.548
	[.070]**	[.067]	[.084]***	[.087]*	[.091]***	[.098]**	[.027]	[.813]
CA	-0.003	0.001	-0.03	-0.017	0.155	0.119	-0.023	0.319
	[.029]	[.029]	.034]	[.034]	[.045]***	[.035]***	[.033]	[.417]
CH	-0.303	-0.217	-0.521	-0.359	-0.479	-0.383	-0.139	1.334
	[.106]***	[.091]**	[.153]***	[.136]***	[.124]***	[.121]***	[.076]*	[.727]*
CN	0.064	0.067	0.002	0.027	0.07	0.069	0.057	0.534
	[.022]***	[.021]***	[.024]	[0.028]	[.023]***	[.023]***	[.022]***	[.413]
CZ			1.451	1.163				
			[.406]***	[.406]***				
DB	0.103	0.019	0.326	0.157			0.662	
	[.107]	[.121]	[.140]**	[.147]			[.246]***	
EG	0.456	0.275			0.658	0.471	0.01	
	[.160]***	[.134]**			[.219]***	[.226]**	[.074]	
EU	-0.051	-0.026	-0.062	-0.028	0.03	0.026	0.009	-0.288
	[.030]*	[.030]	[.028]**	[.028]	[.029]	[.036]	[.017]	[.580]
FR	0.036	0.017	0.061	0.021	-0.065	-0.061	0.026	-0.233
	[.038]	[.033]	[.032]**	[.033]	[.035]*	[.046]	[.038]	[.484]
GM	-0.184	-0.108	-0.36	-0.202	-0.236	-0.156	-0.026	0.437
	[.074]***	[.062]*	[.113]***	[.106]**	[.075]***	[.084]*	[.051]	[.238]*
GN	0.809	0.587	1.212	0.817	1.252	0.962	0.318	
	[.246]***	[.199]***	[.327]***	[.282]***	[.299]***	[.280]***	[.138]**	
GR			0.759	0.444				
			[.206]***	[.197]**				
HK	-0.065	-0.042	-0.065	-0.048	-0.377	-0.301	0.005	0.198
	[.049]	[.051]	[.042]	[.054]	[.099]***	[.092]***	[.047]	[.520]
IL	-0.009	0.039	-0.218	-0.076	-0.015	0.041	0.065	1.909
	[.050]	[.053]	[.090]**	[.094]	[.050]	[.063]	[.051]	[.965]**
IN	-0.122	-0.097	-0.31	-0.233	0.595	0.444	-0.138	
	[.125]	[.136]	[.131]**	[.137]***	[.175]***	[.200]**	[.119]	
IR	0.239	0.206	0.403	0.322	0.248	0.215	0.154	0.066
	[.086]***	[.082]***	[.119]***	[.106]***	[.078]***	[.100]**	[.072]**	[.441]
IT	-0.055	-0.051	-0.037	-0.041	0.149	0.113	-0.05	0.355
	[.057]	[.065]	[.046]	[.064]	[.075]**	[.096]	[.071]	[1.359]
JP	0.154	0.124	0.216	0.176	0.242	0.208	0.101	0.135
	[.035]***	[.028]***	[.052]***	[.042]***	[.046]***	[.043]***	[.025]***	[.357]
KO	0.218	0.151	0.364	0.241	0.364	0.277	0.027	0.097
	[.070]***	[.054]***	[.098]***	[.085]***	[.091]***	[.078]***	[.023]	[.212]
KZ	-1.177	-0.772						
	[.417]***	[.314]**						

Continued

Appendix 3.B: Continued

Host Country Dummies	Base Model		Robustness Check					
	1	2	3	4	5	6	10	11
LA			-1.021	-0.892	0.259	0.175		
			[.295]***	[.342]***	[.071]***	[.069]***		
ML	0.239	0.2	0.359	0.269	0.253	0.195	0.152	0.276
	[.092]***	[.085]**	[.113]***	[.098]***	[.089]***	[.085]**	[.095]	[.643]
MT								
MX	0.057	0.041	0.063	0.051	0.109	0.084	0.005	0.306
	[.035]*	[.033]	[.028]**	[.034]	[.042]***	[.045]**	[.032]	[.395]
NL	0.067	-0.001	0.259	0.149	0.187	0.119	-0.101	0.127
	[.086]	[.061]	[.131]**	[.107]	[.086]**	[.073]*	[.062]*	[.426]
PL								
QT							-0.716	
							[.250]***	
RS	-0.377	-0.275			-0.569	-0.474	-0.146	-5.305
	[.132]***	[.104]***			[.130]***	[.128]***	[.074]**	[3.425]
SA	-0.209	-0.183	-0.318	-0.261	-0.26	-0.218	-0.127	-0.226
	[.081]***	[.084]**	[.098]***	[.094]***	[.128]**	[.159]	[.057]**	[.162]
SB								
SD							0.212	
							[.118]*	
SG	0.137	0.051	0.361	0.171	0.328	0.217	-0.035	-0.509
	[.078]*	[.087]	[.116]***	[.135]	[.135]**	[.154]	[.058]	[.501]
SL	-0.309	-0.206	-0.591	-0.375	-0.239	-0.167	-0.081	0.609
	[.121]***	[.096]**	[.189]***	[.160]**	[.078]***	[.074]**	[.078]	[.845]
SP	1.095	0.968					0.025	
	[.363]***	[.377]***					[.089]	
TK	0.191	0.092	0.446	0.225	0.252	0.151	-0.121	0.431
	[.101]**	[.085]	[.155]***	[.137]*	[.093]***	[.096]	[.108]	[1.075]
TW	-0.498	-0.363	-0.805	-0.551	-0.728	-0.56	-0.216	0.669
	[.156]***	[.127]***	[.222]***	[.190]***	[.179]***	[.163]***	[.108]**	[.623]
UK	-0.015	0.008	-0.071	-0.019	-0.23	-0.162	0.073	-0.375
	[.048]	[.053]	[.049]	[.060]	[.086]***	[.091]*	[.045]*	[.480]
UR			-2.108	-1.307	-1.532	-1.123	-0.103	
			[.619]***	[.532]**	[.418]***	[.379]***	[.205]	
VN	-0.552	-0.394	-0.909	-0.599	-0.729	-0.553	-0.202	0.311
	[.189]***	[.154]***	[.261]***	[.230]***	[.195]***	[.191]***	[.108]*	[.411]
VZ	-0.928	-0.858						
	[.320]***	[.359]**						
Suggested Combination	AR CN EG GN IR JP KO ML MX SG SP TK	AR CN EG GN IR JP KO ML SP	AT AR CZ DB FR GR GN IR JP KO ML MX SG TK	AT AR CZ GR GN IR JP KO ML TK	AR CA CN EG GN IN IR IT JP KO LA ML MX NL SG TK	AR CA CN EG GN IN IR JP KO LA ML MX NL	CN DB GN IR JP SD UK	CH GM IL
∑coefficients	4.174	2.996	7.147	4.058	5.497	3.683	1.577	3.68
Average	0.347	0.332	0.476	0.451	0.343	0.283	0.225	1.226
Range	[0.057,1.095]	[0.067, 0.968	[0.061, 1.451	[0.101, 1.163	[0.07, 1.252]	[0.069, 0.962	[0.057, 0.662]	[0.437,1.909]

Robust standard errors are in parentheses. ***, **, * indicate significances at 1%, 5% and 10% levels, respectively.
The empty entries indicate no estimated coefficients for variables that are dropped because of collinearity .

Chapter 4:

Employment by Foreign Firms: Heterogeneous Response to Investment-Promotion Policies across US States

4.1. Introduction

State and local governments are increasingly engaged in providing Multinational Enterprises (MNEs) with substantial tax, fiscal, administrative and financial incentives aimed at attracting foreign investment (Head 1998; Girma et al. 2001; Girma and Görg 2005; Rogers and Wu 2012). Meanwhile, employment by foreign-owned plants operating in the US is an increasingly important aspect of Foreign Direct Investment (FDI) activities. In 2009, about 5.97 million US workers were employed by foreign-owned plants in the US (BEA 2010). Between 2003 and 2009, foreign owned companies created about 632,500 new jobs in over 4,500 new projects (ITA 2010). However, the role of investment-promotion policies in this employment growth and other local outcomes associated with the US inward FDI has been elusive. Rogers and Wu (2012) address this gap by utilizing a two-way fixed effects Dynamic System Generalized Method of Moments (DSGMM) approach to investigate how state business incentives affect employment in the US by foreign-owned firms (FDI-related employment, hereafter). In the present paper, particular attention is given to exploring the potential heterogeneous response to business incentives based on different state-level employment characteristics of foreign firms.

My contribution to the literature is twofold. First, although the firm-level research examining the heterogeneous response across the distribution of employment outcomes is extensive (Görg et al. 2000; Görg and Strobl 2002; Falzoni and Grasseni 2005; Nataraj 2008; Girma and Gong 2008; Görg et al. 2000; Mata and Machado 1996; Coad and Rao 2007), few studies examine the uneven response of employment by foreign firms alone (Bellak and Pfaffermayr 2002; Bellak 2004). Significant variations in responses across the distribution are also reported for many aggregate-level outcomes (Dufrenot et al. 2010; Fayissa and Nsiah 2010; Gomanee et al. 2005; Sula 2008; Okada and Samreth 2011; Goel and Ram 2004). Such unequal effects on the aggregate-level employment, however, are not well established. Therefore I extend the literature by investigating the potential heterogeneous effects of business incentives on the FDI-related employment aggregated to the state level.

Second, my empirical approach extends Rogers and Wu (2012), and addresses the potential bias associated with the violation of a normal distribution assumption. I employ panel data on manufacturing FDI-related employment for the 50 US states between 1997 and 2008. Notably, FDI-related employment does not follow a normal distribution when aggregated to the state level. This may render the conditional mean effects generated by standard least squares estimates unreliable. Accordingly, I estimate a log-linear panel data model (Gross and Ryan 2008) using a Simultaneous Quantile Regression (SQR) approach to reveal the relative importance of each policy at various locations of the employment distribution.

My results refine the findings of Rogers and Wu (2012) that state investment-promotion policies such as providing more foreign-trade zones (FTZs), the provision of better public services even with higher corporate income tax (CIT) rates, and holding overseas offices in particular countries, have statistically significant effects on FDI-related employment in the US. Furthermore, the SQR estimation adds to the previous research by revealing that the estimated effects of a better transport infrastructure and FTZs vary significantly across the FDI-related employment distribution. Therefore, unequal employment benefits of attracting FDI could be expected between states, as well as more interest for FDI for some but not all states. The implications are of interest to researchers and policy makers regarding the strategic use of business incentives to attract inbound foreign investment and to promote US employment.

4.2. Variable Selection

My empirical specification developed in the next section employs six categories of state attributes. These are selected based on previous research. For a detailed discussion of how these selected variables fit into the literature and how they outperform their alternatives, please refer to Rogers and Wu (2012).

My dependent variable ($MFGEMP_{i,t}$) is the total employment by foreign-owned manufacturing firms in each US state. In so doing, people's attention is brought into the employment outcomes of inbound FDI activities, and assessment could be made on state FDI-attracting policies with an eye toward expanding and retaining local employment.

I analyze four major investment-promotion policies. First, tax policy is captured by the top CIT rate for each US state ($TAXRATE_{i,t}$). The use of statutory top tax rates is following the suggestion by Reed and Rogers (2006) and others to avoid the measurement error due to changes driven by non-tax factors, such as income, gross product and population. Competitive and low CIT rates are a tool to encourage investments. Second, per-capita total expenditure on subsidies by a state government ($SUBSIDY_{i,t}$) is used to instrument for jobs (capital) subsidy because the latter may be endogenous. As shown by Figure 4.1, per-capita total subsidy spending varied across US states during the sample period. The top 5 states (Rhode Island, California, Arizona, Oregon and Connecticut) on average spent \$183.3 per-capita and the average for the bottom 5 (Idaho, Oklahoma, Utah, North Dakota and West Virginia) was \$108.9. Third, I build off Head et al. (1999) by employing the sum of number of both general-purpose zones and subzones ($FTZ_{i,t}$) to capture state effort at providing FTZs. Fourth, I build on Coughlin and Segev (2000) in utilizing the counts of all overseas offices for each state ($OFFICE_{i,t}$) to measure state effort at opening offices abroad. I further extend their work by creating separate dummy variables ($HOST_{i,t}$) for all office-host countries to explore their differential impacts on US FDI-related employment (refer to Table 4.4 for the list of country and related abbreviations).

Figure 4.2 demonstrates the considerable dynamics of US foreign offices from both the spatial and the time perspectives by displaying the distribution of overseas offices across states for three years of the data. In 1991, only 76 foreign offices were held by 22 states, among which 46 were held by 13 eastern and southern coastal states and none was in the west. In 2002, the total count of foreign offices increased sharply to 236 in 42 states. Although most offices were established by states in the Atlantic coast and Great Lakes area, 23 were held by 3 Pacific coast states. In 2009, 3 states (California, Maine and Utah) closed their foreign offices and 6 (Delaware, Mississippi, Nebraska, Nevada, New Hampshire and Vermont) opened foreign offices. As a consequence, there were a total of 240 offices belonging to all but 5 states (Maine, Rhode Island, Utah, Wyoming and California). Figure 3 illustrates the top 10 office-host countries that are the most popular among US states. Between 1991 and 2009, the Far East (Japan, China, Korea and Taiwan) has been the most attractive region for US overseas offices. Europe was the second most popular region in 1991, but it was overtaken by North America after 2002. This is primarily due to the rising popularity of Mexico which attracted 27 and 25 state offices in 2002 and 2009, respectively. Other developing countries such as Brazil also became increasingly popular, and China even outperformed Japan and became the most office-attractive country by 2009.

Foreign firms cluster within a region to take advantage of information sharing and labor pooling and to strengthen their bargaining power (Du et al. 2008; Blonigen et al. 2005; Head et al. 1999; List, 2001; etc). I follow Blonigen et al. (2005) and use the one-year lagged employment by US manufacturing affiliates in a state ($MFGEMP_{i,t-1}$) to capture the intra-industry-within-state dimension of agglomeration. On the other hand, FDI location decisions across multiple regions are not independent (Head et al. 1995; Blonigen et al. 2007; Arauzo-Carod 2012). To account for the spatial interaction of FDI between proximate locales, the sum of employment by foreign-owned plants in all industries in all adjacent states ($\sum_{j \neq i} ALLEMP_{i,j,t}$) is used as the measure of all-industry-cross-state dimension of FDI agglomeration. The estimated coefficient on this variable would indicate whether the crowd-out effect (consistent with a negative correlation) dominates the agglomeration effect (indicated by a positive coefficient) in terms of the FDI-related employment outcomes across contiguous states.

In a similar manner two dimensions of market size are considered. First, I use state per-capita personal income ($INCOME_{i,t}$) to measure the host market demand and capacity (List et al. 2004; Head et al. 1999; Woodward 1992; Coughlin and Segev 2000). For one thing, a domestic market with a large buying power tends to attract more FDI inflows with a "market-seeking" purpose. For another, if transportation costs are not important, then foreign investment seeking low production costs may locate in a state with low income. Second, I employ the sum of per-capita personal income in all adjacent states ($\sum_{j \neq i} INCOME_{i,j,t}$) to capture the model of horizontal FDI that multinationals to whom transportation costs are important would invest and produce in one region and then sell products to regions surrounding the host market (Head et al. 1999).

Labor conditions for each US state are characterized by three variables. First, the annual compensation paid to per manufacturing worker ($COMPENSATION_{i,t}$) is used to measure the actual total costs for hiring an employee (Broaconier et al. 2005; McConnell and Schwab 1990; List et al. 2004 and List 2001). Second, labor market conditions are captured by state unemployment rates (UNEMPi,t). A high unemployment rate may indicate labor surplus and low wages which would encourage foreign investment (Head et al. 1999). High jobless rates may alternatively indicate an inactive business environment and deter investments (Woodward 1992). Finally, the share of a state's working-age population with at least a high school diploma ($HSEDU_{i,t}$) is employed to represent the state labor quality (Coughlin and Segev 2000).

State per square mile highway mileages ($HIGHWAY_{i,t}$) is employed to measure accessibility to transport infrastructure which would reduce the transportation costs of inputs and outputs and would lower employees' commuting costs (Fredriksson et al. 2003). Borders may be important for FDI location decisions due to the convenience of serving both the host market and a third-country sharing borders (Arauzo-Carod et al. 2010). The border effects on US inward foreign investment, however, has been largely ignored (Rogers and Wu 2012). To explore whether the borders are more attractive to foreign investors in terms of their business operations and employment outcomes, I construct two dummy variables for the two neighbors of the US and states are assigned a value of one if border Mexico and Canada (MEX_i and CAN_i), respectively.

4.3. Empirical Specification

My basic empirical specification builds off Rogers and Wu (2012). It is a log-linear panel data model for the 50 US states between 1997 and 2008. Specifically,

$$logMFGEMP_{i,t} = \beta_0 PROMOT_{i,t} + \beta_1 AGGLOM_{i,t} + \beta_2 MARKET_{i,t} + \beta_3 LABOR_{i,t} + \beta_4 TRANSP_{i,t} + \beta_5 BORDER_{i,t} + \xi_{i,t}, \quad (1)$$

All variables are described in Table 4.1 and their summary statistics are summarized in Table 4.2.

In a panel data estimation procedure, excluding state-specific unobservable factors and time-specific macroeconomic shocks from the specification is debatable in the sense that the estimated coefficients may be biased due to omitted variables (Co 2001; Fredriksson et al. 2003). Ideally, I would like to include the state dummy variables in Equation (1). However, both the implementation and the interpretation of quantile regression (QR) estimator for a panel structure have not been well established (Sula 2008; Gomanee et al. 2005).[68] Meanwhile, concern about the potential bias given by the exclusion of time-specific factors could be mitigated to

[68] Although advances are being made on this topic very recently, the implication of quantile regression for a panel structure is still not straightforward. For references of several recently-developed approaches on this issue, see Koenker (2004), Lamarche (2010) and Galvao (2009).

some degree by utilizing the QR approach (Dufrenot et al. 2010). This approach accounts for unobserved heterogeneity and heterogeneous effects, and accordingly, the unobserved macroeconomic shocks could be captured by the individual specific errors (Sula 2008; Goel and Ram 2004; Fayissa and Nsiah 2010).

Within a cross-sectional framework, the interpretation of time effects indicated in Equation (1) is particularly worth noting. First, the estimation of Equation (1) could reasonably yield long-run parameters by utilizing state-level cross-sectional data (Goel and Ram 2004). Accordingly, the estimation results here also refer to the long-run effects on state-level FDI-related employment. Second, the inclusion of lagged FDI-related employment as an explanatory variable in a cross-sectional analysis is no longer an indirect procedure for obtaining the long-run effects. Instead, the lagged employment variable is just a measure of intra-industry-within-state FDI agglomeration effect (Blonigen et al. 2005; Barrios et al. 2006). More importantly, a QR with bootstrapped standard errors would treat Equation (1) as an error-correction model (Rogers 1992). Therefore, even without the inclusion of time dummies, the cyclical shock could be captured by the short-run dynamic components, i.e. the lagged FDI-related employment variable (Dufrenot et al. 2010).

4.3.1. Econometric Issues

A further investigation of my dataset reveals that state-level manufacturing FDI-related employment in the US does not have a normal distribution, even though the performance variable is measured in logarithm ($\log MFGEMP$). The upper panel of Figure 4.4 shows that both the real density and the Kernel density estimates of $MFGEMP$ depart from the corresponding density if the data were normally distributed. This is also confirmed by the 1st column of Table 4.3, which describes the summary statistics for the dependent variable: the reported P-values from both Shapiro and Francia (1972) test for normality and D' Agostino et al. (1990) skewness and kurtosis test for normality are statistically significant at 1 percent level, rejecting the null hypothesis that $MANUFEMP$ is normally distributed.

The lower panel of Figure 4.4 compares the real density and the Kernel density estimates of $\log MFGEMP$ with its normality appearance. Although the departure from normality is not very clearly observed from the figure, the results from two normality tests strongly reject the null hypothesis of a normal distribution (Column 2 of Table 4.3).

Standard least squares estimation techniques focus on the conditional mean function of the dependent variable. However, if the distribution of the dependent variable is skewed and violates the assumption of a normal distribution, or there are significant outliers, then the estimated "average" effect becomes less informative. As a result, least squares regression techniques end up being inadequate (Girma and Görg 2005; Gomanee et al. 2005; Okada and Samreth 2011).

The QR estimate proposed by Koenker and Bassett (1978), however, turns out to be an appropriate solution. By centering regressors around different quantiles, this technique estimates the effect of independent variables on the outcome not only in the center but also in the lower and upper tails of the conditional distribution of the response variable. Moreover, its optimization scheme is to minimize an objective function which equals a weighted sum of absolute deviations (Gomanee et al. 2005). Accordingly, the QR approach is "more robust to outliers than least-squares regression … [and] can be consistent under weaker stochastic assumptions than possible with least-squares estimation" (Cameron and Trivedi 2005, pp. 85; Okada and Samreth 2011).

In addition, in the presence of persistent heterogeneity in terms of employment outcomes across firms (see for reference, Görg et al. 2000; Mata and Machado 1996; Görg and Strobl 2002; Falzoni and Grasseni 2005), researchers are specifically interested in investigating if FDI-related employment outcomes respond heterogeneously to state attributes. To this empirical end, neither conventional OLS nor MLE approach is adequate. The QR approach, however, generates estimates of various slope coefficients at multiple quantiles of the conditional distribution of FDI-related employment outcome. As a consequence, a more precise picture showing the dynamics of the response across the entire distribution are obtained which enables investigation of impacts at specific parts of the FDI-related employment distribution (Koenker 2005; Okada and Samreth 2011).

4.3.2. Quantile Regression: Koenker and Bassett (1978)

For the sake of analytic convenience, Equation (1) can be re-written in a more general form:

$$y_i = \beta' x_i + \mu_i\ , \qquad i = 1,2, \dots N, \quad and\ \mu_i\ is\ i.i.d \sim \text{F} \tag{2}$$

where $y_i\{i = 1,2, \dots N\}$ is a random sample of a random variable Y with a distribution function F. Let $Q_Y(\tau \mid X)$ for $\tau \in (0,1)$ denote the τth quantile of the distribution of Y, given a vector X of independent variables. Considering the conditional distribution function,$\text{F}_{Y|X}(\tau)$, we can model the conditional quantile by:

$$Q_Y(\tau \mid X) \equiv inf\{y\colon \text{F}_{Y|X}(y) \geq \tau\} = x'\beta_{(\tau)}\ , \tag{3}$$

where $\beta_{(\tau)}$ is a vector of QR coefficients.

Koenker and Bassett (1978) proposed to estimate coefficients $\beta_{(\tau)}$ by solving a simple optimization problem:

$$\min_{\beta_{(\tau)}} \left\{ \sum_{i:y_i \geq x_i'(\tau)} \tau \mid y_i - x_i'(\tau) \mid + \sum_{i:y_i \leq x_i'(\tau)} (1-\tau) \mid y_i - x_i'(\tau) \mid \right\} \tag{4}$$

This method estimates quantiles by assigning asymmetric weights to positive and negative residuals. When $\tau = 0.5$ (the median), the procedure described above minimizes the sum of absolute value of residuals,[69] also known as the median regression or the least absolute deviations estimator (Cameron and Trivedi 2005, pp.87). The same procedure could be applied to other quantiles by changing τ. To illustrate, in order to obtain the 30th quantile estimator, set $\tau = 0.3$. According to the optimizing scheme in Equation (4), the negative residuals given by y_i that lies on the

[69] This is analogous to the standard least square estimator:$\hat{\beta} = \arg\ min \sum_{i=1}^{N} (y_i - x_i'\beta)^2$, which estimates the linear conditional mean function $E(y \mid x) = x'\beta$.

lower percentile of the distribution are given a larger weight than the positive ones. The minimum of the procedure (4) is achieved until 70 percent of the residuals are negative. Therefore, as one increases τ continuously from 0 to 1, one can trace the entire distribution of the dependent variable Y, conditional on explanatory variables X (Fayissa and Nsiah 2010; Gomanee et al. 2005).

Several points are worth noting when applying a QR approach. First, the QR method allows the response coefficients to vary by quantiles of the dependent variable conditional on both observed covariates and unobservable factors. The procedure is analogous to segmenting the entire distribution of the outcome variable into some subsets conditional on covariates. Therefore, it is not comparable to the procedure which segments the unconditional distribution of the dependent variable and then runs a least-square estimation. The latter, according to Koenker and Hallock (2001), involves errors from sample selection problems.

Second, the QR approach applied in this paper estimates a random effects model with a cross-sectional dataset. As mentioned above, in spite of the very recent advances of applying a quantile regression for panel data (for reference, see Koenker 2004, Lamarche 2010 and Galvao 2009, etc.), the application of this approach in estimating a fixed effects model is not straightforward. Differencing (or time-demeaning) the data, which is a typical way to estimate a fixed-effect model, becomes inappropriate for QR: the sum of quantiles conditional on X is not equal to the quantiles of the sum of Y (Arias et al. 2001).[70] In addition, an alternative method that includes a set of individual state- and/or time-specific dummy variables is also inappropriate. The inclusion of too many individual fixed effects may inflate the variation of estimating other explanatory variables and as a result, even "to estimate an individual specific location-shift effect … may strain credulity" (Koenker 2004).

Lastly, the concern of potential bias due to unobserved state- and/or time-specific effects could be mitigated somewhat by applying QR. This econometric approach controls for unobserved heterogeneous effects by allowing the τth quantile of state FDI-related employment to be conditional on (1) the explanatory variables X, and (2) the quantile of the state conditional on X. Accordingly, the response coefficients could be obtained at multiple quantiles of both observed and unobserved factors (Sula 2008). This advantage of QR makes the inclusion of individual fixed effects less beneficial. Moreover, an examination of my dataset reveals that the FDI-related employment in a certain state falls within a certain range of quantiles. If different intercept terms were assigned to different states, then I may end up with failing to capture the heterogeneous sizes of FDI-related employment among states.

4.4. Results

Table 4.4.a presents the results from a SQR estimate where the basic model is estimated as simultaneous equations across quantiles of state manufacturing FDI-related employment. To allow for the presence of heteroschedasticity, standard errors

---

[70] $\sum_{i=1,2,,\dots N} Q_{Y_i}(\tau \mid X) \neq Q_{\sum_{i=1,2,\dots N} Y_i}(\tau \mid X)$.

are bootstrapped following the procedure introduced by Gould (1997). I report estimated coefficients for 10 percentiles of state employment by foreign manufacturing firms. To compare effects at various quantiles with the conditional mean effect, Table 4.4.a also presents results from the OLS regression estimate with random effects and results from the DSGMM estimator. To illustrate how heterogeneously the FDI-related employment responds to each independent variable across its distribution, the estimated coefficients are plotted for quantiles in Figures 4.5.a – 4.5.n. I further test whether these coefficients are statistically different across quantiles using the F-tests of equality (Dufrenot et al. 2010; Goel and Ram 2004; Falzoni and Grasseni 2005; Gomanee et al. 2005). The corresponding results are reported in Table 4.4.b. The discussion focuses primarily on coefficients on investment-promotion policy variables. Among the non-policy variables, only those whose estimated coefficients are statistically significant and/or statistically different across the distribution will be discussed. By comparing the SQR estimate results with that of OLS and DSGMM approach, cautions are drawn on the scenarios in which conditional mean effects may not be reliable.

4.4.1 State Business Incentives

The estimated coefficient of state top CIT rates ($TAXRATE_{i,t}$) is found to be positive but statistically insignificant for percentiles from the 20th up to the 80th and to follow an inverted U-shape pattern (Figure 4.5.a). The reported F-tests of equality in Table 4.5, however, indicate a failure to reject the null hypothesis of equality for $TAXRATE_{i,t}$ across quantiles. Therefore, the magnitude of the positive coefficients on $TAXRATE_{i,t}$ is about the same between quantiles. This result suggests an absence of a significant negative CIT effect and thus confirms in part that of Rogers and Wu (2012). Compared with the SQR estimate results, the conditional mean effects fail to reveal the negative CIT effect at the two tails of the FDI-related employment distribution (Figure 4.5.a).

The coefficient on government total subsidies/grants ($SUBSIDY_{i,t}$) is estimated to be negative and statistically significant for most quantiles. The reported P-values of the F-tests suggest a failure to reject the null hypothesis of equality for coefficients on $SUBSIDY_{i,t}$ between quantiles. Accordingly, the average of coefficients at all quantiles seems to be consistent with the mean effect generated by the OLS estimate (Figure 4.5.b). The reported negative relationship diverges from Head et al. (1999). Head et al. utilize directly the subsidies on jobs creation and capital usage which may be endogeneous. I employ the government total spending on subsidies to address the potential policy endogeneity. The latter, however, may be a weak instrument for the former because the government subsidy/grant on factor usage may be a quite small portion of the total governmental subsidies/grants. Take California as an example. In 2008, per-capita governmental subsidies/grants in California was $216.19; per-capita government spending on job training (labor) and on housing and urban development (capital) subsidies was $15.28 and $29.76, respectively. So, per-capita labor and capital subsidy spending accounted for merely 20.83% of total subsidies per-capita.[71]

The provision of both general-purpose zones and subzones is estimated to have positive and statistically significant effects throughout the distribution of state manufacturing FDI-related employment. The magnitudes of these positive coefficients, however, vary significantly between quantiles: a 10 percent increase in the count of FTZs is predicted to correlate with various rates of employment growth ranging from 1.08 percent at the 50th up to 3.31 percent at the 90th. The reported F-tests of equality indicate rejecting the null hypothesis of equality for coefficients between the lower and the median, and between the median and the higher quantiles. Plotting the estimated coefficients on $FTZ_{i,t}$ for different quantiles, Figure 4.5.c reveals a U-shape pattern: the positive impact of FTZs on state FDI-related jobs first decreases with quantiles and then increases after reaching the minimum at the median. Therefore, it would be inappropriate to rely on the conditional mean effect of FTZs in interpreting its policy implication.

The SQR estimated coefficients on $OFFICE_{i,t}$ suggest that the *total* count of state trade offices abroad has a predicted small and negative effect on the FDI-related employment for all quantiles but the 80th, and that the negative relationship is statistically significant at the lower and median quantiles. Furthermore, the reported F-tests of equality suggest that the null hypothesis of equal coefficients could be

[71] The data for these calculations are from *Stimulus Spending by State*, the Wall Street Journal, August 6, 2009.

rejected only between the 80th and other quantiles. This result adds to the DSGMM estimate by Rogers and Wu (2012) which predicts a negative and statistically insignificant effect of having more overseas offices. My general finding also adds to Head et al. (1999), Woodward (1992) and Coughlin and Segev (2000), which report that holding investment-promotion offices in *Japan* is predicted to attract more Japanese firms.

The SQR estimate results reinforce the finding of Rogers and Wu (2012) that the role of the selection of office-host countries is notable in affecting the US FDI-related employment. To be specific, holding foreign offices in East Asia (e.g. Korea, Japan, China, Malaysia, India) is predicted to have a significant and positive effect throughout the employment distribution; while, having overseas offices in South America (e.g. Brazil, Argentina) and the Europe Union is estimated to have a negative effect. In addition, the SQR estimate adds to the conditional mean effects by revealing the heterogeneous effects of office-host countries across the employment distribution. For example, state overseas offices in China, Korea, Japan and Mexico all have estimated positive and significant effects according to the OLS and GMM estimates. However, offices in China are not predicted to promote the US FDI-related employment at its lower tail; offices in Korea and Japan are predicted to fail at the upper tail and offices in Mexico may fail at quantiles around the median. The reported F-tests of equality further confirm that office-host countries rarely have constant effects between different quantiles. Notably, the conditional mean effects would miss some office-host countries, such as Dubai (positive) and Argentina (negative), which may have a significant relationship with the employment by US affiliates at some but not other quantiles.

4.4.2. Other Explanatory Variables

Some non-policy variables have estimated coefficients that follow an inverted U-shape pattern when plotted for quantiles. First, the estimated coefficients on the intra-industry-within-state dimension of agglomeration ($MFGEMP_{i,t-1}$) are positive and significant at 1% level throughout the employment distribution (Devereux et al. 2007; Woodward 1992; Coughlin and Segev 2000; List 2001; Head et al. 1999; Rogers and Wu 2012).[72] This result suggests that US affiliates of foreign manufacturing firms tend to cluster within one state. Furthermore, plotting these coefficients for quantiles, Figure 4.5.e reveals an inverted U-shape pattern: the positive intra-industry-within-state agglomeration effect first increases and peaks at the median (0.889). After that, its magnitude decreases with quantiles and drops by half at the 90^{th} quantile. The reported F-tests of equality further confirm this pattern and suggest the null hypothesis of equal coefficients is rejected between the lower and the higher, as well as between the median and the higher quantiles.

The estimated all-industry-cross-state FDI agglomeration effect ($\sum_{j\neq i} ALLEMP_{i,j,t}$) also has an inverted U-shape pattern. It is negative throughout the employment distribution but statistically significant only at the upper tail (-0.258). The null hypothesis of equal coefficients could be rejected between the 90^{th}

[72] A few studies report that the agglomeration has negative effect on FDI location decisions, for reference, see List et al. (2004) and Sun et al. (2002).

and all other quantiles. A similar "crowding out" effect has been reported by List et al. (2004) and Sun et al. (2002). Nevertheless, the SQR estimate adds to this literature by revealing that the "crowding out" effect associated with the competition of FDI in neighboring states is not equal across the employment distribution and it is the top percentiles that suffer significantly the most (Figure 4.5.f).

Some variables have estimated coefficients that follow a U-shape pattern when plotted for quantiles. The market demand in adjacent states is estimated to have a positive and statistically significant effect (0.317) only at the top percentiles (Figure 4.5.h). The reported F-test of equality confirms that the FDI-related employment at the top quantiles does respond to $\sum_{j \neq i} INCOME_{i,j,t}$ in a significantly different way than at other quantiles. Meanwhile, the SQR estimate reports a positive but insignificant coefficient throughout the distribution for the host market size variable $INCOME_{i,t}$. My finding of the insignificant market potential effect at all quantiles except the upper tail of the distribution contributes to the literature by revealing a transition from the models of "vertical" FDI to that of "horizontal" FDI as the size of FDI activities expands.[73]

The estimated positive coefficients on state transportation system variable ($HIGHWAY_{i,t}$) also follow a U-shape pattern and the two tails of the FDI-related

[73] The "vertical" models predict that US affiliates of foreign firms produce in the US and then re-import the products back to the home country or export them to other countries (Helpman and Krugman 1985). The "horizontal" models conclude that foreign investment would locate in economies with great market potential with a market-seeking purpose (Markusen 1984).

employment distribution are impacted more than the median area (Figure 4.5.l). At the median, a 10 percent increase in $HIGHWAY_{i,t}$ is expected to result in a 0.6 percent increase in the FDI-related manufacturing jobs; this effect is doubled at the 30th quantile and quadrupled at the 90th. The reported F-tests of equality indicate the null hypothesis is rejected between the median and the higher quantiles. This result, combined with the estimated positive tax effect, adds to Rogers and Wu (2012) in suggesting that different packages of public service and corporate income tax should be considered by states according to their locations of the employment distribution.

The estimated coefficients on state educational attainment variable ($HSEDU_{i,t}$) follow a down-ward sloping curve pattern when plotted for quantiles (Figure 4.5.k). They are negative, increasing in magnitude with quantiles, and statistically significant for quantiles higher than the median. The reported F-tests suggest rejecting the null hypothesis of equal coefficients between the higher and other quantiles. This finding confirms and extends that of Rogers and Wu (2012) which report a negative and statistically significant mean effect of education attainment. This contrasts studies that report a positive effect of educational attainment on business location choices (Coughlin and Segev 2000; Woodward 1992). The negative effect may actually be attributed to the unobserved wage effects (Bartik 1985, pp.21).

The estimated effect of state unemployment rate is moving up and down around an average when plotted for quantiles (Figure 4.5.j). The estimated negative coefficients on $UNEMP_{i,t}$ are statistically significant at all quantiles but the 90^{th}. The reported F-test of equality suggests a failure to reject the null hypothesis of equal coefficients. This reinforces the finding of Rogers and Wu (2012) that a high jobless rate may deter foreign investments because it may indicate weak economy or low quality of life (Woodward 1992; Fredriksson et al. 2003).

4.5. Robustness Check

I explore the implications of examining investment-promotion policies in isolation. Specifically, I estimate the basic SQR procedure for all 50 states using four alternative specifications where only a single policy variable is included in each specification. The SQR estimate results are presented in Tables 4.5.a – 4.8.a and the corresponding results of the F-tests for equality are reported in Tables 4.5.b – 4.8.b, respectively. A comparison between the SQR result and its OLS counterpart in each case is shown graphically in Figures 4.6 – 4.9.

When only CIT is included, its estimated effect becomes negative at the median and the upper quantiles (Table 4.5.a). Furthermore, the null hypothesis of equal coefficients is rejected between the 20^{th} and the median percentile of the employment distribution (Table 4.5.b). When only the state government spending variable is included, its estimated impact remains negative and equal in magnitude throughout the employment distribution. However, it loses statistical significance for the higher quantiles. Meanwhile, the estimated effect of the market proximity in adjacent states becomes negative at the lower tail (Table 4.6.a) and the reported F-test of equality suggests rejecting the null hypothesis between the lower tail and all other quantiles (Table 4.6.b). When only FTZs are included, the estimated positive impact of FTZs drops dramatically in magnitude throughout the distribution and it becomes significant only for quantiles higher than the median. Meanwhile, the estimated negative Canadian border effect becomes statistically significant for the lower and the median quantiles of the FDI-related employment distribution (Table 4.7.a).

There are common trends associated with these three specifications. First, the estimated positive and significant effect of $MANUFEMP_{i,t-1}$ and the negative effect of $\sum_{j \neq i} ALLEMP_{i,j,t}$ now both decrease with quantile. This indicates that as the manufacturing FDI-related employment expands in scale, the positive intra-industry-within-state FDI agglomeration effect is declining and meanwhile the crowding-out effect due to the competition with FDI from all industries in contiguous states would intensify. Second, the estimated manufacturing compensation effect now becomes positive and statistically significant for most quantiles and I fail to reject the null hypothesis of equal coefficients between any two different quantiles. Consequently, a significant and positive compensation effect throughout the employment distribution is revealed in these specifications. Third, the estimated effect of state transport infrastructure becomes negative for most of quantiles and it is significant for percentiles lower than the median. Not only is this result counterintuitive, it is also controversial and inconsistent with the existing studies. Lastly, instead of a positive Mexican border effect throughout the employment distribution, I now observe a negative Mexican border effect for most of the quantiles and the statistical significance is confirmed for percentiles lower than median.

When only the state policy of overseas offices is examined, the number of offices has an estimated negative effect and this effect remains significant for the lower and the median percentiles (Table 4.4.a and Table 4.8.a). There are, however, notable departures from the baseline estimate results. First, few office-host country dummies have significant coefficients across the employment distribution, and, controversially, having offices in Korea is now expected to be negative for the higher quantiles at the 0.05 significance level. Second, the estimated manufacturing compensation effect is now negative only at the higher quantiles and it is significantly different in magnitude between the lower and the higher quantiles, indicating responses in opposite directions between the two tails of the employment distribution. Third, the estimated effect of education attainment loses significance for percentiles above the median. Fourth, not only does the estimated transport infrastructure effect now become insignificant throughout the employment distribution, it also varies little in magnitude. Finally, instead of being positive and insignificant, the estimated Mexican border effect becomes negative and insignificant throughout the employment distribution.

Taken together, the differences in results between the basic model (Table 4.4.a) and specifications investigating policy variables separately (Table 4.5.a - 4.8.a) highlight the importance of considering investment-promotion policies in combination rather than in isolation. As a consequence, conclusions stemming from studies that examine related policies in isolation warrant further scrutiny.

4.6. Conclusions and Policy Implications

This study explores the potential heterogeneous effects of state business incentives on the employment by foreign-owned firms in the US throughout the employment distribution. Specifically, I empirically investigate the US inbound manufacturing FDI for 50 states during the period 1997 – 2008 using a random effects panel data framework. My contributions are twofold. My paper contributes to the literature of uneven effects on the employment outcomes by focusing on the FDI-related employment aggregated to the state level. In addition, econometric issues associated with the violation of the normal distribution assumption are addressed using the simultaneous quantlile regression approach. The SQR estimate reveals the relative importance rather than a single central tendency of each policy at various points of the employment distribution.

My estimates provide evidence of heterogeneous response to investment-promotion policies based on different state-level employment characteristics of foreign-owned firms. Foreign investments tend to create and/or retain jobs in regions with high corporate taxes as long as these regions provide more public goods and services (Gabe and Bell 2004). Notably, the estimated positive transport infrastructure effect differs significantly between the median and the upper tail of the employment distribution.

Take Washington in 2005 and Texas in 2006 for example. The former has 21,700 employees (at the median of the distribution) and the latter has 97,700 employees (at the 90th percentile) in foreign manufacturing firms. Holding other conditions constant, a one percentage increase in Washington's top CIT rate from 9% to 10% (or from 0% to 1% in Texas) coupled with a one percent increase in Washington's highway mileage of 0.026 mile per-mile^2 (or 0.02 mile per-mile^2 in Texas) is predicted to create 77 more jobs by foreign manufacturing firms in Washington (or 528 more such employees in Texas).[74]

The estimated positive effect of the provision of FTZs (both general-purpose zones and subzones) on state employment by foreign firms varies significantly along the distribution with a U-shape pattern. The policy implication associated with this result is worth noting. For instance, if the count of FTZs in Washington increased by 10 percent (or 15 * 10% = 1.5 more FTZs) in 2005 (which is located at the median of the distribution), ceteris paribus, then it is expected that there would have been approximate 1.08 percent (or 21,700 * 1.08% = 234.36 jobs) more employment by foreign manufacturing firms. A 10 percent growth of FTZs in North Dakota 2000 (the 10th percentile) and Texas 2006 (the 90th percentile), ceteris paribus, is predicted to increase the FDI-related employment by 2.44 percent (or 2,800 * 2.44% = 68.32

[74] $21{,}700 * (0.294 + 0.06)\% \approx 77$ and $97{,}700 * (0.294 + 0.246)\% \approx 528$. I use the conditional mean CIT effect (0.294, c.f. Table 4.a) obtained from the OLS estimate because the reported F-tests of equality suggest that coefficients on $TAXRATE_{i,t}$ are equal in magnitude (Table 4.b).

employees) and 3.31 percent (or 97,700 * 3.31% = 3233.87 employees), respectively.

Having more trade offices abroad is predicted to decrease state FDI-related employment throughout the employment distribution and this negative relationship is statistically significant for the lower and the median percentiles. Ceteris Paribus, a 100 percent (or 3 * 100% = 3 offices) increase in the count of overseas offices by Washington State in 2005 (at the median of the employment distribution) is expected to be associated with an approximate 2.6 percent drop (or 21,700 * 2.6% = 564.2 employees) in Washington's manufacturing FDI-related jobs.

Finally, the predicted employment enhancing office-host countries include Japan, Korea, China, Malaysia, India, Mexico, Dubai, etc. In contrast, some office-host countries such as Brazil, Argentina, Taiwan, Canada and the Europe Union are negatively associated with the FDI-related manufacturing employment in the US. Furthermore, the SQR estimate reveals heterogeneity in the effects of office-host countries at different points of the employment distribution. For example, offices in Korea and Japan have an estimated positive effect for the lower and the median quantiles where a negative effect is expected for the EU. China and Mexico, however, are predicted to promote the FDI-related employment at the two tails of the distribution.

My exploration of the heterogeneous effects of state investment-promotion policies on the FDI-related employment is innovative and provides a basis for future investigation regarding the effects of inward FDI on local economies. My results, however, should be interpreted with caution. The source-country specific information in the state-level employment data is available for only seven countries, namely Canada, France, Germany, Netherlands, Switzerland, United Kingdom and Japan. The lack of detailed source-country specific information has been found in some of other subnational-level studies such as Coughlin and Segev (2000), Kozlowski, Solocha and Dixon (1994), etc. In spite of this data limitation, it has been widely recognized that foreign offices serve as an important component of state's marketing efforts to promote business (and thus employment) within a global context. Correspondingly, the link between state overseas offices and inward foreign investment (and thus US employment) is warranted. An investigation of the bilateral relationship between state business incentives and the employment by inbound FDI from a source-country (or source-region) would be an interesting extension.

Table 4.1: Description of Variables

Variables	Description	Exp. Sign	Data Source
Dependent: $MFGEMP_{i,t}$	Employment in state i by foreign-owned manufacturing firms in year t (in 1,000s)		*Employment and Manufacturing Employment of All Nonbank U.S. Affiliates, by State, 1997-2008,* BEA.
Independent:			
$MFGEMP_{i,t-1}$	Employment in state i by foreign-owned manufacturing firms in the previous year (in 1,000s)	+	*Ibid.*
$\sum_{j\neq i} ALLEMP$	Employment by **ALL foreign -owned firms** in all states neighboring i in year t	?	*Ibid.*
$INCOME_{i,t}$	Per-capita personal income in state i and year t (current US Dollars)	+	*Personal current taxes,* Regional Economic Information System, BEA.
$\sum_{j\neq i} INCOME_{i,j}$	Sum per -capita personal income in all states that are adjacent to i	+	*Ibid.*
$COMPENSATI$	Annual manufacturing compensation divided by manufacturing employees by state i	–	*Compensation of employees by NAICS industry*, Regional Economic Information System, BEA
$UNEMP_{i,t}$	State unemployment rate in year t (percent)	?	*Local Area Unemployment Statistics,* BLS
$HSEDU_{i,t}$	Share of population over 25 years old with at least a high school diploma for each state (percent)	+	*Educational Attainment by State: 1990 to 2009,* FactFinder, U.S. Census Bureau. *50 State Comparison - Fiscal, Economics, and Population Table,* Postsecondary Education Commission of California.
$TAXRATE_{i,t}$	Tax policy, state top corporate income tax rate	-	*State Corporate Income Tax Rates,* various years, Tax Foundation
$SUBSIDY_{i,t}$	State total subsidy spending divided by population (current US dollars)	+	*State and Local Government Finances by Level of Government and by State: 1997-2008,* State and Local Government Finance, U.S. Census Bureau.
$FTZ_{i,t}$	Sum of counts of both general -purpose and subzone Foreign Trade Zones	+	*Annual Report of the FTZ Board to the Congress of the United States* , various years, U.S. Department of Commerce
$OFFICE_{i,t}$	Sum of all overseas offices established by state i	+	*Directory of Incentives for Business Investment and Development in the United States: A State-by-State Guide, 1991,* National Association of State Development Agencies (NASDA). *State Official's Guide to International Affairs,* by Chris Whatley, the Council of State Governments.
$HOST_{i,t}$	Set of dummy variables indicating if a state has an office(s) in that country (See Table 4 for a list of countries and abbrviations).	+	*Ibid.*
$HIGHWAY_{i,t}$	Highway mileage per square mile in each state	+	*Highway Statistics,* various years, U.S. Federal Highway Administration. *U.S. States Area and Ranking,* EnchantedLearning.com.
$MEX_{i,t}, CAN_{i,}$	Dummy equals one for states that share borders with Mexico and Canada, respectively	+	*Map of Border Governments,* U.S. - Mexico Border Field Office of the Pan American Health Organization; *The Canada-U.S. Border Map*, the Canada-United States Transportation Border Working Group.

Table 4.2: Summary Statistics (1997 - 2008, by State)[a]

Variable	Observation	Mean (S.D.)	Min	Max
$MFGEMP_{i,t}$	550	38.78 (40.52)	0.5	208.2
$\sum ALLEMP_{i,,j,t}$	550	111.56 (126.87)	3.7	749.4
$INCOME_{i,t}$	600	31,246.86 (6,255.13)	18,880	56,245
$COMPENSATION_{i,t}$	600	53,844.67 (11,508.01)	30,635.35	92,279.29
$UNEMP_{i,t}$	600	4.68 (1.14)	2.3	8.3
$HSEDU_{i,t}$	600	84.77(4.15)	72.9	92.8
$TAXRATE_{i,t}$	600	6.76 (2.79)	0	12
$SUBSIDY_{i,t}$	600	142.24 (77.78)	22.84	624.32
$FTZ_{i,t}$	600	13.37 (15)	0	104
$OFFICE_{i,t}$	600	3.75 (4.04)	0	23
$HOST_{i,t}$	2250 foreign offices between 43 countries	52.3 offices per Host-country	0	1
Total Highway Mileage	600	79,405.30 (52,158.27)	4165	306,404
$HIGHWAY_{i,t}$	600	1.64 (0.96)	0.02	4.50
Geographical Area (Square Miles)	600	75,736.32 (95,354)	1,545	656,425
Border Dummies: $MEX_{i,t}$, $CAN_{i,t}$	600	4 states border Mexico; 12 border Canada	0	1

[a] Due to the fact that since 2008 state-level data on US affiliates employment published by BEA include both bank and nonbank affiliates, such data are thus inconsistent with the one before 2008. As a result, state FDI-related employment data are for the years 1997-2007.

Table 4.3: Summary Statistics for State-Level Manufacturing FDI-Related Employment in US ($MFGEMP$) and Log $MFGEMP$, 1997-2008

Statistics	**Variable**	
	$MFGEMP$ (1000s)	$\log MFGEMP$
Mean	38.78	4.298
Standard Deviation	40.516	0.578
Skewness	1.449	-0.496
Kurtosis	4.842	2.455
5th quantile	1.6	3.23
10th quantile	2.75	3.447
25th quantile	8.7	3.942
Median	21.5	4.336
75th quantile	57.2	4.765
90th quantile	97.3	4.985
95th quantile	120.3	5.08
Num. of Obs.	600	600
Test 1 (P-value)	0.000***	0.000***
Test 2 (P-value)	0.000***	0.000***

Notes:
Test 1: Shapiro and Francia (1972) test for normality
Test 2: D'Agostino et al.(1990) Skewness and Kurtosis test for normality

Table 4.4.a: Empirical Results, Dependent Variable: Logarithm of State Employment by Foreign Manufacturing Firms in U.S.

Independent Variables	Quantile Regressions									OLS_RE	DSGMM_FE
	10th	20th	30th	40th	50th Median	60th	70th	80th	90th	Mean	Mean
$TAXRATE_{i,t}$	-0.063	0.253	0.476	0.382	0.327	0.391	0.189	0.211	-0.135	0.294	0.802
	[.627]	[.365]	[.381]	[.351]	[.340]	[.363]	[.410]	[.550]	[.575]	[.386]	[.455]*
$log SUBSIDY_{i,t}$	-0.073	-0.047	-0.054	-0.046	-0.052	-0.059	-0.051	-0.045	-0.085	-0.06	0.048
	[.041]*	[.032]	[.031]*	[.026]*	[.026]**	[.028]**	[.030]*	[.039]	[.045]*	[.030]**	[.054]
$log FTZ_{i,t}$	0.244	0.208	0.189	0.126	0.108	0.129	0.171	0.209	0.331	0.302	0.323
	[.067]***	[.069]***	[.062]***	[.062]**	[.058]*	[.060]**	[.065]***	[.081]***	[.092]***	[.078]***	[.119]***
$\log(OFFICE + 1)_{i,t}$	-0.017	-0.029	-0.021	-0.023	-0.026	-0.019	-0.021	0.019	-0.002	-0.026	-0.059
	[.025]	[.015]**	[.013]*	[.013]*	[.012]**	[.017]	[.022]	[.026]	[.025]	[.017]	[.048]
$HOST_{i,t}$ b											
Positive and Significant	KO	IT JP KO ML MX RS SP	CN DB IT JP KO ML	CN DB IN JP KO	DB JP KO ML	CN JP KO	CN JP MX	CN IL	CN GM IL MX SP UK	CN EG IL JP KO ML MX SP UK	AR CN EG GN IR JP KO ML MX SG SP TK
Negative and Significant	TW	BZ EU NL TW	BZ CA EU FR KZ NL SL TW	AG BZ CA EU KZ TW	AG EU KZ	BZ EU CA	None	VN	HK LA NL SG TK VN	BZ CA EU LA NL SL TW VN	BZ CH EU GM KZ RS SA SL TW VN VZ
$log MFGEMP_{i,t-1}$	0.809	0.829	0.851	0.873	0.885	0.843	0.771	0.669	0.452	0.621	0.514
	[.100]***	[.062]***	[.052]***	[.053]***	[.055]***	[.064]***	[.076]***	[.103]***	[.103]***	[.081]***	[.122]***
$log \sum_{j \neq i} ALLEMP_{i,j,t}$	-0.073	-0.103	-0.057	-0.059	-0.062	-0.067	-0.04	-0.09	-0.258	-0.088	0.132
	[.094]	[.065]	[.058]	[.046]	[.047]	[.051]	[.060]	[.069]	[.081]***	[.044]**	[.075]*
$log INCOME_{i,t}$	-0.316	0.173	0.304	0.017	0.072	0.219	0.484	0.107	0.217	-0.078	0.058
	[.578]	[.350]	[.274]	[.225]	[.218]	[.238]	[.253]**	[.324]	[.415]	[.280]	[.600]
$log \sum_{j \neq i} INCOME_{i,j,t}$	0.086	0.135	0.07	0.065	0.066	0.081	0.08	0.128	0.317	0.119	-0.182
	[.114]	[.073]*	[.063]	[.054]	[.052]	[.059]	[.066]	[.080]	[.095]***	[.052]**	[.095]**

Table 4.4.a: Continued

Independent Variables	Quantile Regressions									OLS_RE	DSGMM_FE
	10^{th}	20^{th}	30^{th}	40^{th}	50^{th} Median	60^{th}	70^{th}	80^{th}	90^{th}	Mean	Mean
$logCOMPENSATION_{i,t}$	0.341	-0.17	-0.197	0.148	0.139	0.04	-0.298	-0.102	-0.411	0.159	0.757
	[.616]	[.348]	[.290]	[.255]	[.237]	[.273]	[.290]	[.326]	[.385]	[.305]	[.772]
$UNEMP_{i,t}$	-2.932	-1.584	-1.915	-2.233	-1.948	-2.266	-1.625	-2.65	-1.388	-2.775	-3.293
	[1.162]***	[.766]**	[.524]***	[.531]***	[.581]***	[.661]***	[.831]**	[1.035]***	[.973]	[.817]***	[1.192]***
$HSEDU_{i,t}$	0.058	-0.102	-0.037	-0.154	-0.296	-0.47	-0.632	-0.603	-1.435	-0.597	-2.087
	[.424]	[.255]	[.243]	[.246]	[.252]	[.278]*	[.340]*	[.452]	[.543]***	[.282]**	[.635]***
$logHIGHWAY_{i,t}$	0.155	0.148	0.124	0.071	0.06	0.055	0.054	0.057	0.246	0.164	0.247
	[.120]	[.066]**	[.052]**	[.060]	[.063]	[.068]	[.079]	[.079]	[.110]**	[.066]***	[.075]***
MEX_i	0.091	0.053	0.072	0.042	0.023	0.03	0.029	0.029	-0.019	0.033	-0.016
	[.077]	[.045]	[.043]*	[.045]	[.041]	[.051]	[.066]	[.084]	[.087]	[.048]	[.038]
CAN_i	-0.001	-0.006	-0.007	-0.009	0.006	-0.005	0.013	-0.08	-0.092	-0.007	0.168
	[.109]	[.039]	[.038]	[.038]	[.041]	[.045]	[.051]	[.067]	[.078]	[.042]	[.073]**
Constant	0.574	0.632	0.159	-0.064	-0.168	-0.084	0.542	1.779	4.222	1.512	
	[1.372]	[.809]	[.765]	[.754]	[.795]	[.918]	[1.046]	[1.214]	[1.196]**	[0899]*	
Num. of Obs.	515	515	515	515	515	515	515	515	515	515	475
R_squared	0.866	0.883	0.884	0.882	0.879	0.874	0.862	0.849	0.836	0.971	

[a] Bootstrapped standard errors for simultaneous quantile regressions and robust standard errors for the OLS method are in parentheses. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 level, respectively.

[b] Key Abbreviation: AG-Argentina; AT-Australia; AR-Austria; BZ-Brazil; CA-Canada; CH-Chile; CN-China; CZ-Czech Republic; DB-Dubai; EG-Egypt; EU-Europe Union; FR-France; GM-Germany; GN-Ghana; GR-Greece; HK-Hongkong; IL-Ireland; IN-India; IR-Israel; IT-Italy; JP-Japan; KO-Korea; KZ-Kazakhstan; LA-Latin American; ML-Malaysia; MT-Montenegro; MX-Mexico; NL-Netherlands; PL-Poland; QT-Qatar; RS-Russia; SA-South Africa; SB-Saudi Arabia; SD-Scandinavia; SG-Singapore; SL-Switzerland; SP-Spain; TK-Turkey; TW-Tai Wan; UK-United Kingdom; UR-Ukraine; VN-Vietnam; VZ-Venezuela.

Table 4.4.b: Tests of Equality between Coefficients at Different Quantiles in Table 4.4.a

Independent Variables [a]	Quantiles													
	10-50	20-50	30-50	10-70	10-90	20-70	20-80	20-90	30-80	30-90	40-80	40-90	50-80	50-90
$TAXRATE_{i,t}$	0.563	0.849	0.612	0.729	0.93	0.92	0.943	0.564	0.654	0.358	0.735	0.388	0.835	0.46
$logSUBSIDY_{i,t}$	0.611	0.846	0.924	0.632	0.836	0.95	0.952	0.502	0.82	0.562	0.957	0.387	0.824	0.466
$logFTZ_{i,t}$	0.138	0.096*	0.062*	0.468	0.448	0.578	0.988	0.201	0.771	0.116	0.216	0.010***	0.096*	0.005***
$\log(OFFICE+1)_{i,t}$	0.716	0.86	0.684	0.901	0.669	0.74	0.075*	0.38	0.094*	0.502	0.065*	0.386	0.029**	0.265
$HOST_{i,t}$ [b]														
Positive and Significant	KO	JP KO ML	DB JP KO ML	None	None	JP MX	None	MX SP	CN	CN	CN	CN	None	None
Negative and Significant	None	EU	EU	None	None	None	None	NL	None	NL	None	None	None	None
$logMFGEMP_{i,t-1}$	0.418	0.295	0.39	0.706	0.01***	0.409	0.065*	0.001***	0.022**	0.000***	0.005***	0.000***	0.001***	0.000***
$log\sum_{j\neq i} ALLEMP_{i,j,t}$	0.928	0.52	0.909	0.798	0.157	0.415	0.853	0.05**	0.621	0.004***	0.618	0.005***	0.636	0.006***
$logINCOME_{i,t}$	0.493	0.703	0.251	0.174	0.363	0.358	0.856	0.909	0.556	0.823	0.771	0.588	0.905	0.697
$log\sum_{j\neq i} INCOME_{i,j,t}$	0.879	0.297	0.924	0.968	0.146	0.503	0.925	0.050**	0.394	0.002***	0.327	0.001***	0.301	0.001***
$logCOMPENSATION_{i,t}$	0.725	0.322	0.11	0.276	0.233	0.736	0.874	0.618	0.794	0.59	0.468	0.145	0.434	0.135
$UNEMP_{i,t}$	0.437	0.599	0.947	0.332	0.329	0.964	0.355	0.87	0.484	0.638	0.672	0.413	0.406	0.58
$HSEDU_{i,t}$	0.428	0.463	0.253	0.17	0.028**	0.141	0.215	0.027**	0.136	0.019**	0.216	0.025**	0.328	0.028**
$logHIGHWAY_{i,t}$	0.506	0.204	0.226	0.558	0.603	0.324	0.342	0.401	0.425	0.265	0.856	0.083*	0.965	0.060*
MEX_i	0.488	0.536	0.153	0.562	0.35	0.69	0.732	0.385	0.535	0.266	0.829	0.471	0.934	0.639
CAN_i	0.951	0.779	0.709	0.886	0.479	0.736	0.288	0.329	0.255	0.273	0.217	0.284	0.11	0.179

[a] P-values of F tests are reported. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 level, respectively.
[b] Same host country dummies whose coefficients are estimated to be statistically significant between regressions at different quantiles. Key abbreviations used here are the same with the ones reported in Table 4.4.a.

Table 4.5.a: Robustness Check _ SQR Estimate Results when Only State Top CIT Rates Are Incorporated into the Examination

Independent Variables[a]	Quantile Regressions								
	10	20	30	40	50(Median)	60	70	80	90
$TAXRATE_{i,t}$	0.039	. 161	. 065	-0.0003	-0.072	0.021	0.035	0.077	-0.078
	[.177]	[.152]	[.132]	[.129]	[.136]	[.139]	[.102]	[.151]	[.280]
$log MFGEMP_{i,t-1}$	1.071	1.033	1.016	1.003	0.993	0.982	0.959	0.943	0.898
	[.013]***	[.014]***	[.009]***	[.009]***	[.008]***	[.012]***	[.013]***	[.017]***	[.022]***
$log \sum_{j\neq i} ALLEMP_{i,j,t}$	0.032	-0.004	-0.009	-0.014	-0.017	-0.023	-0.021	-0.034	-0.052
	[.031]	[.028]	[.016]	[.012]	[.013]	[.017]	[.022]	[.069]	[.045]***
$log INCOME_{i,t}$	0.003	0.063	0.024	0.024	0.05	0.056	0.042	0.008	0.097
	[.123]	[.101]	[.077]	[.057]	[.067]	[.091	[.088]	[.088]	[.133]
$log \sum_{j\neq i} INCOME_{i,j,t}$	-0.029	0.012	. 015	0.011	0.013	0.023	0.02	0.038	0.04
	[.034]	[.028]	[.017]	[.014]	[.014]	[.019]	[.023]	[.032]	[.046]
$log COMPENSATION_{i,t}$	0.313	0.196	0.187	0.164	0.164	0.14	0.191	0.291	0.23
	[.134]**	[.114]*	[.082]**	[.072]**	[.090]*	[.109]	[.105]*	[.129]**	[.148]
$UNEMP_{i,t}$	-2.177	-1.807	-1.908	-1.817	-1.597	-1.431	-1.716	-2.053	-1.913
	[.621]***	[.369]***	[.273]***	[.272]***	[.309]***	[.410]***	[.493]***	[.556]***	[.891]**
$HSEDU_{i,t}$	-0.053	-0.234	-0.098	-0.18	-0.196	-0.255	-0.339	-0.456	-0.433
	[.199]	[.121]**	[.093]	[.085]**	[.100]**	[.140]**	[.144]**	[.184]**	[.215]**
$log HIGHWAY_{i,t}$	-0.112	-0.071	-0.058	-0.03	-0.016	-0.006	0.001	-0.017	0.051
	[.032]***	[.030]**	[.016]***	[.014]**	[.012]	[.015]	[.018]	[.030]	[.056]
MEX_i	-0.04	-0.05	-0.039	-0.03	-0.016	-0.021	-0.015	-0.022	0.026
	[.023]*	[.019]***	[.016]**	[.016]*	[.018]	[.020]	[.024]	[.036]	[.042]
CAN_i	-0.009	-0.004	-0.01	-0.011	-0.01	-0.012	0.003	0.004	-0.0003
	[.014]	[.012]	[.007]	[.005]*	[.007]	[.010]	[.011]	[.010]	[.015]
Constant	-1.748	-1.159	-0.936	-0.646	-0.695	-0.524	-0.507	-0.642	-0.455
	[.513]***	[.356]***	[.173]***	[.175]***	[.210]***	[.274]**	[.257]**	[.335]*	[.494]
Num. of Obs.	549	549	549	549	549	549	549	549	549
R_squared	0.857	0.876	0.879	0.877	0.873	0.866	0.854	0.832	0.791

[a] Bootstrapped standard errors for simultaneous quantile regressions and robust standard errors for the OLS method are in parentheses. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 level, respectively.

Table 4.5.b: Tests of Equality between Coefficients at Different Quantiles in Table 4.5.a

Independent Variables [a]	Quantiles												
	10-50	20-50	30-50	10-80	10-90	20-80	20-90	30-80	30-90	40-80	40-90	50-80	50-90
$TAXRATE_{i,t}$	0.522	0.056*	0.183	0.852	0.72	0.665	0.46	0.947	0.646	0.658	0.799	0.375	0.985
$\log MFGEMP_{i,t-1}$	0.000***	0.001***	0.003***	0.00***	0.0***	0.00***	0.00***	0.000***	0.000***	0.000***	0.000***	0.001***	0.000***
$\log \sum_{j \neq i} ALLEMP_{i,j,t}$	0.084*	0.593	0.544	0.081*	0.11	0.385	0.338	0.39	0.354	0.455	0.375	0.498	0.404
$\log INCOME_{i,t}$	0.707	0.873	0.688	0.967	0.591	0.581	0.812	0.859	0.558	0.853	0.562	0.609	0.724
$\log \sum_{j \neq i} INCOME_{i,j,t}$	0.165	0.957	0.91	0.094*	0.216	0.454	0.582	0.436	0.587	0.326	0.503	0.333	0.526
$\log COMPENSATION_{i,t}$	0.261	0.735	0.763	0.901	0.669	0.532	0.836	0.441	0.768	0.312	0.649	0.298	0.659
$UNEMP_{i,t}$	0.34	0.588	0.214	0.869	0.802	0.684	0.908	0.797	0.995	0.664	0.911	0.339	0.693
$HSEDU_{i,t}$	0.481	0.774	0.25	0.117	0.176	0.29	0.38	0.044**	0.117	0.099*	0.21	0.104*	0.239
$\log HIGHWAY_{i,t}$	0.003***	0.053*	0.006***	0.040**	0.016**	0.155	0.048**	0.197	0.056*	0.665	0.134	0.947	0.224
MEX_i	0.335	0.096*	0.142	0.657	0.156	0.096	0.072*	0.625	0.100*	0.864	0.158	0.838	0.257
CAN_i	0.947	0.656	0.919	0.371	0.639	0.499	0.787	0.146	0.466	0.103	0.453	0.123	0.494

[a] P-values of F-tests are reported. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 level, respectively.

Table 4.6.a: Robustness Check _ SQR Estimate Results when Only State Government Spending on Subsidy/Grant Is Incorporated into the Examination

Independent Variables[a]	Quantile Regressions								
	10	20	30	40	50(Median)	60	70	80	90
$log SUBSIDY_{i,t}$	-0.016	-0.04	-0.023	-0.027	-0.033	-0.054	-0.032	-0.032	-0.041
	[.030]	[.024]*	[.015]	[.013]**	[.018]*	[.017]***	[.027]	[.029]	[.048]
$log MFGEMP_{i,t-1}$	1.07	1.037	1.018	1.007	0.99	0.98	0.959	0.94	0.897
	[.015]***	[.013]***	[.011]***	[.009]***	[.008]***	[.011]***	[.013]***	[.015]***	[.027]***
$log \sum_{j \neq i} ALLEMP_{i,j,t}$	0.037	-0.006	-0.014	-0.013	-0.022	-0.026	-0.026	-0.032	-0.072
	[.024]	[.023]	[.016]	[.013]	[.013]*	[.019]	[.024]	[.028]	[.046]
$log INCOME_{i,t}$	0.036	0.112	0.086	0.06	0.077	0.128	0.097	0.151	0.106
	[.119]	[.093]	[.077]	[.073]	[.071]	[.075]*	[.089]	[.099]	[.140]
$log \sum_{j \neq i} INCOME_{i,j,t}$	-0.035	0.014	0.016	0.012	0.019	0.027	0.026	0.034	0.059
	[.027]	[.026]	[.019]	[.015]	[.015]	[.022]	[.027]	[.027]	[.047]
$log COMPENSATION_{i,t}$	0.27	0.136	0.131	0.161	0.136	0.096	0.152	0.186	0.216
	[.144]*	[.095]	[.075]*	[.079]**	[.075]*	[.080]	[.101]	[.110]*	[.160]
$UNEMP_{i,t}$	-2.156	-1.548	-1.619	-1.781	-1.595	-1.227	-1.683	-2.004	-2.176
	[.118]***	[.470]***	[.333]***	[.340]***	[.333]***	[.375]***	[.460]***	[.483]***	[.878]**
$HSEDU_{i,t}$	-0.012	-0.127	-0.061	-0.151	-0.171	-0.198	-0.332	-0.363	-0.502
	[.208]	[.147]	[.104]	[.091]*	[.090]**	[.119]*	[.130]***	[.136]***	[.212]**
$log HIGHWAY_{i,t}$	-0.107	-0.063	-0.043	-0.031	-0.009	-0.007	0.004	-0.011	0.062
	[.030]***	[.028]**	[.018]***	[.014]**	[.011]	[.014]	[.016]	[.028]	[.065]
MEX_i	-0.035	-0.033	-0.032	-0.025	-0.011	-0.012	-0.005	-0.0002	0.028
	[.022]	[.020]*	[.014]**	[.013]*	[.013]	[.017]	[.023]	[.030]	[.035]
CAN_i	-0.01	-0.002	-0.009	-0.008	-0.008	-0.006	0.003	0.003	-0.001
	[.012]	[.011]	[.007]	[.005]	[.006]	[.008]	[.011]	[.013]	[.019]
Constant	-1.691	-1.123	-0.926	-0.794	-0.63	-0.585	-0.506	-0.774	-0.255
	[.475]***	[.333]***	[.200]***	[.176]***	[.168]***	[.172]***	[.226]**	[.305]**	[.522]
Num. of Obs.	549	549	549	549	549	549	549	549	549
R_squared	0.857	0.876	0.88	0.878	0.874	0.868	0.854	0.832	0.791

[a] Bootstrapped standard errors for simultaneous quantile regressions and robust standard errors for the OLS method are in parentheses. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 level, respectively.

Table4. 6.b: Tests of Equality between Coefficients at Different Quantiles in Table 4.6.a

Independent Variables [a]	Quantiles											
	10-50	20-50	30-50	10-80	10-90	20-80	20-90	30-90	40-80	40-90	50-80	50-90
$log SUBSIDY_{i,t}$	0.61	0.803	0.557	0.706	0.654	0.834	0.98	0.703	0.839	0.75	0.966	0.852
$log MFGEMP_{i,t-1}$	0.000***	0.000***	0.001***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
$log \sum_{j \neq i} ALLEMP_{i,j,t}$	0.017**	0.444	0.596	0.045**	0.020**	0.463	0.195	0.221	0.498	0.183	0.702	0.249
$log INCOME_{i,t}$	0.731	0.666	0.884	0.469	0.699	0.746	0.969	0.885	0.4	0.737	0.479	0.822
$log \sum_{j \neq i} INCOME_{i,j,t}$	0.040**	0.832	0.855	0.032**	0.053**	0.557	0.396	0.371	0.398	0.29	0.538	0.357
$log COMPENSATION_{i,t}$	0.355	0.995	0.944	0.618	0.784	0.713	0.64	0.594	0.826	0.723	0.619	0.576
$UNEMP_{i,t}$	0.438	0.915	0.937	0.864	0.984	0.443	0.461	0.491	0.634	0.62	0.373	0.452
$HSEDU_{i,t}$	0.43	0.756	0.183	0.112	0.100*	0.177	0.115	0.043**	0.125	0.100*	0.100*	0.116
$log HIGHWAY_{i,t}$	0.001***	0.041**	0.037**	0.025**	0.020**	0.214	0.070*	0.100*	0.49	0.145	0.963	0.256
MEX_i	0.309	0.251	0.100*	0.311	0.123	0.297	0.131	0.283	0.38	0.133	0.677	0.244
CAN_i	0.834	0.605	0.805	0.395	0.673	0.682	0.951	0.319	0.338	0.729	0.313	0.719

[a] P-values of F-tests are reported. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 level, respectively.

Table 4.7.a: Robustness Check _ SQR Estimate Results when Only State FTZs Are Incorporated into the Examination

Independent Variables[a]	Quantile Regressions								
	10	20	30	40	50(Median)	60	70	80	90
$logFTZ_{i,t}$	0.035	0.03	0.013	0.001	0.007	0.035	0.046	0.075	0.1
	[.029]	[.021]	[.015]	[.013]	[.013]	[.015]**	[.016]***	[.017]***	[.029]***
$logMFGEMP_{i,t-1}$	1.052	1.015	1.009	1.003	0.99	0.963	0.929	0.894	0.846
	[.028]***	[.021]***	[.016]***	[.013]***	[.013]***	[.016]***	[.016]***	[.019]***	[.033]***
$log\sum_{j\neq i}ALLEMP_{i,j,t}$	0.036	0.0009	-0.007	-0.015	-0.016	-0.021	-0.025	-0.031	-0.01
	[.028]	[.026]	[.016]	[.013]	[.015]	[.018]	[.020]	[.028]	[.041]
$logINCOME_{i,t}$	0.097	0.085	0.038	0.025	0.046	0.082	0.076	0.091	0.015
	[.090]	[.077]	[.068]	[.055]	[.068]	[.077]	[.086]	[.116]	[.169]
$log\sum_{j\neq i}INCOME_{i,j,t}$	-0.027	0.008	0.014	0.013	0.014	0.028	0.03	0.046	0.019
	[.032]	[.027]	[.018]	[.014]	[.018]	[.019]	[.020]	[.029]	[.039]
$logCOMPENSATION_{i,t}$	0.188	0.146	0.154	0.16	0.152	0.118	0.162	0.148	0.192
	[.113]*	[.084]*	[.075]**	[.065]**	[.080]*	[.083]	[.091]*	[.131]	[.164]
$UNEMP_{i,t}$	-1.968	-2.045	-1.899	-1.816	-1.6	-1.706	-2.053	-2.279	-2.541
	[.069]***	[.457]***	[.280]***	[.264]***	[.336]***	[.364]***	[.357]***	[.432]***	[.757]***
$HSEDU_{i,t}$	0.099	-0.172	-0.054	-0.182	-0.137	-0.2	-0.354	-0.422	-0.129
	[.216]	[.152]	[.090]	[.089]**	[.098]	[.099]**	[.115]***	[.159]***	[.235]
$logHIGHWAY_{i,t}$	-0.108	-0.068	-0.056	-0.031	-0.016	-0.02	-0.003	-0.014	0.008
	[.032]***	[.031]**	[.019]***	[.015]**	[.015]	[.018]	[.022]	[.029]	[.046]
MEX_i	-0.04	-0.047	-0.04	-0.03	-0.019	-0.04	-0.03	-0.023	-0.0009
	[.020]**	[.016]***	[.013]***	[.013]**	[.015]	[.018]**	[.021]	[.031]	[.037]
CAN_i	-0.008	-0.002	-0.012	-0.012	-0.012	-0.015	-0.003	-0.005	-0.007
	[.014]	[.010]	[.006]**	[.005]**	[.006]*	[.010]	[.012]	[.013]	[.018]
Constant	-1.705	-1.011	-0.863	-0.635	-0.678	-0.549	-0.433	-0.259	-0.124
	[.507]***	[.423]**	[.231]***	[.209]***	[.240]***	[.282]**	[.217]**	[.354]	[.526]
Num. of Obs.	548	548	548	548	548	548	548	548	548
R_squared	0.857	0.876	0.879	0.877	0.874	0.867	0.855	0.835	0.797

[a] Bootstrapped standard errors for simultaneous quantile regressions and robust standard errors for the OLS method are in parentheses. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 level, respectively.

Table 4.7.b: Tests of Equality between Coefficients at Different Quantiles in Table 4.7.a

Independent Variables [a]	Quantiles												
	10-50	20-50	30-50	10-80	10-90	20-80	20-90	30-80	30-90	40-80	40-90	50-80	50-90
$logFTZ_{i,t}$	0.321	0.285	0.685	0.231	0.100*	0.080*	0.043**	0.001***	0.003***	0.000***	0.001***	0.000***	0.002***
$logMFGEMP_{i,t-1}$	0.015***	0.188	0.178	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
$log\sum_{j\neq i} ALLEMP_{i,j,t}$	0.043**	0.417	0.534	0.084*	0.336	0.292	0.784	0.366	0.941	0.531	0.898	0.539	0.885
$logINCOME_{i,t}$	0.625	0.631	0.898	0.962	0.688	0.961	0.682	0.654	0.896	0.543	0.953	0.684	0.848
$log\sum_{j\neq i} INCOME_{i,j,t}$	0.176	0.795	0.984	0.107	0.795	0.298	0.8	0.281	0.897	0.216	0.872	0.219	0.78
$logCOMPENSATION_{i,t}$	0.78	0.955	0.976	0.822	0.984	0.989	0.798	0.968	0.834	0.923	0.847	0.978	0.807
$UNEMP_{i,t}$	0.549	0.339	0.344	0.668	0.564	0.682	0.573	0.406	0.438	0.305	0.336	0.117	0.206
$HSEDU_{i,t}$	0.292	0.815	0.41	0.063*	0.468	0.222	0.872	0.042**	0.761	0.171	0.822	0.082*	0.97
$logHIGHWAY_{i,t}$	0.000***	0.031**	0.008***	0.007***	0.016**	0.073*	0.081*	0.090*	0.112	0.485	0.339	0.918	0.547
MEX_i	0.381	0.055**	0.100*	0.636	0.347	0.448	0.211	0.58	0.267	0.82	0.411	0.891	0.609
CAN_i	0.73	0.335	0.978	0.869	0.962	0.893	0.841	0.615	0.784	0.595	0.772	0.558	0.755

[a] P-values of F tests are reported. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 level, respectively.

Table 4.8.a: Robustness Check _ SQR Estimate Results when Only State International Offices Are

Independent Variables[a]	Quantile Regressions								
	10	20	30	40	50(Median)	60	70	80	90
$\log(OFFICE+1)_{i,t}$	-0.025	-0.034	-0.028	-0.032	-0.028	-0.026	-0.012	-0.005	0.03
	[.021]	[.015]**	[.013]**	[.015]**	[.016]*	[.016]	[.019]	[.023]	[.026]
$HOST_{i,t}$									
Positive and Significant	None	RS UK	None	JP	None	JP	None	CN GM IL MX SL	CN GM IL SL UR
Negative and Significant	None	NL	None	None	None	None	None	HK	KO ML NL TK
$logMFGEMP_{i,t-1}$	0.937	0.966	0.958	0.961	0.953	0.937	0.894	0.815	0.697
	[.091]***	[.035]***	[.031]***	[.029]***	[.028]***	[.035]***	[.043]***	[.068]***	[.091]***
$log\sum_{j\neq i} ALLEMP_{i,j,t}$	0.009	-0.022	-0.038	-0.033	-0.045	-0.067	-0.032	-0.086	-0.125
	[.108]	[.066]	[.058]	[.050]	[.054]	[.052]	[.060]	[.067]	[.091]
$logINCOME_{i,t}$	-0.388	-0.057	0.163	0.118	0.11	0.164	0.334	0.372	0.208
	[.502]	[.320]	[.270]	[.251]	[.256]	[.241]	[.252]	[.278]	[.414]
$log\sum_{j\neq i} INCOME_{i,j,t}$	-0.013	0.024	0.037	0.023	0.042	0.069	0.042	0.101	0.147
	[.127]	[.071]	[.065]	[.057]	[.058]	[.057]	[.066]	[.078]	[.105]
$logCOMPENSATION_{i,t}$	0.679	0.345	0.134	0.185	0.179	0.112	-0.046	-0.185	-0.15
	[.502]	[.292]	[.241]	[.230]	[.237]	[.246]	[.0258]	[.268]	[.371]
$UNEMP_{i,t}$	-3.03	-2.265	-2.239	-1.863	-1.823	-1.667	-1.556	-1.644	-1.52
	[1.102]***	[.701]***	[.534]***	[.508]***	[.555]***	[.611]***	[.765]**	[.875]*	[1.096]
$HSEDU_{i,t}$	-0.322	-0.246	-0.285	-0.289	-0.268	-0.372	-0.498	-0.579	-0.847
	[.396]	[.218]	[.220]	[.211]	[.192]	[.237]	[.300]*	[.460]	[.632]
$logHIGHWAY_{i,t}$	-0.001	0.042	0.031	0.025	0.019	0.021	0.001	0.01	0.074
	[.135]	[.054]	[.053]	[.048]	[.057]	[.060]	[.066]	[.063]	[.126]
MEX_i	-0.034	-0.001	-0.019	0.0006	0.013	-0.004	-0.005	-0.011	-0.093
	[.109]	[.045]	[.040]	[.034]	[.035]	[.047]	[.062]	[.079]	[.100]
CAN_i	-0.012	0.013	-0.007	0.003	-0.003	0.003	0.006	-0.08	-0.111
	[.094]	[.035]	[.037]	[.034]	[.035]	[.041]	[.054]	[.055]	[.085]
Constant	-0.895	-1.016	-0.925	-0.892	-0.852	-0.656	-0.436	0.433	1.635
	[1.140]	[.607]*	[.552]*	[.521]*	[.548]	[.564]	[.739]	[.951]	[1.217]
Num. of Obs.	516	516	516	516	516	516	516	516	516
R_squared	0.861	0.879	0.881	0.879	0.876	0.87	0.859	0.845	0.827

[a] Bootstrapped standard errors for simultaneous quantile regressions and robust standard errors for the OLS method are in parentheses. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 level, respectively.

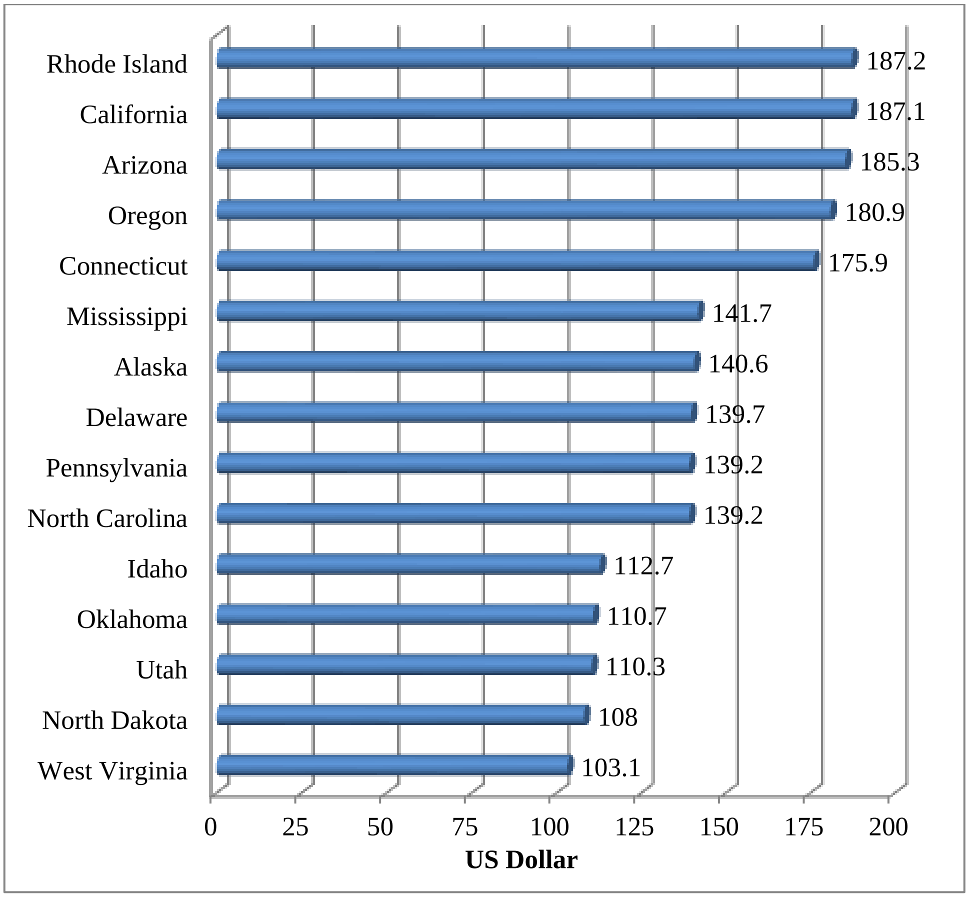
Table 4.8.b: Tests of Equality between Coefficients at Different Quantiles in Table 4.8.a

Independent Variables [a]	Quantiles												
	10-50	20-50	30-50	10-80	10-90	20-80	20-90	30-80	30-90	40-80	40-90	50-80	50-90
$\log(OFFICE+1)_{i,t}$	0.895	0.738	0.994	0.538	0.100*	0.298	0.027**	0.338	0.032**	0.273	0.021**	0.341	0.032**
$HOST_{i,t}$ [b]													
Positive and Significant	None	None	None	None	None	None	None	None	None	None	None	None	None
Negative and Significant	None	None	None	None	None	None	NL	None	None	None	None	None	None
$logMFGEMP_{i,t-1}$	0.854	0.708	0.839	0.266	0.048**	0.028**	0.003***	0.027**	0.002***	0.013**	0.001***	0.012**	0.002***
$log\sum_{j\neq i} ALLEMP_{i,j,t}$	0.584	0.682	0.883	0.404	0.300	0.386	0.264	0.498	0.344	0.456	0.330	0.545	0.385
$logINCOME_{i,t}$	0.308	0.546	0.806	0.137	0.315	0.208	0.564	0.464	0.914	0.327	0.825	0.317	0.823
$log\sum_{j\neq i} INCOME_{i,j,t}$	0.634	0.754	0.919	0.404	0.287	0.365	0.244	0.443	0.296	0.346	0.247	0.451	0.313
$logCOMPENSATION_{i,t}$	0.311	0.514	0.826	0.086*	0.166	0.084*	0.216	0.236	0.448	0.138	0.349	0.148	0.399
$UNEMP_{i,t}$	0.266	0.502	0.384	0.281	0.272	0.511	0.514	0.502	0.519	0.787	0.751	0.815	0.777
$HSEDU_{i,t}$	0.902	0.922	0.930	0.661	0.459	0.466	0.333	0.528	0.374	0.483	0.346	0.428	0.322
$logHIGHWAY_{i,t}$	0.875	0.696	0.817	0.929	0.680	0.675	0.807	0.778	0.752	0.821	0.722	0.897	0.693
MEX_i	0.668	0.751	0.376	0.865	0.706	0.895	0.379	0.917	0.476	0.867	0.345	0.734	0.285
CAN_i	0.924	0.666	0.906	0.547	0.452	0.115	0.148	0.216	0.213	0.130	0.165	0.171	0.201

[a] P-values of F tests are reported. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 level, respectively.

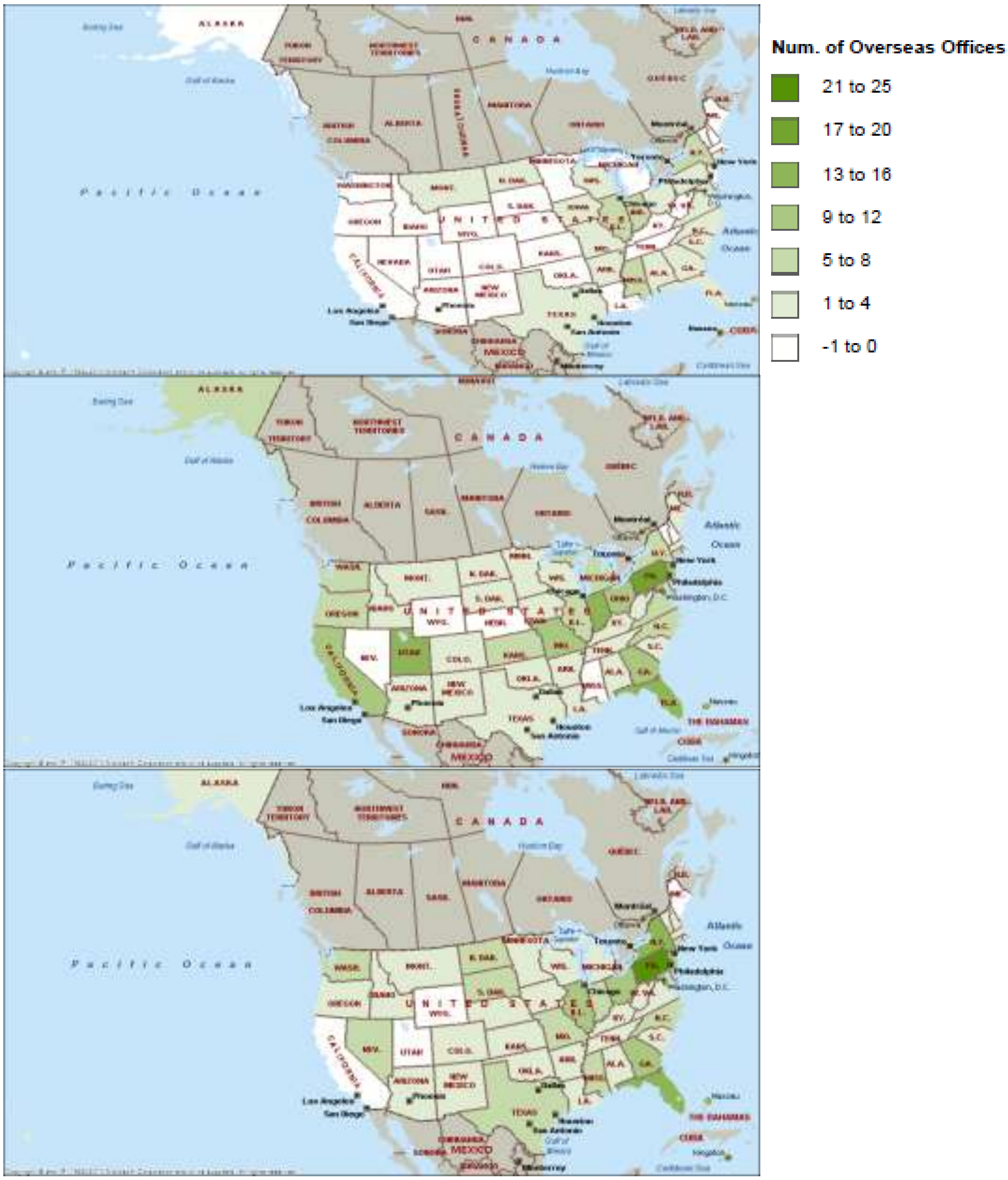
[b] Same host country dummies whose coefficients are estimated to be statistically significant between regressions at different quantiles. Key abbreviations used here are the same with the ones reported in Table 4.4.a.

Figure 4.1: Annual Per-Capita Spending on Subsidies by State and Local Governments in US, Average over 1997-2008, By State (Top 5, Middle 5 and Bottom 5)



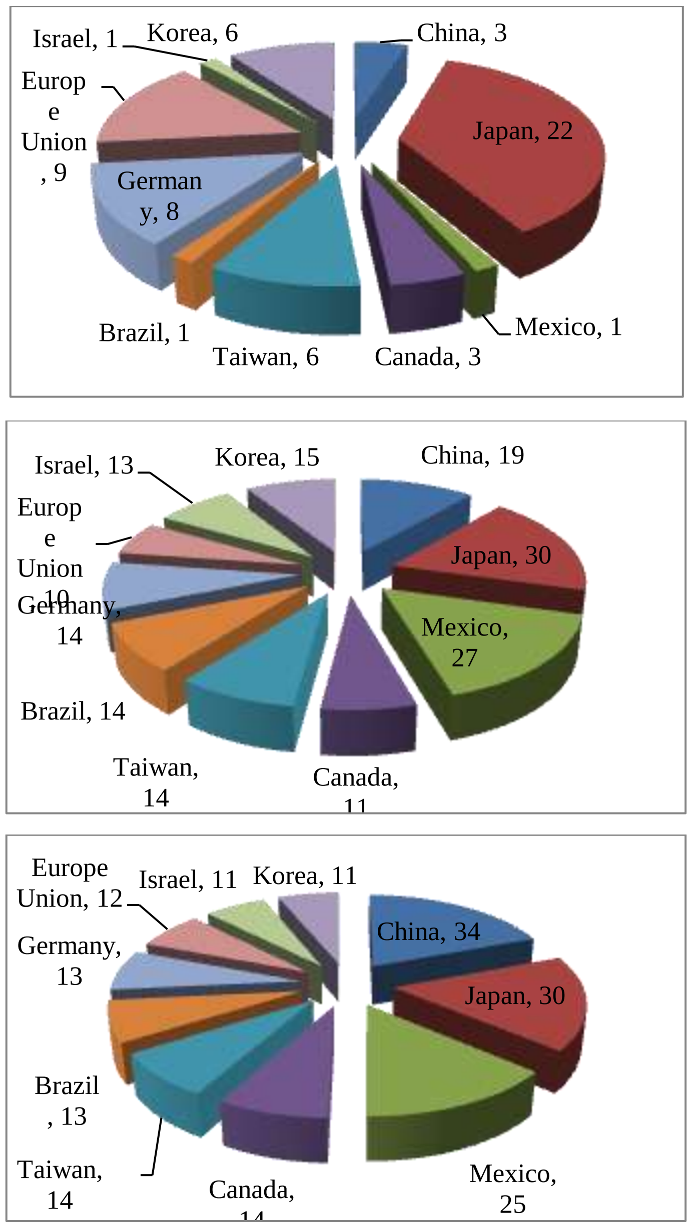
Data source: *State and Local Government Finances by Level of Government and by State: 1997-2008*, State and Local Government Finance, U.S. Census Bureau. http://www.census.gov/govs/www/financegen.html/

Figure 4.2: Distribution of Overseas Offices by US States in 1991, 2002 and 2009 (from top to bottom)[75]



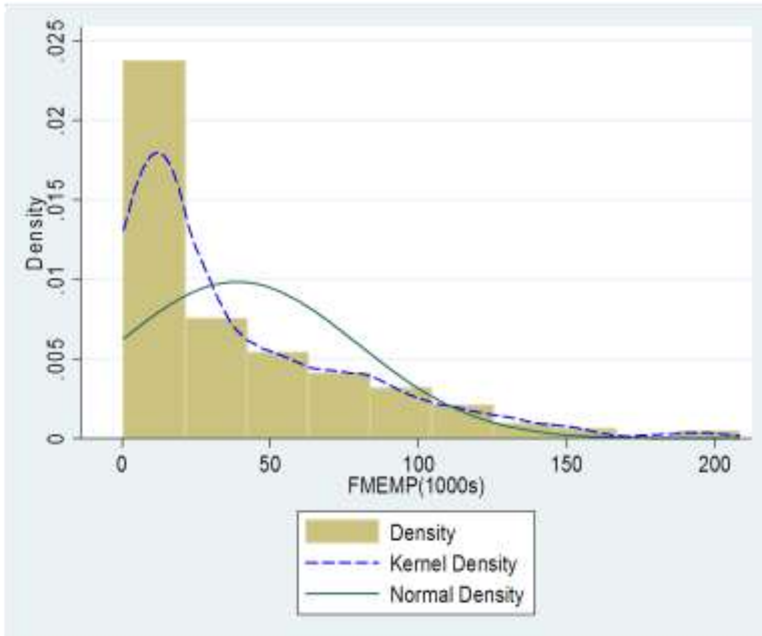
[75] Based on the data collected and compiled by the author, Figure 4.2 is made originally using Microsoft® MapPoint 2011and all rights are thus reserved.

Figure 4.3: Top 10 Popular Office-host Countries by US states in 1991, 2002 and 2009 (from top to bottom, with the counts of overseas offices included)



Data Sources for Figure 4.2 and 4.3: Author's compilation from the following*: Directory of Incentives of Business Investment and Development in the United States: A State-by-State Guide, 1991*, National Association of State Development Agencies (NASA); Appendix A, *State Official's Guide to International Affairs*, by Chirs Whatley, Council of State Governments, 2003, pp. 49-51; and state Websites related to economic development authorities for all states.

Figure 4.4: Density Estimates of State-Level FDI-Related Manufacturing Employment in US ($MFGEMP$) and Log $MFGEMP$, 1997-2008



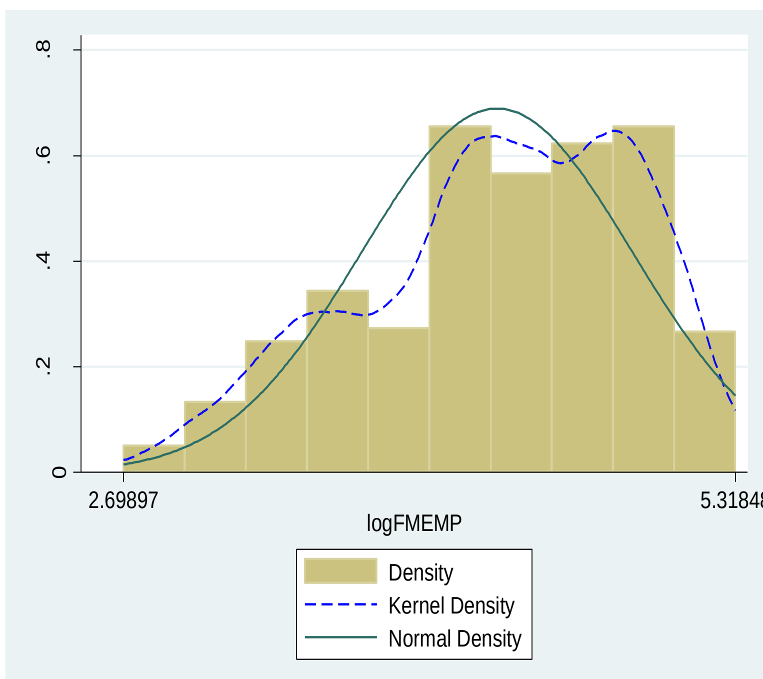


Figure 4.5: Empirical Results _ SQR Estimate Results when All State Business Incentives Are Incorporated

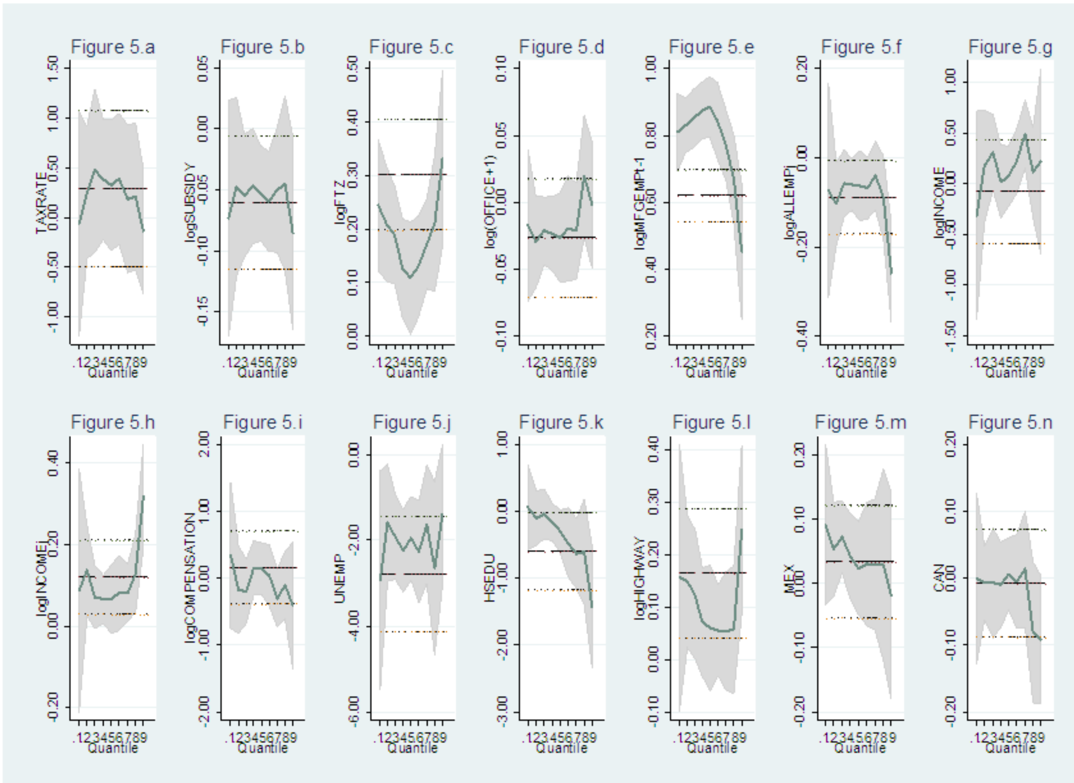


Figure 4.6: Robustness Check _ SQR Estimate Results when Only State Top CIT Rates Are Incorporated

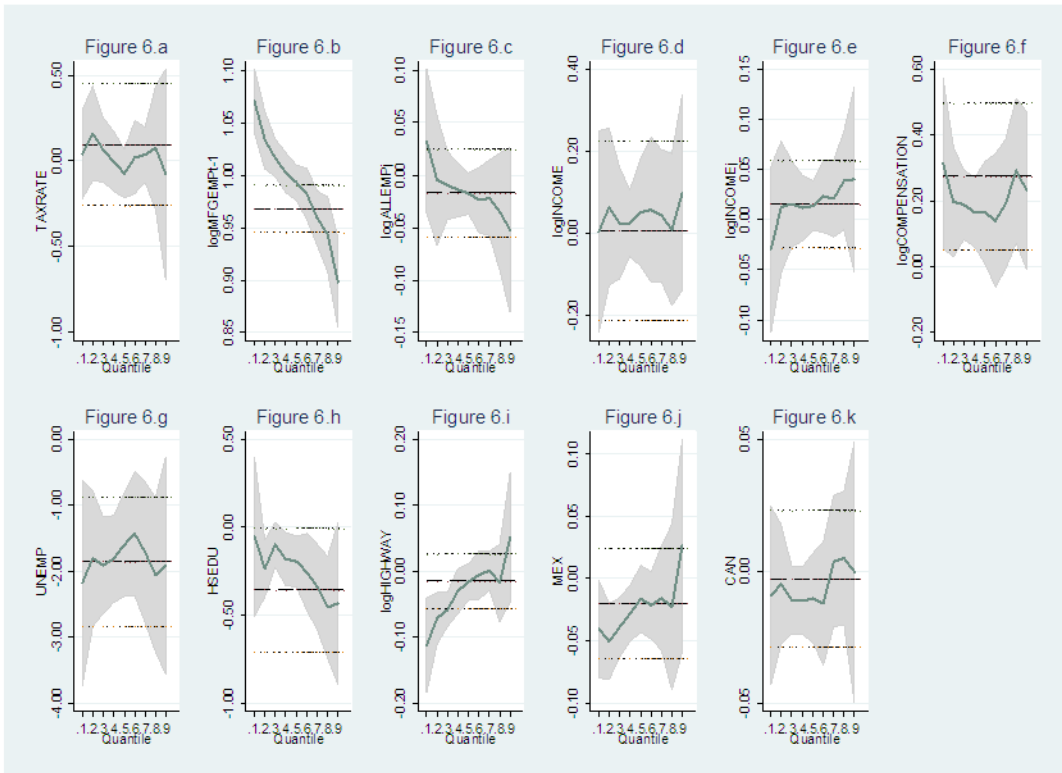


Figure 4.7: Robustness Check _ SQR Estimate Results when Only State Government Spending on Subsidy/Grant Is Incorporated

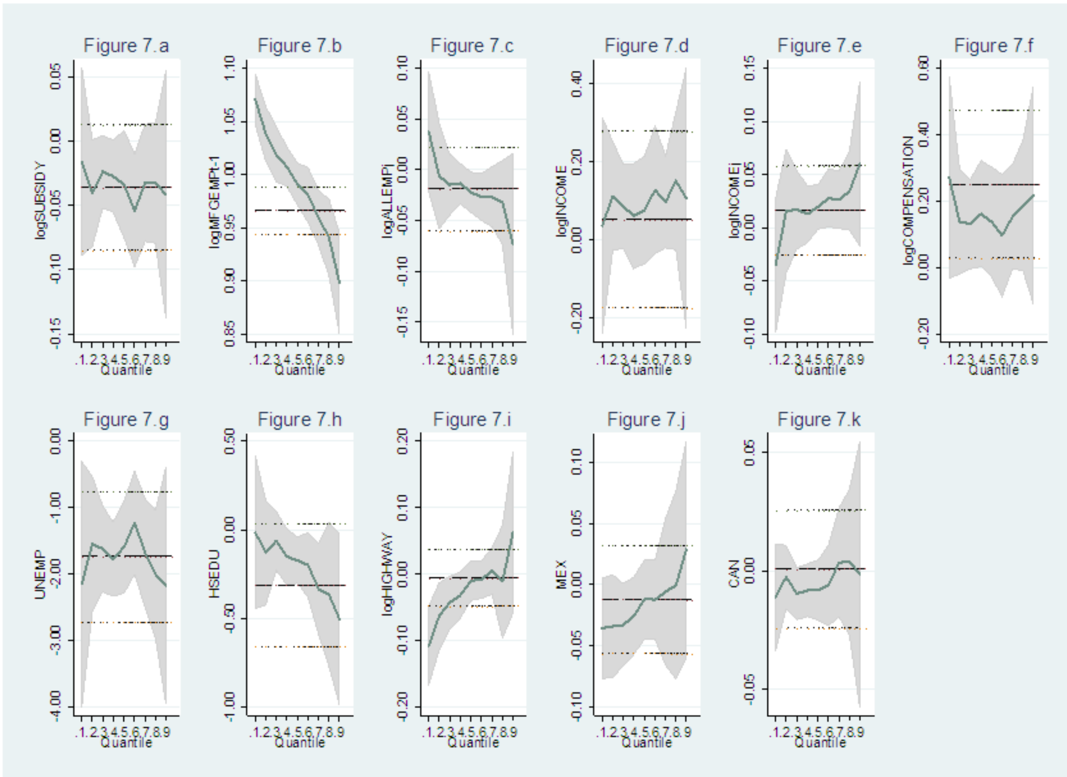


Figure 4.8: Robustness Check _ SQR Estimate Results when Only State FTZs Are Incorporated into the Examination

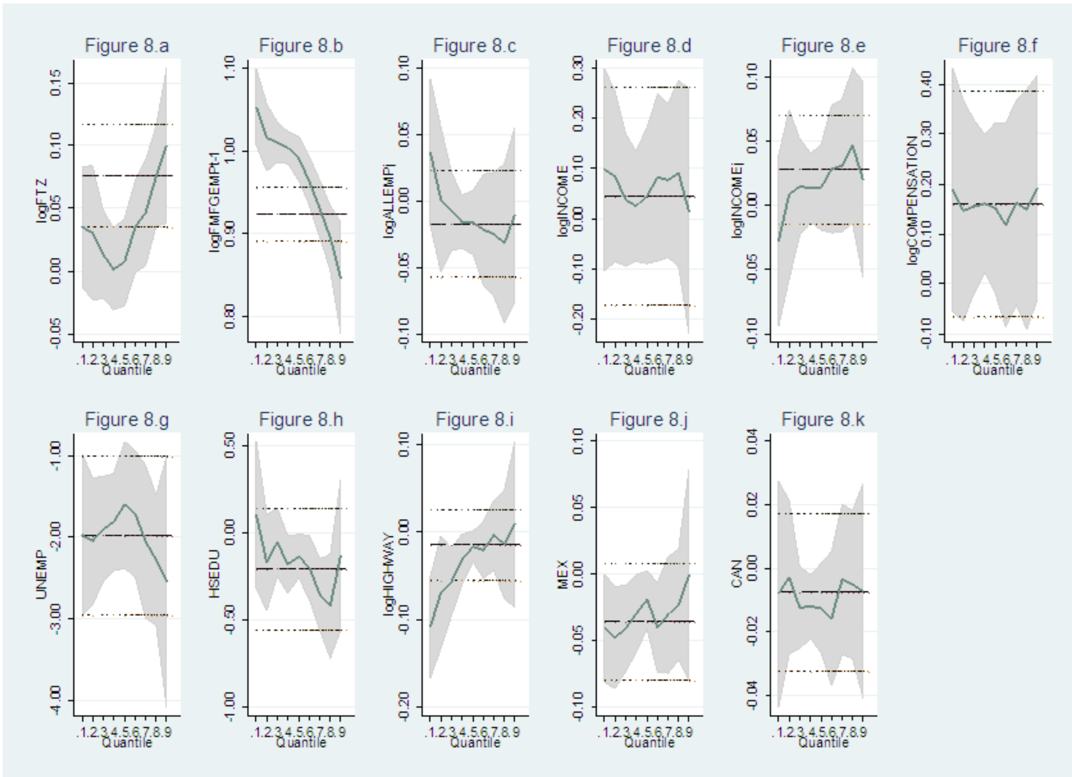
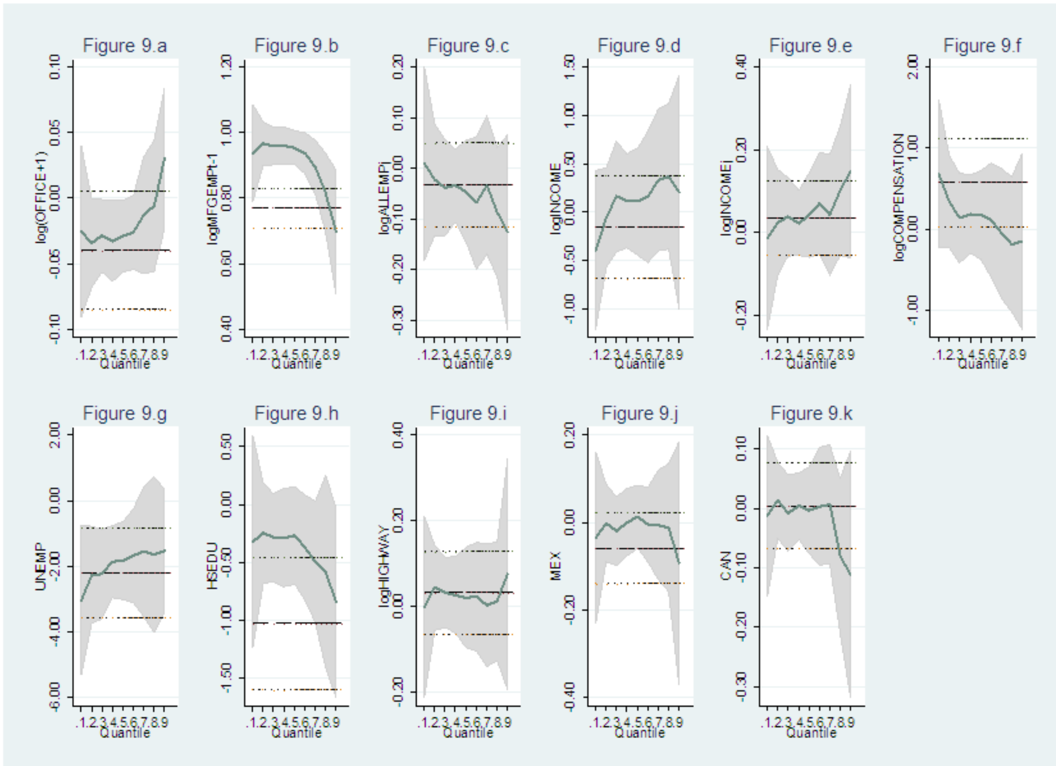


Figure 4.9: Robustness Check _ SQR Estimate Results When Only State International Offices Are Incorporated



Chapter 5:

Entry/Exit Behavior and Employment by Foreign Firms in the US: Sunk Costs, Agglomeration and Investment-Promotion Policies

5.1. Introduction

The expansion of worldwide FDI is remarkable. In the latter half of the 1990s, FDI flows increased annually by around 32%. During the same period, exports increased annually only by 1.5% and the annual growth in world GDP was only 0.6% (Blonigen et al. 2007). The conventional empirical studies on the determinants of FDI entry and exit behavior have relied on either a gravity-type framework or a logit location choice model utilizing firm-level data. More recently, the direction of FDI entry/exit studies has moved from cross-country level towards state/province or even county level. One important reason is that the huge heterogeneity across countries may lead to significant unobservable issues thus biasing the empirical estimation. Meanwhile, some unconventional factors, e.g. FDI agglomeration and spatial interaction across neighboring regions, have been proposed as important determinants of FDI location choice.

Producers' discrete decisions of entry and exit determine the market structure. In the field of Industrial Organization, studies commonly use a two-stage model of entry and competition initiated by Bresnahan and Reiss (1987). Recently, Pakes, Ostrovsky and Berry (2007) developed a dynamic model of entry and exit within the context of imperfect competition to describe the evolution of market structure (Dunne et al. 2009). In their model, the number of firms is determined by firms' entry and exit decisions and is thus endogenous. Firms' choices of entry/exit depend upon their continuation value and entry value. An incumbent will exit the market if expected future profits cannot cover fixed cost. A potential entrant will enter the market if the discounted entry value exceeds its private entry cost. The key step here is to estimate the incumbent's (potential entrant's) perceived transition probabilities across states of the market.

Pakes, Ostrovsky and Berry (2007), by showing how to measure the continuation and entry values from market level data on profits, exit rates and transition rates for market states (Dunne et al. 2009), motivates my investigation of the FDI entry/exit behavior without firm-level data. The implication of local government promotion policy on FDI behavior could also be investigated. Believing that FDI could stimulate local economic growth by increasing employment, transferring new technology and management know-how, many local governments in the U.S. compete aggressively for new FDI by offering various promotion policies to foreign investors (Head et al. 1999). The empirical research is ambiguous regarding the effectiveness of FDI promotion policies. However, the promotional activities by local governments will affect foreign firms' entry costs and fixed costs. As a result, foreign firms may make an entry/exit decision in a different way than domestic firms.

To sum up, this empirical study attempts to test the entry/exit model offered by Pakes, Ostrovsky and Berry (2007) within the context of US county-level FDI in retail industry. To my knowledge, few studies of FDI entry/exit have employed this model and utilized the market-level data.

5.2. Previous Literature on FDIs' Location Choices

5.2.1. Theoretical Literature

The theoretical analysis of Multinational enterprises (MNEs) begins from two important studies. Markusen (1984) provides the first theorem of "horizontal" FDI, which means MNEs arise due to a market-access motive to substitute for export flows. Based on this model, FDI flows into the host region in order to avoid trade frictions. Finally, they sell products to host market. In contrast, Helpman (1984) develops a general-equilibrium model in which MNEs locate firms in the host country not for market access, but for a better resource of production input. Based on this "vertical" FDI model, MNEs investigate potential destination countries searching for the lowest-cost input provider.

Recently developed theoretical models of FDI relax the two-country assumption to allow for more realistic spatial interactions in MNEs location choice motives. Bergstrand and Egger (2004) develop a model of "export-platform" FDI, in which a destination market is selected by MNEs to produce and serve a "third" market as a platform through exporting the final goods from the host market to the "third" market. This type of FDI is a plausible outcome when the trade protection between the host and the "third" markets is relatively lower than trade frictions between the parent and the "third" countries. A more complicated variation of Helpman's "vertical" FDI model, the "complex-vertical" FDI, was offered by Baltagi et al. (2007) . Based on this model, an MNE will separate out different activities along its vertical production chain across regions to exploit the comparative advantages of each location. The incentive for MNEs to follow this type of FDI may be the agglomeration economies due to the supplier networks, or just the immobile resources.

5.2.2. Empirical Literature

The question that what determines the FDI location decision continues to intrigue academics and policy-makers. Conventional empirical studies on the determinants of FDI have relied on a gravity-type framework and used data on bilateral country-level FDI activity. The widely suggested determinants include production costs, infrastructure, institutions, market size and geographical distance, etc. For example, Fredriksson et al. (2003) focus on testing the "pollution haven" hypothesis and the relationship between corruption and FDI by investigating the effect of endogenous US state environmental regulations on FDI inflows controlling for state government corruption. They regress a continuous measure of inbound FDI in a state on environmental regulation, supply of public goods, control variables (including tax effort, unemployment and unionization, market proximity, population, wage rate, land value, etc), and state/time dummies, using both OLS-FE and IV-FE estimators. Their empirical results confirm the expected role played by aforementioned determinants (see also Levinson 1996, List and Co 2000).

More recently, the direction of FDI location choice studies has moved from cross-country level towards state/province or even county level. This reflects a concern that the huge heterogeneity across countries may lead to significant unobservable issues thus biasing the empirical estimation. During the same period, some unconventional factors have been proposed as important determinants for FDI location choice. First, agglomeration among FDI could impact MNEs entry decision. This sort of FDI concentration within one region could result in huge economies of scale, as well as the convenience of sharing information and labor pooling (Krugman 1991). For instance, Du et al. (2008*)* investigate the importance of agglomeration economies and institutional quality in addition to the conventional factors like production costs and infrastructure as determinants of FDI location choices. To account for the issue of endogeneity, they utilize a discrete choice model with firm-level data on manufacturing firms from U.S., EU, Japan and Korea over the period 1993–2001 in China. As a result, they mainly focus on how regional institutions and industry agglomeration affect individual foreign firms’ location choice without worrying about codetermination. The empirical results from a conditional logit model confirm that higher horizontal and vertical agglomerations and stronger regional institutions promote inward FDI. Foreign horizontal agglomeration may help overcome the regional weak institutions and thus it plays a more pronounced role in regions with weaker institutional strength.

Blonigen et al. (2005) examine the potential effect of networking connections through horizontal keiretsu (a type of within-industry clustering) on Japanese manufacturing MNEs' location choices by employing a conditional logit model. To distinguish between agglomeration effects and networking/information effects, they consider both stock measures (agglomeration) and one-year flow measures (information) for 4 types of clustering within a region. In contrast to previous studies that examined only whether membership in a horizontal keiretsu affects investment decisions, they investigate the effect of recent investment activity by horizontal keiretsu members across regions to identify the networking effect (cf. Kolstad and Villanger 2008; Barrios et al. 2006; List 2001; Ge 2009).

Second, the spatial agglomeration spillover effect between bordering regions has been highlighted but not sufficiently investigated. The spatial effects vary with patterns of FDI. The "horizontal FDI", which is motivated by market access and minimizing transportation costs and import protection in host countries, incurs no spatial relationship with FDI in neighboring markets. The "export-platform FDI", which assumes MNEs choose one region to produce and serve other markets via exports, may imply both a negative spatial lag and a positive surrounding-market potential effect. In the model of "vertical FDI", MNEs will select the host country which is the lowest-cost provider to produce and resend the goods to their parent markets. So, we could predict a negative spatial lag coefficient and an insignificant surrounding-market potential effect.

The first study concerning the spatial interaction of FDI agglomeration is Coughlin and Segev (2000b). By looking at US FDI across Chinese provinces, this paper finds that the FDI flows into one province is positively correlated with FDI flows into neighboring provinces due to the spatial spillover of agglomeration economies. Blonigen et al. (2007) investigate two questions that are not addressed by the previous literature by utilizing a panel of annual data on US outbound FDI into 35 host countries for the period 1983 to 1998. The first question is whether the omission of spatial interactions biases coefficients on conventional regressors and the other question is how robust the estimated spatial relations in FDI patterns across samples are.

Third, believing that FDI could stimulate local economic growth by increasing employment, transferring new technology and management know-how, many local governments in U.S compete aggressively for new FDI by offering various promotion policies to foreign investors (Head et al. 1999). Whether those FDI promotion policies work or not has not been concluded in the empirical work.

Girma et al. (2007) focus on investigating whether the grant provision system in the Irish manufacturing sector has contributed to enhancing plant survival probabilities. Their empirical results indicate that the grant payments have differential impacts on the performance between domestic firms and foreign multinationals. The grant provision can effectively enhance domestic-owned plant survival probabilities; however, the evidence on foreign-owned firms is much more tentative.

Governmental subsidies are offered to regions with low economic growth performance for the purpose of attracting investments from multinationals. Devereux et al. (2007) investigate the question that whether the potential benefits from agglomeration affects the effectiveness of fiscal instruments like government discretionary grants to investors. Their study further disentangles the effects of agglomeration externalities into two parts, namely, the effects of localization within industry (horizontal agglomeration), and the diversification across industries (vertical agglomeration). To fulfill these objectives, they first use data on matched grant-offered-plants which actually have grants to estimate coefficients for expected grants equation. Then, they use the estimated parameters to obtain an expected grant for each entrant in each location. When investigating the impacts of grants and agglomeration on firm locational choice, they use a fixed effect conditional logit model.

5.3. Previous Literature on Market Structure in Empirical IO

5.3.1. Static Equilibrium Models

When investigating the dynamics of market structure adjustments to policy changes, the key determinants include sunk entry costs and scrap value (sell-off value) if firms exit the market. However, the lack of "sunk costs" data has been existing for a long time. The first difficulty is that they are proprietary and are thus very hard to access. The second problem is that they are difficult to measure. As a result, the early stream of entry/exit studies has to rely on two-period static models which only make sense when the sunk costs are assumed away. The static nature of this type of model precludes accounting for the impacts of environmental dynamics on market structure over time; see Bresnahan and Reiss (1990,1991), Berry (1992), Mazzeo (2002), Seim(2002), and Cilberto and Tamer (2007).

The early studies with static equilibrium models of the market structure focused on the optimal number of active firms across markets. For example, Bresnahan and Reiss (1990) assume that variable profits in a market depend on the market structure and exogenous variables representing the effects from demand and cost variables. Market structure is assumed to linearly depend on market population, contiguous market population and population growth. Based on this set-up, we could expect that the coefficients on the number of firms are negative and decreasing in magnitudes with the number of active firms in the market. One important issue associated with static two-step models is that they may result in multiple equlibria which makes it impossible to determine the probability of an outcome conditional on observables and estimated parameters (Pakes, Ostrovsky and Berry 2007). Almost all papers in the early entry/exit literature tried to deal with this critical issue using different methods.

Berry (1992) considered the effect of nonunique equilibriums in a sequential-move entry model and allowing for fixed costs to vary among firms. He modeled airlines' decisions to serve airline routes as a result of a comparison between variable profits and fixed costs. The homogeneous-product variable profit for a firm in a certain market depends on mileage between endpoint cities, population, number of operating firms and unobserved profit shocks. The heterogeneity is modeled in fixed costs which contain a set of dummies, like whether a firm serves both endpoint cities. To guarantee the uniqueness of equilibrium, he made a key assumption that airlines are post-entry symmetric such that the only thing that affects profits is the total number of operating firms. A market structure of N^* firms is the unique equilibrium when it satisfies the condition that N^* results in nonnegative net gains while (N^*+1) will lead to non-positive net gains.

Mazzeo (2002) obtained data on motels with different qualities at geographically distinct highway exits. His discrete choice game is one where potential entrants decide about both the quality and the entry. To address the non-uniqueness issue of equilibrium, he made two assumptions. The first follows Berry (1992) and assumes a sequential-move game. This assumption guarantees a unique prediction for the game. Different from Berry (1992), he assumed that motels are ex ante symmetric and then select qualities after entry. This makes it possible to estimate profit functions without knowing the order of entry. Assuming that the entry of a motel with the same quality lowers profits more than a different-quality monopolist, we could infer that the 2nd-mover will always choose the other quality than the 1st-mover no matter what type the 1st-mover selected.

Ciliberto and Tamer (2009) utilize a “bounds” approach which properly fit the situation in which the econometric model cannot make complete predictions about observed outcomes. The general idea is that, if a firm enters, then its expected average profit plus the unexpected profit shock should be nonnegative. However, in the existence of multiple equilibria, the aforementioned conditions are necessary but not sufficient, because the observed and unobserved profit shifters may result in different entry decisions. As a result, they calculate the joint probabilities across firms in a market that satisfy the aforementioned two conditions using the distribution of unobserved profit shocks. Note that, these probabilities are upper bounds, in the sense that necessary conditions are weaker than necessary and sufficient conditions. The problem of the “bounds” approach is that the “identified set” of parameters which satisfies the necessary-but-not-sufficient conditions may not be informative enough.

5.3.2. Dynamic Games

The aforementioned two-step static equilibrium analysis assumes away “sunk costs” and thus avoids computational complexity. Although useful in organizing empirical facts, it is unable to analyze the effects of dynamics in policies or in environment over time. In a lot of cases, these dynamics may greatly change the desirability of certain policies. As a result, the analysis based on dynamic oligopolistic competition becomes more informative. The examples of dynamic situation include entry/exit decisions, dynamic pricing and auction games, collusion study and investment decisions.

5.3.2.1. Framework

The critical feature of dynamic games is that the future state will be affected by current actions of firm. Through this channel, firms' future values and strategic interactions are impacted correspondingly. Assuming that all firms move simultaneously with symmetric information, we immediately obtain a set of objective functions, in which each firm maximizes its expected discounted sum of profits conditional on its current state and firm-specific profit shocks:

$$\max_a E[\sum_{t=0}^{\infty} ß^t \pi_i (a_t, s_t, v_{it})|s_0, v_{i0}] \quad (1)$$

The actions represented by a_{it} may be decisions on entry/exit, investment, prices and quantities. Relevant state variables s_{it} include firms' production capacities, product qualities, market share, technical progress, or the set of incumbent firms, etc.

For dynamic games with infinite time horizon, it is important to specify the transitions between states. In situations where current decisions have lasting effects on future states, for example, entry/exit decision and long-term investment, the current decisions could further impact future payoffs by affecting future states. So, it's reasonable to assume that states are distributed based on the probability function $P(s_{t+1}|s_{t,}a_t)$. Focusing on Markov perfect equilibria (MPE), in which a Markov strategy is defined as the action taken by a firm based on the current state and information, we could define a Markov strategy profile ψ_i as a MPE if for firm i, ψ_i is always preferable to $\psi_i^{'}$ given that opponents choose ψ_{-i}. That is:

$$V_i\,(s, v_i|\psi_i, \psi_{-i}) \geq V_i(s, v_i|\psi_i', \psi_{-i}) \quad (2)$$

In a recursive form of MPE, firm present discounted profits can be written as the Bellman equation (BLP 2007):

$$V_i\,(s, v_i|\psi) =$$

$$E_{v_{-i}}[\pi_i\,(\psi(s, v), s, v_i) + ß \int \mathrm{V_i}\,(\mathrm{s}', \mathrm{v_i}'|\,\psi)\mathrm{dG}(v_i'|s')\,dP\,(s'|\,\psi(s, v), s)] \quad (3)$$

5.3.2.2. The Nested Fixed Point Approach

In order to estimate the dynamic games model, one needs to calculate the continuation values. As the initial wave towards solving continuation values, Rust (1987) offered a direct method of obtaining continuation values by solving for a fixed point of a function. The methodology suggested by Rust (1987) could be simplified as a 3-step searching and matching procedure as follows:

1. Obtain an equilibrium firm value given a set of states and parameters Θ, with the help of computers;
2. Plug the equilibrium firm value into an objective function which is then estimated using data;
3. Iterate step 1 and step 2 in a searching process for the value of parameters until the objective functions are maximized.

Pakes and McGuire (1994) propose an algorithm for computing continuation values based on Rust's idea.[76] The advantage associated with the "nested fixed points" approach is that the 1st step contains no sampling error. However, one disadvantage of this method is the heavy computation burden in empirical models with hundreds of fixed points to calculate. Moreover, dynamic oligopoly models also suffer the problem of multiple equilibia, but using the "nested fixed points" approach to select the correct equilibrium is almost impossible.

5.3.2.3. Two-Step Approaches

To address the obstacle of computation complexity associated with "nested fixed points" approaches, the recent literature on dynamic games derived a set of nonparametric estimates of the continuation values, which effectively avoids the heavy computation of all equalibia. This set of methodology is grouped as "two-step approaches".

5.3.2.3.1 A Single Agent Dynamics Game

As the first attempt of using nonparametrics to release the complexity of computing continuation values in dynamic games, Hotz and Miller (1993) compared a single-agent dynamic discrete-choice problem with a static discrete-choice problem. They showed that, by replacing the mean utilities in a static game with the

---

[76] They suggest to begin with an initial guess of the value function, V0(s; Θ), and substitute it into the right hand side of the Bellman Equation (Eq.(3)). Then, solve the maximization equation on the right hand side of Eq. (3) for each state and every firm. This step will yield a new estimate of the value function V1(s; Θ), which is plugged back in to the Bellman Equation to compute for another new estimate of the value function. The iteration will last until we find the fixed point, i.e. the new and old value functions converge.

value functions in a dynamic one, we could obtain the continuation values nonparametrically follwing a similar "invertion" method used in static game literature to estimate mean utilities. Generally speaking, in the first step, we estimate the firm's choice probabilies for all states using a discrete choice model and then invert them to recover the corresponding continuation values. In the second stage, parameters of profit functions could be estimated using results from the first stage.

Hotz and Miller （1993）made an important simplifying assumption: firms' current payoffs only depend on the states of their own and that of rivals. If firms' payoffs also depend on the rivals' actions, which rely on their own shocks, then we need to integrate over all rivals current actions for maximizing each firm's profits. This would immediately complicate the compution. (As a comparison, one could refer to Aguirregabiria and Mira (2007), in which the firms' profits are modeled to depend on rivals' actions.) Based on Hotz and Miller's simplifying assumption, profits function is given by,

$$\pi_i(a_t, s_t, v_{it}) = \tilde{\pi}(a_{it}, s_t) + v_{it}(a_{it}), \tag{4}$$

where $v_{it}(a_{it})$ is firm i's private profit shock associated with the action a_{it}.

Further, we could obtain the Bellman equation for this problem,

$$V(s, v) = \max_a\{\tilde{\pi}(a, s) + v(a) + ß \int V(s', v')\, dG(v'|s')\, dP(s'|s, a)\}. \tag{5}$$

Now we can infer that in this discrete-choice problem, the mean profit works like the mean utility in a static game,

$$u_a(s) = \tilde{\pi}(a, s) + ß \int V(s', v')\, dG(v'|s')\, dP(s'|s, a). \tag{6}$$

The probability an agent selects an action can be expressed as in a static discrete-choice problem if firm-specific shocks are independent across time and agents,

$$\Pr(a|s) = \Pr(u_a(s) + v(a) \geq u_{a'}(s) + v(a'), \forall a'. \tag{7}$$

The left hand side of Eq.(7) can be obtained from data. The next step is to invert value functions from observed choice probabilities using the relationship

$$u_a(s) - u_1(s) = F_a. \tag{8}$$

Note that this transformation can only identify the normalized or differences in value functions at each state given the estimated choice probabilities. This is due to the nature of the discrete-choice model. Instead, the continuation values are obtained using a maximization routine,

$$V(s, v) = \max_a\{ u_a(s) + v(a)\} . \tag{9}$$

To estimate profit function parameters, in the second step we plug our estimated continuation values into the right hand side of Bellman equation to update,

$$\hat{V}(s; \Theta) =$$

$$\int \max_a\{\tilde{\pi}(a, s; \Theta) + v(a) + ß \int \hat{V}(s', v')\, dG(v'|s')\, dP(s'|s, a)\} dG(v|s). \tag{10}$$

Based on the new continuation values estimates from Eq.(10), we compute new predicted choice probabilities. We then use these choice probabilities to construct objective functions (e.g. pseudo-likelihood, or GMM) that match the model's predictions to the observed choices. One problem with this method, however, is that the firm values and transition rate are estimated nonparametrically. So, there may exist estimation error in the second stage objective function estimation.

5.3.2.3.2. An Investment Dynamics Game with Entry/Exit

Bajari, Benkard and Levin (2007) construct an investment game with entry and exit, in which each firm selects its investment level to improve its own state in the next period without investment spillovers. The appropriate examples that they considered include: (1) the investment improves product quality; (2) advertising investment increases consumers' awareness and (3) investment in capital stock. As a result, an incumbent firm's current profit from running business is equal to

$$q_{it}(s_t, p_t; \Theta_1)\big(p_{it} - mc(s_{it}, q_{it}; \Theta_2)\big) - C(I_{it}, v_{it}; \Theta_3). \tag{11}$$

Considering entry and exit behavior, the firms' current payoffs will depend on their actions (e.g. prices, investment, entry/exit) and their private shocks (e.g. individual entry cost). In a more specific way, at each period, the incumbent firms could choose either staying, or leaving and receiving a scrap value whose distribution is commonly known. The potential entrants could choose to enter the market if their expected discounted value of entering exceeds their entry costs. Both sell-off value and entry costs are assumed to be private information, while their distributions are commonly observed. Based on the aforementioned general framework, firms' current payoffs are given by

$$\pi_i(a_t, s_t, v_{it}) = \{\chi_{it} = 1\}\big[q_{it}(s_t, p_t; \Theta_1)\big(p_{it} - mc(s_{it}, q_{it}; \Theta_2)\big) - C(I_{it}, v_{it}; \Theta_3)\big] + (\chi_{it} - \chi_{i,t-1})^{-}\varphi - (\chi_{it} - \chi_{i,t-1})^{+}\kappa_{it}. \quad (12)$$

Bajari, Benkard and Levin (2007) follow a two-step approach to estimate the discounted values of future returns. They first nonparametrically estimate policy functions by regressing the observed actions on firms' state variables. Then, they use the estimated policies to obtain the discounted value of future returns by a Monte Carlo method.

5.3.2.3.3. Dynamic Discrete Games: Entry and Exit

Pakes, Ostrovsky and Berry (POB, 2007) developed a dynamic model of entry and exit which I briefly outlined in this sector. Assuming that the state variables, s = (n_t,z_t), and the counts of entrants and exits, (e_t, x_t) are observed, with n_t representing the number of incumbent firms and z_t referring to exogenous profit shifters; but, the sunk entry and exit costs are to be estimated. Correspondingly, the number of active firms n will be endogenously given by individual firms' entry and exit decisions and evolves as n' = n + e – x. They are mainly interested in estimating the fixed costs and entry costs by first estimating the continuation/ entry values.

Let's start with the behavior of incumbent firms to exit or to remain in the market. Assume that all incumbent firms have the same average profit $\pi\ (s;\theta)$. At the end of each period, they draw a fixed cost ϕ_i with an independent and identically distributed (i.i.d.) cumulative distribution function G^{ϕ}. If an incumbent firm remains in operation, then this fixed cost will be paid in next period. The firm will exit if its fixed cost exceeds the expected continuation values. So, an incumbent firm's probability of exit is:

$$p^{x}(s;\theta) = \Pr\big(\phi_i > VC(s;\theta)\big) = 1 - G^{\phi}\big(VC(s;\theta)\big). \tag{13}$$

The firm's payoff comes from its production profits as well as the discrete continue/exit decision:

$$V(s;\phi_i,\theta) = \pi(s;\theta) + \max\{\delta VC(s;\theta) - \delta\phi_i, 0\}. \tag{14}$$

Given the continuing incumbent's belief of the future state s', $E^{c}_{s'}$, it will earn the average profit $\pi(s')$ with the a production probability, $\big(1 - p^{x}(s')\big)$. When it actually produces in the future state s', it will earn the discounted expected future value net of the fixed cost. Thus, an incumbent's continuation value could be represented as:

$$VC(s) = E^{c}_{s'}\big[\pi(s') + E_{\phi'}(\max\{\delta VC(s') - \delta\phi', 0\})\big]$$

$$= E^{c}_{s'}\big[\pi(s') + \delta\big(1 - p^{x}(s')\big)\big(VC(s') - E(\phi'|\phi' \leq VC(s')\big)\big]. \tag{15}$$

The last expectation term is conditional on that the incumbent decide to produce in future as the expected continuation value outweighs the fixed cost. We may think about this expectation of fixed costs as the mean over ϕs that are less than VC(s').

To simplify our estimation, we could assume that the fixed costs ϕ follows an exponential random distribution, $G^{\phi} = 1 - e^{-(\frac{1}{\sigma})\phi}$ with parameter σ. So, the mean fixed cost below the value of VC(s') could be written as:

$$E\left(\phi' \middle| \phi' \leq VC(s')\right) = \sigma - VC(s')[p^x(s')/1 - p^x]. \tag{16}$$

Substituting Eq.(16) in to Ea.(15), the continuation value is simplified as:

$$VC(s) = E_{s'}^{c}\left[\pi(s') + \delta VC(s') - \delta\sigma\left(1 - p^x(s')\right)\right] \tag{17}$$

Using aggregate data on average profit and market turnover rate, POB (2007) suggest using nonparametric estimates of both the incumbents' perceived transition rates, $\hat{E}_{s'}^{c}$, and exit probability, $\hat{p}^x(s')$, to construct VC by substituting them into Eq.(17). In this way, we don't have to solve the continuation values at each parameter vector.

Next, let's look at the decision procedure of potential entrants. Assuming that each potential entrant faces a private entry cost κ_i with a common distribution, G^{κ}. A potential entrant will enter the market if its private entry cost is less than the discounted expected entering value: $\delta VE(s') \geq \kappa_{i.}$ As a result, the entry rate is:

$$p^e(s) = \Pr\left(\kappa_i < \delta VE(s)\right) = G^{\kappa}(\delta VE(s)). \tag{18}$$

Once a potential entrant enters the market, its expected future payoffs will be the same as that of incumbents, however, all are conditional on a potential entrant's belief about the state transition rate, $E^e_{s'}$. The expected future payoff for a firm that enters the market is:

$$VE(s) = E^e_{s'}\left[\pi(s') + \delta VC(s') - \delta\sigma\big(1 - p^x(s')\big)\right]. \tag{19}$$

Given $\widehat{VC}$, $\hat{\pi}$ from estimation of Eq.(17) and nonparametric estimates of $E^e_{s'}, \hat{E}^e_{s'}$, we can construct $\widehat{VE}$. Then, we could substitute $\widehat{VE}$ into Eq.(18) to estimate the entry cost cumulative distribution function G^{κ} using the entry flow data.

As an empirical application of POB (2007), Dunne et al. (2009) utilize the market level U.S. data on entry/exit flow for dentist and chiropractor industries in small towns to estimate a dynamic entry game. They first project the average profit function on the market structure and a set of exogenous variables (e.g. population, per capita income, etc) using revenue and cost data. And then, they estimate the entry/continuing values as well as the sunk costs by employing POB (2007) method. The main differences between the two studies appear in both the model setup and the method used to estimate continuation values. POB (2007) assumed that an incumbent will obtain a scrap value (sell-off value) if it exits the market, but Dunne et al. (2009) assumed a fixed cost for remaining incumbent in the next period. Moreover, POB (2007) suggested using nonparametric estimates of both $\hat{E}^c_{s'}$, and exit probability, $\hat{p}^x(s')$, to construct VC. This method may relief the computation complexity, since we don't need to calculate the continuation values for each parameter vector. Dunne et al. (2009), however, used a fixed-point approach to calculate VC. Given nonparametric estimate of $\hat{E}^c_{s'}$ which is obtained from observed data on the state transitions, they estimate VC as a fixed point to Eq.(17) with $1 - p^x(s') = G^{\phi}(VC)$. Though computationally complicated, this method may result in an exit rate that is consistent with other parameters.[77]

5.4. Empirical Model

Following Dunne et al. (2009), my methodology could be identified as a 3SLS-matching estimation. To be specific:

5.4.1. Profit Function

As the first step, we need to run the average profit for all foreign firms in a market (say a county) on variables such as FDI agglomeration structure (how many foreign firms are in the county in the last year), variables measuring the competition effect from domestic firms, a set of exogenous variables (population, personal income, average wage), FDI promotion policy variable showing how many Free Trade Zones are in the county, and market fixed effect:

$$\Pi_{mt} = \Theta_0 + \Theta_1 FDI_{m,t-1} + \Theta_2 FDI^2_{m,t-1} + \Theta_3 DOM_{mt} + \Theta_4 DOM^2_{mt} + \Theta_5 pop_{mt} + \Theta_6 pop^2_{mt} + \Theta_7 w_{mt} + \Theta_8 w^2_{mt} + \Theta_9 inc_{mt} + \Theta_{10} inc^2_{mt} + \Theta_{11}(pop_{mt} * w_{mt}) + \Theta_{12}(pop_{mt} * inc_{mt}) + \Theta_{13}(inc_{mt} * w_{mt}) + \Theta_{14} FTZ_{mt} + f_m + \varepsilon_{mt} \quad (20)$$

Although foreign firms and domestic firms may have different entry costs and fixed costs due to the promotion policies (e.g. government grant, tax credit and

[77] Dunne et al. (2009) argue that their fixed point approach to Eq.(17) is not a source of computation burden and their estimated VC are stable.

subsidy paid to FDI), there should not be significant difference in terms of profit ability between foreign firms and domestic firms which have same technological productivity level. Later on, we will use $\widehat{\Pi}_{mt}$, the estimate of equation (20) as the average profit condition for all firms in the market.

5.4.2. State Transitions, the Value of Entry and Continuation

In this stage, we need first to estimate two transition matrices M_c and M_e. To fulfill this purpose, we construct an exogenous aggregated market state variable vector z, which reflects income, population, wages and unobserved market-specific effects on profits based on the 1st-stage estimates:

$$\hat{z}_{mt} = \hat{\Theta}_5 pop_{mt} + \hat{\Theta}_6 pop_{mt}^2 + \hat{\Theta}_7 w_{mt} + \hat{\Theta}_8 w_{mt}^2 + \hat{\Theta}_9 inc_{mt} + \hat{\Theta}_{10} inc_{mt}^2 + \hat{\Theta}_{11}(pop_{mt} * w_{mt}) + \hat{\Theta}_{12}(pop_{mt} * inc_{mt}) + \hat{\Theta}_{13}(inc_{mt} * w_{mt}) + \hat{f}_m + \hat{\Theta}_{14} FTZ_{mt}. \quad (21)$$

Then, following Dunne et al. (2009) we discretize the market state variables for all counties into a small number of categories (e.g low-z, median-z and high-z) and use the mean of each category z_d as the discrete set of points for evaluation. To highlight the impact of promotion policy on FDI entry/exit behavior, we separate all markets into policy groups based on their promotion strength which is measured by $\hat{F}_{mt} = \hat{\Theta}_{14} FTZ_{mt}$. We denote the means of each policy group as F_d and use it for evaluation.

Based on how many discrete groups we have in FDI, DOM, z_d and F_d, the size of transition matrices could be determined. In total, there are $FDI_{max}*DOM_{max}*z_d*F_d$ discrete states. For the computation convenience, we use 5 groups for z_d (large-, upper-middle-, middle-, lower-middle- and small-market) and 3 groups for F_d (high-, middle- and low-promotion policy). Even though, the size of estimated transition matrices could also be quite large, depending on FDI_{max} and DOM_{max} in the selected industry.

The transition probability for a continuing foreign firm is:

$$M_c^F(FDI', DOM', z'_d, F_d) =$$

$$M_{Fc}(FDI', DOM'|FDI, DOM, z_d, F_d) * M_z(z'_d|z_d) * I_{F_d}, \quad (22)$$

where

$$\widehat{M}_{Fc}(FDI', DOM'|FDI, DOM, z_d, F_d) =$$

$$\frac{\sum_{mt \in T(FDI,DOM,z_d,F_d)}(FDI - x_{mt}^F) * I[FDI_{mt+1} = FDI', DOM_{mt+1} = DOM']}{\sum_{mt \in T(FDI,DOM,z_d,F_d)}(FDI - x_{mt}^F)}. \quad (23)$$

Here, I is a dummy variable which is equal to one if in the period t+1 the state is FDI' and DOM'.

The transition probability for a continuing domestic firm is:

$$M_c^D(FDI', DOM', z'_d, F_d) =$$

$$M_{Dc}(FDI', DOM'|FDI, DOM, z_d, F_d) * M_z(z'_d|z_d) * I_{F_d}. \quad (24)$$

$$\widehat{M}_{Dc}(FDI', DOM'|FDI, DOM, z_d, F_d) =$$

$$\frac{\sum_{mt\in T(FDI,DOM,z_d,F_d)}(DOM - x^D_{mt}) * I[FDI_{mt+1} = FDI', DOM_{mt+1} = DOM']}{\sum_{mt\in T(FDI,DOM,z_d,F_d)}(DOM - x^D_{mt})}. \quad (25)$$

The transition probability perceived by a potential foreign entrant is:

$$M^F_e(FDI', DOM', z'_d, F_d) =$$

$$M_{Fe}(FDI', DOM'|FDI, DOM, z_d, F_d) * M_z(z'_d|z_d) * I_{F_d}, \quad (26)$$

where

$$\widehat{M}_{Fe}(FDI', DOM'|FDI, DOM, z_d, F_d) =$$

$$\frac{\sum_{mt\in T(FDI,DOM,z_d,F_d)}(e^F_{mt}) * I[FDI_{mt+1} = FDI', DOM_{mt+1} = DOM']}{\sum_{mt\in T(FDI,DOM,z_d,F_d)}(e^F_{mt})}. \quad (27)$$

The transition probability perceived by a potential domestic entrant is:

$$M^D_e(FDI', DOM', z'_d, F_d) =$$

$$M_{De}(FDI', DOM'|FDI, DOM, z_d, F_d) * M_z(z'_d|z_d) * I_{F_d}, \quad (28)$$

where

$$\widehat{M}_{De}(FDI', DOM'|FDI, DOM, z_d, F_d) =$$

$$\frac{\sum_{mt\in T(FDI,DOM,z_d,F_d)}(e^D_{mt}) * I[FDI_{mt+1} = FDI', DOM_{mt+1} = DOM']}{\sum_{mt\in T(FDI,DOM,z_d,F_d)}(e^D_{mt})}. \quad (29)$$

For all of the aforementioned transition probabilities, the transition probability for the exogenous state variable z is:

$$\widehat{M}_z(z_d'|z_d) = \frac{\sum_{mt \in T(FDI,DOM,z_d,F_d)} (e_{mt}^D) * I[z_{mt+1} = z_d']}{\sum_{mt \in T(FDI,DOM,z_d,F_d)} I[z_{mt} = z_d]}. \tag{30}$$

The estimators in equations for $\widehat{M}_{ij}$ (i=F or D; j=e or x) allow to get estimates of M_j^i.

5.4.3. Fixed Costs and Entry Costs

Assumptions about the distributions of fixed costs λ and entry costs κ are required for estimating these costs. Due to the local promotion policies, both costs could differ for foreign firms and domestic firms. For the sake of convenience, we assume that these costs are distributed as exponential random variables (Dunne et al. 2009). Accordingly, their cdf's are:

$$F^{\lambda_i}(\sigma_i) = 1 - e^{-(1/\sigma_i)\lambda_i}, \tag{31}$$

$$F^{\kappa_i}(\partial_i) = 1 - e^{-(1/\partial_i)\kappa_i}. \tag{32}$$

The subscription i is F or D, for foreign firms or domestic firms, respectively. σ_{i} is the mean fixed cost and ∂_{i} is the mean entry cost.

Before we estimate σ_{i} and ∂_{i} using Maximize Likelihood Estimator (MLE), we need the estimates of VCs and VEs. VCs are constructed as a function of the mean fixed cost σ:

$$\widehat{VC}_{mt}^i(\sigma_i) = \left[I - \delta \widehat{M}_c^i\right]^{-1} \widehat{M}_c^i[\hat{\pi} - \delta\sigma_i(1 - p_i^x)]. \tag{33}$$

VEs are also constructed as a function of the mean fixed cost σ:

$$\widehat{VE}^i_{mt}(\sigma_i) = \left[I - \delta \widehat{M}^i_e\right]^{-1} \widehat{M}^i_e [\hat{\pi} - \delta \sigma_i (1 - p^x_i)]. \tag{34}$$

$\hat{\pi}$ is estimated in the first stage and $\widehat{M}^i_c$ and $\widehat{M}^i_e$ are from the second stage estimates.

Following Dunne et al. (2009), we estimate VC as a fixed point because $1 - p^x_i = F^{\lambda_i}\left(\widehat{VC}^i_{mt}\right)$. Given the estimators of continuation values and entry values, combining the exponential distribution assumption for costs, the log of the probability to observe a market with x^F_{mt} (the number of exits by foreign firms), x^D_{mt} (the number of exits by domestic firms), e^F_{mt} (the number of entrants by foreign firms) and e^D_{mt} (the number of entrants by domestic firms) is:

$$l(x^i_{mt}, e^i_{mt}; \sigma_{i,} \partial_i) = \sum_{i=F,D} \{ \left(n^i_{mt} - x^i_{mt}\right) \log(F^{\lambda_i}\left(\widehat{VC}^i_{mt}(\sigma_i); \sigma_i\right) + \left(x^i_{mt}\right) \log(1 - F^{\lambda_i}\left(\widehat{VC}^i_{mt}(\sigma_i); \sigma_i\right) + \left(e^i_{mt}\right) \log(F^{\kappa_i}\left(\widehat{VE}^i_{mt}(\sigma_i); \partial_i\right) + \left(p^i_{mt} - e^i_{mt}\right) \log(1 - F^{\kappa_i}\left(\widehat{VE}^i_{mt}(\sigma_i); \partial_i\right) \}. \tag{35}$$

Finally, given the observations on entry and exit flows, (x^i_{mt}, e^i_{mt}), we could estimate the mean fixed costs and entry costs by MLE, that is:

$$\max_{(\sigma_i, \partial_i)} L(\sigma_i, \partial_i) = \sum_m \sum_t l(x^i_{mt}, e^i_{mt}; \sigma_{i,} \partial_i). \tag{36}$$

A firm may quit the market if its future continuation value is less than the fixed cost, implying that the probability of exit for a firm with type i (i=F or D) is:

$$\hat{p}^x_i = prob(\lambda_i > VC(\sigma_i))$$

$$= 1 - F^{\lambda_i}\left(\widehat{VC}^i_{mt}(\sigma_i); \sigma_i\right). \tag{37}$$

A potential entrant may enter the market if the entry cost is lower than its expected value of entry. So, the probability of entry for firms with type i is:

$$\hat{p}_i^e = prob(\kappa_i < VE(\sigma_i))$$

$$= F^{\kappa_i}\left(\widehat{VC}_{mt}^{i}(\sigma_i\ ); \partial_i\right). \quad (38)$$

5.5. Data Description

Table 5.1 shows the descriptive statistics for U.S. inbound foreign-owned establishments in all industries in the year of 2002. California had the largest number of foreign-owned establishments (13969), and South Dakota had the least (152). On average, each state had 2325 foreign-owned establishments in 2002. The foreign-owned firms in California hired the largest amount of employments (673738), while Montana's FDIs had the least employments (4723). The average employment level for each state was 115601. California also had the largest amount of payrolls (34933 million dollars) and sales (317446 million dollars) from foreign-owned firms in all states. South Dakota and Montana has the least amount of payrolls and sales, respectively. The reported standard deviations indicate states vary significantly in terms of the absolute values. In contrast, the shares of foreign-owned establishments over all US establishments vary less drastically among states. Delaware (South Carolina) led all other states with 3.7 percent (9 percent) of total establishments (total employment) by foreign-owned firms. At the lower end, Montana had the lowest FDI shares in both total establishments (0.7 percent) and total employment (1.6 percent). Table 5.2 reports the descriptive statistics for U.S. inbound Foreign-

Owned Establishments in Retail Trade Industry only. The data reveals variations in both magnitudes and shares of retail FDI among states in 2002.

5.6. Ongoing Research

I prefer county-(or metropolitan-) level panel data on both foreign-owned firms and domestic firms for a specific industry (e.g. manufacturing or retail industry). The data on market level demand and cost variables, i.e. population, per-capita income and average wage paid to industry employees are available from annual *County and City Data Book,* various years. However, data on FDI that I've obtained from the Bureau of Economic Analysis are selected data of Majority-Owned U.S. Affiliates by Industry of Affiliate and selected data of U.S. inward FDI by states. The data include information about FDI employment, sales, net income, PPE, etc. either by industry or by state. Although I have not obtained the county-level data so far, I will keep searching. The empirical investigation will be conducted upon obtaining the data, and the resulting policy implications will be discussed as well. The primary contribution of this analysis is to examine how investment-promotion policies affect foreign firms' entry/exit behavior in the US within a dynamic market structure as proposed by POB (2007).

Table 5.1: U.S. Inbounds Foreign-Owned Establishments in ALL Industries

Discriptive Statistics, by state, 2002

States	Number of Establishments: Foreign-Owned	Number of Establishments: As % of all US Est.	Employment: Foreign-Owned	Employment: As % of all US Est.	Payroll (million$): Foreign-Owned	Payroll (million$): As % of all US Est.	Sales (million$): Foreign-Owned	Sales (million$): As % of all US Est.	Num. of FTZ
Total	118588	1.7	5895669	5.4	273947	7.4	2335700	13.5	249
Alabama	1539	1.6	83708	5.5	2932	6.7	24034	11	5
Alaska	292	1.6	14668	6.8	740	9.4	8770	22.1	5
Arizona	2002	1.7	64819	3.8	2306	4.5	16340	6.4	6
Akansas	537	0.9	33283	3.6	1083	4.4	14188	10.1	2
California	13969	1.8	673738	5.3	34933	7.3	317446	15	17
Colorado	2259	1.6	84461	4.3	3554	5.3	39815	13.4	2
Connecticut	2095	2.4	125260	8.3	6667	10.5	78374	31.2	4
Dalaware	867	3.7	32062	8.7	1858	13	22757	28.3	1
Dist. of Columbia	499	2.6	13619	3.9	712	4.2	3751	7.7	
Florida	7015	1.6	315390	5.1	10828	5.9	77162	9.3	20
Georgia	4313	2.2	198904	6.2	8582	8.1	90915	15.8	3
Hawaii	990	3.3	35110	8.4	1017	8.3	5699	10.9	1
Idaho	419	1.1	12284	2.8	399	3.4	2959	5	1
Illinois	5602	1.9	286205	5.7	14481	7.8	144122	16.1	8
Indiana	2012	1.4	153390	6.3	6521	8.5	54889	13.4	6
Iowa	826	1.1	41514	3.5	1466	4.3	15193	8.7	3
Kansas	829	1.2	37118	3.5	1408	4.4	13498	8	2
Kentucky	1497	1.7	95901	6.8	4145	10.1	40551	16.6	2
Louisiana	1274	1.3	52983	3.5	2242	5.2	39608	14.1	5
Maine	572	1.5	29966	6.3	973	7.2	8167	13.6	4
Maryland	2644	2.1	110548	5.5	4129	5.9	35235	12.5	4
Massachusetts	3824	2.3	201121	7	9360	8	64634	14.8	3
Michigan	3343	1.5	224455	6	11577	8.7	100197	15.3	7
Minnesota	1792	1.3	93147	4.1	4466	5.6	26050	7.3	2
Missisippi	604	1.1	25186	2.9	714	3.2	5905	5	3
Missouri	1909	1.4	96703	4.3	4025	5.6	42666	11.9	3
Montana	228	0.7	4723	1.6	131	1.8	1528	4.2	3
Nebraska	466	1	19408	2.7	628	3	4712	4.4	2
Nevada	808	1.6	35655	3.8	1652	5.7	7271	6.1	2
New Hampshire	808	2.2	41109	7.8	1743	10	9402	13	1
New Jersey	4216	1.8	255839	7.3	13992	10	130833	20.1	5
New Mexico	494	1.2	12805	2.3	441	3	2689	3.7	2
New york	8332	1.7	462951	6.4	34155	10.7	226859	20.8	13
N. Carolina	4098	2.1	218887	7	8283	8.6	66484	13.8	6
N Dakota	182	0.9	7426	3	259	4.1	2644	7.6	2
Ohio	4663	1.8	239390	5.2	9829	6.6	90035	12.5	10
Oklahoma	774	0.9	37845	3.3	1390	4.4	10307	6.5	4
Oregon	1399	1.4	52048	4.1	2052	5	23510	11.9	4
Pennsylvania	5094	1.8	271858	5.7	12214	7.7	73823	10.2	7
Rhode Isand	520	1.9	24699	6.2	776	6.2	5538	11.5	1
S. Carolina	1950	2.1	134110	9	4918	11.6	38506	17.8	3
S. Dakota	152	0.7	4940	1.7	156	2.1	1015	2.6	1
Tennessee	2611	2.1	136827	6.2	4973	7.3	45876	12.6	6
Texas	8319	1.8	370172	4.8	18042	7	177732	12.8	31
Utah	971	1.7	35196	4.1	1355	5.5	9776	8.6	1
Vermont	310	1.5	13483	5.5	412	5.8	3247	10.2	2
Virginia	3711	2.2	150768	5.3	5775	6	36490	9.3	5
Washington	2562	1.6	90674	4.3	3959	4.9	33718	9.8	13
W. Virginia	427	1.1	24233	4.5	944	6.6	8335	11.4	2
Wisconsin	1735	1.3	106419	4.6	4276	5.9	28609	8.3	3
Wyoming	234	1.3	8661	4.8	472	9.7	3837	13.4	1
Maximum	13969	3.7	673738	9	34933	13	317446	31.2	31
Minimum	152	0.7	4723	1.6	131	1.8	1015	2.6	1
Average	2325.255	1.652941	115601.4	5.084314	5371.471	6.562745	45798.06	11.89412	4.98
Standard Deviation	2636.017	0.584244	132504.5	1.790907	7358.326	2.517933	61481.1	5.702435	5.501354

Data source: Bureau of Economic Analysis, Bureau of Labor Statistics, U.S. Census Bureau, FTZ Board at U.S. Department of Commerce

Table 5.2: U.S. Inbound Foreign-Owned Establishments in Retail Trade Industry							
Descriptive Statistics, by state, 2002							
	Number of Establishments		Employment		Payroll (million$)	Sales (million$)	Num. of FTZ
States	Foreign-Owned	As % of all US Est.	Foreign-Owned	As % of all US Est.	Foreign-Owned	Foreign-Owned	
Total	30540	2.7	655359	4.5	13173	128684	249
Alabama	433	2.2	14004	6.3	278	2901	5
Alaska	55	2.1	969	2.9	20	171	5
Arizona	528	3.1	6283	2.3	130	1235	6
Arkansas	111	0.9	968	0.7	17	170	2
California	3337	3.1	50027	3.3	1251	12110	17
Colorado	778	4.1	9172	3.7	162	1651	2
Connecticut	447	3.2	22852	11.9	479	4476	4
Delaware	111	3	2754	5.3	56	545	1
District of Columbia	44	2.3	748	4	20	147	
Florida	2386	3.4	38146	4.2	715	6808	20
Georgia	990	2.9	16178	3.6	306	2941	3
Hawaii	302	6.1	5357	8.4	104	1265	1
Idaho	138	2.3	1535	2.2	29	315	1
Illinois	1097	2.5	18000	3	391	4053	8
Indiana	539	2.2	8808	2.6	193	2662	6
Iowa	246	1.8	3362	1.9	65	611	3
Kansas	194	1.6	1790	1.2	36	400	2
Kentucky	305	1.8	3446	1.6	59	664	2
Louisiana	261	1.5	5702	2.5	88	818	5
Maine	233	3.3	11624	14.5	197	2157	4
Maryland	814	4.2	29370	10.3	688	5923	4
Massachusetts	948	3.7	44860	12.5	906	8402	3
Michigan	708	1.8	16611	3.2	363	2972	7
Minnesota	434	2.1	5894	1.9	117	895	2
Missisippi	148	1.2	3499	2.6	62	571	3
Missouri	447	1.9	4029	1.3	87	841	3
Montana	44	0.9	564	1.1	10	80	3
Nebraska	115	1.4	1704	1.6	35	277	2
Nevada	248	3.4	3072	2.7	77	670	2
New Hampshire	276	4.1	11040	11.8	205	2195	1
New Jersey	827	2.4	27746	6.4	666	6287	5
New Mexico	122	1.7	1041	1.2	20	158	2
New York	1759	2.3	61574	7.3	1340	12121	13
N. Carolina	1099	3.1	35900	8.2	601	6582	6
N Dakota	56	1.6	618	1.5	11	83	2
Ohio	1565	3.7	21845	3.6	384	4508	10
Oklahoma	163	1.2	1978	1.2	40	352	4
Oregon	315	2.2	3158	1.7	70	1053	4
Pennsylvania	1100	2.3	29788	4.5	513	4709	7
Rhode Island	140	3.4	6979	13.8	141	1373	1
S. Carolina	600	3.3	17958	8.4	293	3038	3
S. Dakota	42	1	579	1.2	10	88	1
Tennessee	908	3.8	14906	4.9	250	2592	6
Texas	1714	2.3	20320	2	419	3837	31
Utah	356	4.4	4087	3.4	58	632	1
Vermont	125	3.2	3834	9.6	71	733	2
Virginia	1632	5.6	40533	10.1	743	7743	5
Washington	673	3	8682	2.9	176	1803	13
W. Virginia	122	1.6	2223	2.5	35	378	2
Wisconsin	447	2.1	8742	2.8	180	1593	3
Wyoming	58	2	500	1.7	8	98	1
Maximum	3337	6.1	61574	14.5	1340	12121	31
Minimum	42	0.9	500	0.7	8	80	1
Average	598.8235	2.633333	12850.18	4.588235	258.3333	2523.275	4.98
Standard Deviation	659.9098	1.125641	14624.08	3.729914	311.9327	2953.443	5.50135419

Data source: Bureau of Economic Analysis, Bureau of Labor Statistics, U.S. Census Bureau, FTZ Board at U.S. Department of Commerce

Bibliography

Aguireberria, V. and P Mira, 2007, "Sequential Estimation of Dynamic Discrete Games," *Econometrics* 75(1): 1-53.

Ahn, S. C. and P. Schmidt, 1995, "Efficient Estimation of Models for Dynamic Panel Data," *Journal of Econometrics* 68: 5-27.

Arauzo-Carod, J., D. Liviano-Solis and M. Manjon-Antolin, 2010, "Empirical Studies in Industrial Location: An Assessment of Their Methods and Results," *Journal of Regional Science*, Vol.50, No.3: 685-711.

Arellano, M. and O. Bover, 1995, "Another Look at the Instrumental-Variable Estimation of Error-Components Models," *Journal of Econometrics* 68: 29-52.

Arellano, M. and S. R. Bond, 1991, "Some Tests of Specification for Panel Data: Monte Carlo Evidence and An Application to Employment Equations," *Review of Economic Studies* 58: 277-297.

Arias, O., K. Hallock and W. Sosa-Escudero, 2001, "Individual Heterogeneity In The Returns to Schooling: Instrumental Variables Quantile Regression Using Twins Data," *Empirical Economics* 26: 7-40.

Bajari, P., L. Benkard, and J. Levin (2007), "Estimating Dynamic Models of Imperfect Competition," *Econometrica*, forthcoming. http://www.stanford.edu/~lanierb/research/d041107.pdf

Baltagi, B. H., P. Egger and M. Pfaffermayr, 2007, "Estimating Models of Complex FDI: Are There Third-country Effects?" *Journal of Econometrics* 140: 260-281.

Barrios, S., L. Bertinelli and E. Stobl, 2006, "Coagglomeration and Spillovers," *Regional Science and Urban Economics* 36: 467-481.

Barrios, S., L. Bertinelli and E. Stobl, 2006, "Coagglomeration and spillovers," *Regional Science and Urban Economics* 36: 467-481.

Bartik, T. J., 1985, " Business Location Decisions in the United States: Estimates of the Effects of Unionization, Taxes, and Other Characteristics of States," *Journal of Business and Economic Statistics*, Vol.3 No.1: 14-22.

Basu, K., and A. J. Felkey, 2008, "A Theory of Efficiency Wage with Multiple Unemployment Equilibria:How a Higher Minimum Wage Law Can Curb Unemployment," *The Institute for the Study of Labor (IZA) Discussion Paper No. 3381.*

Bellak, C. and M. Pfaffermayr, 2002, "Why Foreign-Owned firms Are Different: a Conceptual Framework and Empirical Evidence for Austria," in Jungnickel, R. (editor), *Foreign-owned Firms – Are They Different?* (pp. 13–57). Houndsmill: Palgrave.

Bellak, C., 2004, "How Domestic And Foreign Firms Differ And Why Does It Matter?" *Journal of Economic Surveys* 18(4): 483-514.

Bergstrand, J.H. and P. Egger, 2004, "A theoretical and empirical model of international trade and foreign direct investment with outsourcing: Part 1, developed countries", *Mimeo*.

Berry, S., 1992, "Estimation of a Model of Entry in the Airline Industry", *Econometrica* 60(4): 889-917.

Berry, S. and P. Reiss, 2007, "Empirical Models of Entry and Market Structure," forthcoming in Armstrong and Porter (eds.) *Handbook of Industrial Organization*, Volume III. Amsterdam, North Holland.

Blonigen, B. A. , R. B. Davies, G. R. Waddell and H. T. Naughton, 2007, "FDI in space: Spatial autoregressive relationships in foreign direct investment," *European Economic Review* 51:1303-1325.

Blonigen, B. A., and R. B. Davies, 2004, "The effects of bilateral tax treaties on U.S. FDI activity," *International Tax and Public Finance* 11: 601-622.

Blonigen, B. A., R. B. Davies, G. R. Waddell and H. T. Naughton, 2007, "FDI in Space: Spatial Autoregressive Relationships in Foreign Direct Investment," *European Economic Reviews* 51: 1303-1325.

Blonigen, B.A., C.J. Ellis and D. Fausten, 2005, " Industrial groupings and foreign direct investment," *Journal of International Economics* 65: 75-91.

Blundell, R.W. and S. R. Bond, 1998, "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models," *Journal of Econometrics* 87: 115-143.

Bresnahan, T. and P. Reiss, 1990, "Entry in Monopoly Markets", *Review of Economic Studies* 57: 531-553.

Broaconier, H., P. Norback and D. Urban, 2005, " Multinational enterprises and wage costs: Vertical FDI revisited," *Journal of International Economics* 67: 446-470.

Bureau of Economic Analysis (BEA), 2010, *Foreign Direct Investment in the U.S.: Financial and Operating Data for U.S. Affiliates of Foreign Multinational Companies,* various years.

Cameron, A. C., and P. K. Trivedi, 2005, *Microeconometrics: Methods and Applications*, Cambridge University Press.

Carlton, D. W., 1983, "The Location and Employment Choices of New Firms: An Econometric Model with Discrete and Continuous Endogenous Variables," *Review of Economics and Statistics* 65: 440-449.

Cheng L. K. and Y. K. Kwan, 2000, " What are the determinants of the location of foreign direct investment? The Chinese experience," *Journal of International Economics* 51: 379-400.

Cieślik, A., 2005, "Location of Foreign Firms and National Border Effects: The Case of Poland," *Journal of Economic & Social Geography 96*, 440-449.

Cilberto, F. and E. Tamer, 2007, "Market Structure and Multiple Equilibria in Airline Markets," working paper, http://people.virginia.edu/~fc3p/papers/SSRN-id605723.pdf.

Coad, A., and R. Rao, 2007, "The Employment Effects of Innovations in High-Tech Industries," *Papers on Economics and Evolution*, No. 0705.

Coughlin, C. C. and E. Segev, 2000, "Location Determinants of New Foreign-Owned Manufacturing Plants," *Journal of Regional Science*, Vol.40, No.2: 323-351.

Coughlin, C., and E. Segev, 2000b, " Foreign direct investment in China: a spatial econometric study," *The World Economy* 23(1): 1-23.

D'Agostino, R.B., A. Balanger and R.B. D'Agostino Jr., 1990, "A Suggestion for Using Powerful and Informative Tests of Normality," *American Statistician* 44: 316-321.

Desai, M. A., C. F. Foley and J. R. Hines Jr., 2004, "Foreign Direct Investment in a World of Multiple Taxes," *Journal of Public Economics* 88: 2727-2744.

Devereux, M.P., R. Griffith, and H. Simpson, 2007, "Firm location decisions, regional grants and agglomeration externality," *Journal of Public Economics* 91: 413–435.

Du, J., Y. Lu and Z. Tao, 2008a, "Economic institutions and FDI location choice: Evidence from US multinationals in China," *Journal of Comparative Economics* 36: 412-429.

Du, J., Y. Lu and Z. Tao, 2008b, "FDI Location Choice: Agglomeration Vs. Institutions," *International Journal of Finance and Economics* 13: 92-107.

Dufrenot, G., V. Mignon and C. Tsangarides, 2010, “The Trade-Growth Nexus in the Developing Countries: a Quantile Regression Approach,” *Review of World Economics* 146: 731–761.

Dunne, T, S. D. klimek, M. J. Roberts and D. Y. Xu, 2009, “Entry, Exit and the Determinants of Market Structure,” NBER Working Paper 09-07.

Falzoni, A. M., and M. Grasseni, 2005, “Home Country Effects of Investing Abroad: Evidence From Quantile Regressions,” manuscript, University of Bergamo and CESPRI – Bocconi University.

Fayissa, B., and C. Nsiah, 2010, “The Impact of Governance on Economic Growth: Further Evidence for Africa,” Middle Tennessee State University, *WORKING PAPER SERIES*.

Figlio, D. and B. Blonigen, 2000, "The Effects of Foreign Direct Investment on Local Communities," *Journal of Urban Economics* 48:338-363.

Ford, T., J.C. Rork, and B. Elmslie, 2008, “Foreign Direct Investment, Economic Growth, and the Human Capital Threshold: Evidence from U.S. States,” *Review of International Economics* 16, 679–690.

Ford, T..C and J.C. Rork, 2010, “ Why buy what you can get for free? The effect of foreign direct investment on state patent rates,” *Journal of Urban Economics* 68: 72–81.

Foreign Trade Statistics (FTS), U.S. Census Bureau, 2010, *Top Trading Partners - Surplus, Deficit, Total Trade*. http://www.census.gov/foreign-trade/top/index.html#1998.

Fredriksson, P. G., J. List and D. Millimet, 2003, "Bureaucratic Corruption, Environmental Policy and Inbound US FDI: Theory and Evidence," *Journal of Public Economics* 87: 1407-1430.

Gabe, T. M., and K. P. Bell, 2004, “Tradeoffs Between Local Taxes and Government Spending as Determinants of Business Location,” *Journal of Regional Science*, Vol.44, No.1: 21-41.

Galvao, A., 2009, “Quantile Regression for Dynamic Panel Data with Fixed Effects," manuscript, University of Wisconsin-Milwaukee.

Ge, Y., 2009, “Globalization and Industry Agglomeration in China,” *World Development* 37(3): 550-559.

Girma, S., and H. Görg, 2005, "Foreign Direct Investment, Spillovers and Absorptive Capacity: Evidence from Quantile Regressions," *Kiel Institute for World Economics*, Kiel Working Paper No. 1248.

Girma, S., and Y. Gong, 2008, "Putting People First ? Chinese State-Owned Enterprises' Adjustment to Globalization," *International Journal of Industrial Organization* 26(2): 573–585.

Girma, S., D. Greenaway, and K. Wakelin, 2001, "Who Benefits From Foreign Direct Investment in the UK?" *Scottish Journal of Political Economy* 48: 119–33.

Girma, S., H. Gorg and E. Strobl, 2007, "The Effects of Government Grants on Plant Survival: A Micro-Econometric Analysis," *International Journal of Industrial Organization* 25, 701-720.

Goel, R. K., and R. Ram, 2004, "Quantile-Regression Estimates of Cigarette Demand Elasticities for the United States," *Journal of Economics and Finance* 28(3): 413-421.

Gomanee, K., S. Girma, and O. Morrissey, 2005, "Aid, Public Spending And Human Welfare: Evidence from Quantile Regressions," *Journal of International Development* 17: 299–309.

Görg, H., and E. Strobl, 2002, "Multinational Companies and Entrant Start-up Size: Evidence from Quantile Regressions," *Review of Industrial Organization* 20: 15–31.

Görg, H., and E. Strobl, 2004, "Foreign Direct Investment and Local Economic Development: Beyond Productivity Spillovers," *GPT Research Paper 2004/11*.

Görg, H., E. Strobl, and F. Ruane, 2000, "Determinants of Firm Start-Up Size: An Application of Quantile Regression for Ireland,' *Small Business Economics* 14: 211–222.

Gross, D. M., and M. Ryan, 2008, "FDI Location and Size: Does Employment Protection Legislation Matter?" *Regional Science and Urban Economics* 38: 590-605.

Hamilton J. D., 1994, *Time Series Analysis*, Princeton University Press.

Hansen, L. P., 1982, "Large Sample Properties of Generalised Method of Moment Estimators," *Econometrica* 50: 1029-1054.

Head, C. K. and T. Mayer, 2004, "Market Potential and the Location of Japanese Investment in the European Union," *The Review of Economics and Statistics* 86(4): 959-972.

Head, C. K., 1998, “Comment on `Comparing Wages, Skills, and Productivity between Domestically and Foreign-Owned Manufacturing Establishments in the United States,´“ in Baldwin, R., R. Lipsey and J.D. Richardson (editors), *Geography and Ownership as Bases for Economic Accounting*, Chicago: Chicago University Press, pp. 255-258.

Head, C. K., J. C. Ries and D. L. Swenson, 1995, "Agglomeration benefits and location choice: Evidence from Japanese manufacturing investments in the United States," *Journal of International Economics* 38(3-4): 223-247.

Head, C. K., J. C. Ries and D. L. Swenson, 1999, “Attracting Foreign Manufacturing: Investment Promotion and Agglomeration,” *Regional Science and Urban Economics* 29: 197-218.

Helpman, E., 1984, “A Simple Theory of Trade with Multinational Corporations”, *Journal of Political Economy* 92: 451-471.

Helpman, E., and P. R. Krugman, 1985, “ Market Structure and Foreign Trade,” MIT Press, Cambridge, MA.

Hotz, J. and R. Miller, 1993, “Conditional Choice Probabilities and the Estimation of Dynamic Models”, *Review of Economic Studies* 60(3): 497-529.

International Trade Administration (ITA), U.S. Department of Commerce, 2010, *Invest in America*, http://www.investamerica.gov/home/iia_main_001154.asp.

Kemegue, F. and R. Mohan, 2009, “ US FDI flows to ASEAN-5: Do Geographic Neighbors Matter?” *MPRA Paper No. 5988, posted 28. November 2007.*

Koenker, R., 2004, “Quantile Regression for Longitudinal Data,” *Journal of Multivariate Analysis* 91:74-89.

Koenker, R., and G. Bassett, 1978, “ Regression Quantiles,” *Econometrica* 46(1): 33–50.

Koenker, R., and K. Hallock, 2001, “Quantile Regression,” *Journal of Economic Perspectives* 15: 143- 156.

Koenker,R., 2005, *Quantile Regression*, Cambridge Books, Cambridge University Press.

Kolstad, I. and E. Villanger, 2008, “Determinants of Foreign Direct Investment in Services,” *European Journal of Political Economy* 24: 528-553.

Kozlowski, P. J., A. Solocha and L. Dixon, 1994, “Attracting Foreign Direct Investment to States: Outcomes, Budgets, and Foreign Offices,” *Regional Science*

Perspectives 24(2): 3-14.

Krugman P., 199), "Increasing Returns and Economic Geography", *Journal of Political Economy* 99: 483-499.

Lamarche, C., 2010, "Robust Penalized Quantile Regression Estimation for Panel Data," *Journal of Econometrics* 157: 396-408.

Lee, K, S. Hwang and M.Lee, 2007, "Agglomeration Economies and Location Choice of Inward FDI in Korea," Working paper..

Levinson, A., 1996, "Environmental Regulations and Manufactures' Location Choices: Evidence from the Census of Manufactures," *Journal of Public Economics* 62: 5-29.

Levinson, A, 1996, "Environmental regulations and manufactures' location choices: Evidence from the Census of Manufactures," *Journal of Public Economics* 62: 5-29.

List, J. and C. Co, 2000, "The Effects of Environmental Regulations on Foreign Direct Investment," *Journal of Environmental Economics and Management* 40: 1-20.

List, J., 2001, "US County-level Determinants of Inbound FDI: Evidence From a Two-step Modified County Data Model," *International Journal of Industrial Organization* 19: 953-973.

List, J., W. W. McHone and D. Millimet, 2004, " Effects of environmental regulation on foreign and domestic plant births: is there a home field advantage?" *Journal of Urban Economics* 56: 303- 326.

List, J and C. Co, 2000, "The Effects of Environmental Regulations on Foreign Direct Investment," *Journal of Environmental Economics and Management* 40: 1-20.

Markusen, J. R., 1984, "Multinationals, Multi-Plant Economies and the Gains from Trade," *Journal of International Economics*16: 205-226.

Mata, J., and J. A. F. Machado, 1996, " Firm Start-Up Size: A Conditional Quantile Approach," *European Economic Review* 40: 1305-1323.

Mazzeo, M., 2002, "Product Choice and Oligopoly Market Structure," *RAND Journal of Economics* 33(Summer): 221-42.

McConnell, V. D., and R. M. Schwab, 1990, "The Impact of Environmental Regulation on Industry Location Decisions: The Motor Vehicle Industry," *Land Economics* 66:67-80.

Mold, A., 2004, "A Proposal for Unitary Taxes on the Profits of Transnational

Corporations," *CEPAL REVIEW* 82: 37-53.

Nataraj, S., 2008, "Distortionary Policies and the Size Distribution of Firms," UNIVERSITY OF CALIFORNIA, BERKELEY, *working papers*.

Okada, K., and S. Samreth, 2011, "The Effect of Foreign Aid on Corruption: A Quantile Regression Approach," *MPRA Paper* No. 27969.

Pakes, A. and P. McGuire, 1994, "Computing Markov-Perfect Nash Equilibria: Numerical Implications of a Dynamic Differentiated Product Model," *RAND Journal of Economics* 25(4): 555-589.

Pakes, A., M Ostrovsky, and S. Berry, 2007, "Simple Estimators for the Parameters of Discrete Dynamic Games, with Entry/Exit Examples," *RAND Journal of Economics* v. 38(2): 373-399.

Reed, W. R. and C. L. Rogers, 2006, "Tax Burden and the Mismeasurement of State Tax Policy," *Public Finance Review*34: 404.

Rogers, W., 1992, "Quantile Regression Standard Errors," *Stata Technical Bulletin Reprints* 3: 77–78.

Rust, J., 1987, "Optimal Replacement of GMC Bus Engines: An Empirical Model of Harold Zurcher," *Econometrica* 55(5): 999-1033.

Sargan, J.D., 1958, "The Estimation of Economic Relationships Using Instrumental Variables," *Econometrica* 26: 329-338.

Seim, K., 2002, "An Empirical Model of Firm Entry with Endogenous Product-Type Choices," *RAND Journal of Economics 33(Autumn)*: 619-40.

Shapiro, C. and Stiglitz, J. 1984, "Equilibrium Unemployment as a Worker Discipline Device," *American Economic Review* **74**, 433-44.

Shapiro, S.S. and R.S. Francia, 1972, "An Approximate Analysis of Variance Test for Normality," *Journal of the American Statistical Association* 67: 215-216.

Sula, O., 2008, "Demand for International Reserves: A Quantile Regression Approach," *MPRA Paper* No. 11680.

Sun, Q., W. Tong and Q. Yu, 2002, "Determinants of Foreign Direct Investment Across China," *Journal of International Money and Finance* 21: 79-113.

Tinbergen, J., 1962, "An Analysis of World Trade Flows," in *Shaping the World Economy*, J. Tinbergen(ed.). New York: Twentieth Century Fund.

Tuan, C. and L. Fung-Yee Ng, 2001, "Regional Division of Labor From Agglomeration Economies' Perspective: Some Evidence," *Journal of Asian Economics* 12: 65-85.

Tuan, C. and L. Fung-Yee Ng, 2003, "Location Decisions of Manufacturing FDI in China: Implications of China's WTO accession," *Journal of Asian Economics* 14: 51-72.

Tuan, C. and L. Fung-Yee Ng, 2006, "Spatial Agglomeration, FDI, and Regional Growth in China: Locality of Local and Foreign Manufacturing Investments," *Journal of Asian Economics* 17: 691-713.

Tuan, C. and L. Fung-Yee Ng, 2007, "The place of FDI in China's Regional Economic Development: Emergence of the Globalized Delta Economies," *Journal of Asian Economics* 18(2): 348-364.

U.S. Census Bureau (USCB), 2010, *State and Local Government Finance,* various years.

Woodward, D.P., 1992, "Locational Determinants of Japanese Manufacturing Start-Ups in the United States," Southern Economic Journal, Vol. 58, No. 3: 690-708.