

# The Determinants of Foreign Direct Investment in U.S. Real Estate: An Empirical Analysis

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Submitted to the Program in Real Estate Development in Conjunction with the Center for Real Estate on July 27<sup>th</sup>, 2011 in Partially Fulfillment of the Requirements for the Degree of Master of Science in Real Estate Development

## **ABSTRACT**

This thesis provides an empirical analysis of the determinants of foreign direct investment in commercial real estate (FDIRE) in the U.S. We examine the major factors that affect levels of FDIRE in the U.S. and foreign investors' location preferences.

First, using panel data from 2002 to 2006, this research develops a model to test the importance of GDP, GDP growth, national investment level, exchange rate, and interest rate in determining levels of FDIRE in the U.S. from major developed countries. Results of the study suggest that economic growth of a country unexpectedly encourages domestic investment rather than foreign investment, and depreciation of currency value of the host country attracts more FDIRE.

Second, the study analyzes the spatial distribution of FDIRE at the state level for the time period 1999 to 2007. A set of location determinants is selected to explain the pattern of FDIRE. These determinants include size of population, personal income, commercial real estate vacancy rate, commercial real estate completion rate, population growth, and personal income growth. Results of the study suggest that foreign investors prefer larger and wealthier states for direct commercial real estate investment. There is also evidence showing that foreign investors begin to diversify toward less populous and less wealthy states.

Thesis Advisor: William C. Wheaton  
Title: Professor of Economics

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I would like to sincerely thank my wife, my parents and sisters for their love, encouragement, and continuous support. Without them, none of these would have been possible.

- Min Liang

I would like to sincerely thank my parents and sister for their love, encouragement, and continuous support. I would also like to thank my grandmother in heaven for her love throughout my life. Without them, none of these would have been possible.

- Sunghoon Yoon

## Table of Contents

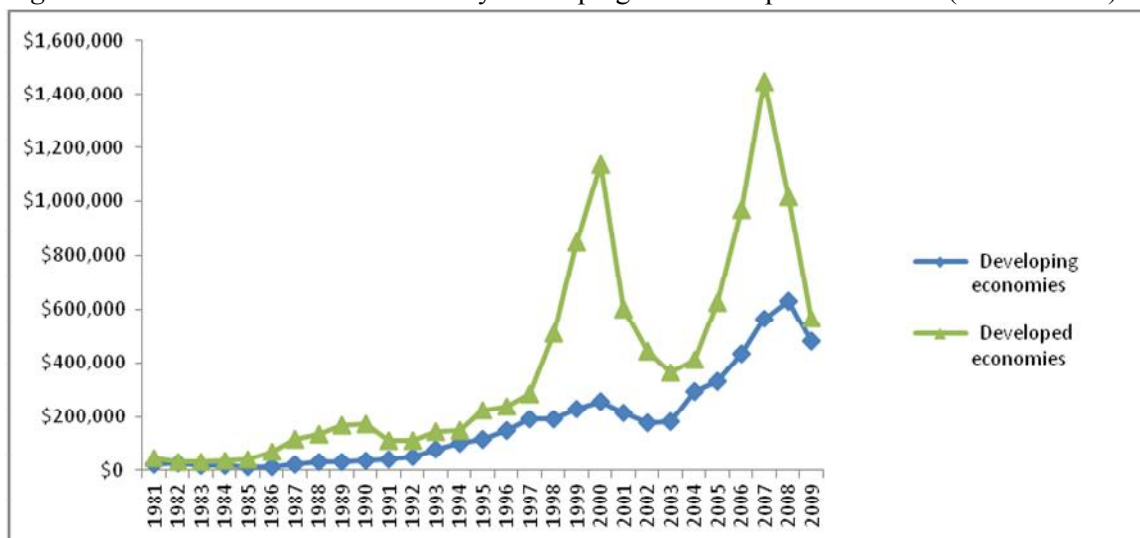
<b>Chapter 1. Introduction.....</b>	<b>6</b>
1.1 FDIRE in the U.S.....	6
1.2 Research Objectives.....	15
<b>Chapter 2. Literature Review.....</b>	<b>17</b>
2.1 Literature Review of Determinants of FDI.....	17
2.2 Applicable Current Trend of FDIRE in U.S. Residential.....	19
2.3 Literature Review of Location Preferences.....	22
<b>Chapter 3. Research Questions and Hypotheses.....</b>	<b>24</b>
<b>Chapter 4. Methodology.....</b>	<b>25</b>
4.1 Methodology for Question 1.....	25
4.2 Methodology for Question 2.....	27
<b>Chapter 5. Data.....</b>	<b>30</b>
5.1 Variables Definition for Question 1.....	30
5.2 Variables Definition for Question 2.....	33
<b>Chapter 6. Results and Findings.....</b>	<b>37</b>
6.1 Results and Findings for Question 1.....	37
6.2 Results and Findings for Question 2.....	44
<b>Chapter 7. Conclusion.....</b>	<b>49</b>
<b>Bibliography.....</b>	<b>51</b>

## Chapter 1. Introduction

### 1.1 FDIRE in the U.S.

Foreign direct investment (FDI) has been a prominent feature of globalization in the world economy. UNCTAD data (*Figure 1.1*) shows that the level of FDI inflows and outflows has been increasing since 1980.

*Figure 1.1:* FDI inflows and outflows by developing and developed economies (million USD)



Source: UNCTAD

Traditionally, direct real estate investment was mostly a local phenomenon. Real estate is considered among the least tradable products because it is physically unmovable. Investors focused on the local markets that they were most familiar with and direct investment in commercial real estate in foreign markets was limited. However, since the 1980s, with the increasing globalization of national economies, real estate investors have begun to venture out of their home countries in large scale. The United States, with its deep real estate market, stable political and economic systems, and strong legal protections for the investors, has been a top destination of foreign direct investment in real estate. According to U.S. Department of

Commerce, Bureau of Economic Analysis (BEA), commercial property assets held by U.S. non-bank affiliates of foreign-owned firms reached \$161.5 billion in 2007.

### **Overview of FDIRE Data**

There are two major sources of data on foreign direct investment in the United States. The BEA provides compilations of the stock for foreign direct investment in commercial real estate.

According to the BEA definition, foreign direct investment, as measured by capital inflow, is the dollar value of transactions made by a foreign parent company in a U.S. affiliate. A foreign parent company must possess at least a 10% stake in the U.S. affiliate, and the funds used for the transaction must be raised outside the United States. The available sample for the BEA data of FDIRE at the origin country level is from 2002 to 2006 time period. The available sample for the data at the recipient state level is from 1999 to 2007. The BEA data capture the foreign direct investment position in U.S. commercial real estate, which is the accumulation over the time.

Because of its position nature, BEA data do not indicate flow of foreign direct investment. Since this study also examines the flow of FDIRE, we need to calculate the flow using the BEA position data. The other issue with BEA data is missing observations. BEA data are collected through confidential surveys of companies. When there is only one company response, the value reported is depressed to avoid the disclosure of individual companies. We need to address the missing observations in this study.

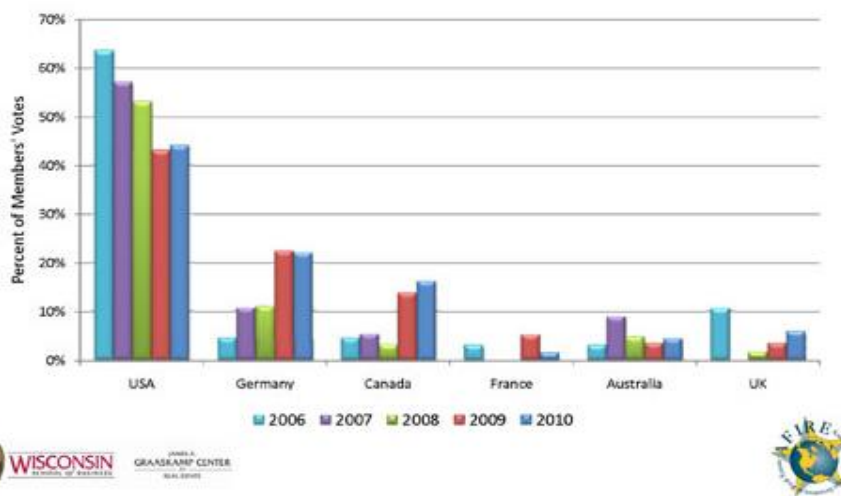
An alternative data source on FDIRE is from the International Trade Administration (ITA), U.S. Department of Commerce. ITA publishes annual reports on foreign direct investment transactions in the United States. Unlike BEA data, ITA data are compiled from generally available public sources, such as newspapers, magazines, and business and trade journals as well as from public files from other government agencies, such as the SEC, the FTC, and the Federal Reserve Board. Because it relies on public information, ITA data may underestimate the number and value of

FDIRE since many real estate investment transactions are private so the information is not publicly available. Also, the researchers in this study were not able to locate the annual ITA reports after year 1994. So this study will use the BEA data.

### Why Invest in U.S. Real Estate

The major reasons for foreign investors to invest in the U.S. commercial real estate assets are financial returns, portfolio diversification, and the security of the U.S. investments. According to surveys from the Association of Foreign Investors in Real Estate (AFIRE), the U.S. has been ranked by AFIRE members as the No.1 country to provide stable and secure real estate investment for five consecutive years from 2006 through 2010 (*Figure 1.2*).

*Figure 1.2* Country providing the most stable and secure real estate investments



Source: 2011 AFIRE Annual Survey

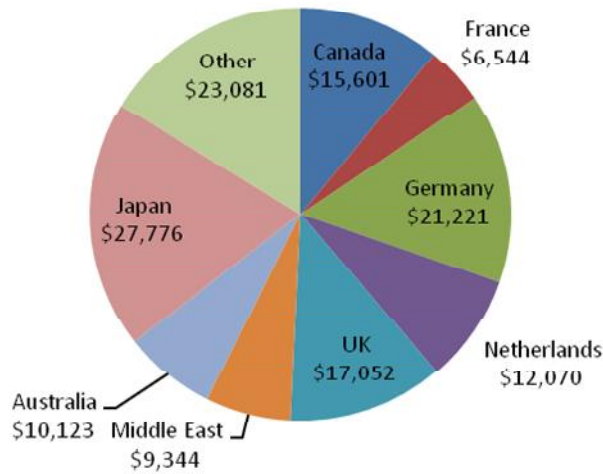
Portfolio diversification is another important reason why foreign investors invest in U.S. real estate. According to a research from Cornerstone Real Estate Advisers (Conerstone, 2009), the U.S. accounts for more than one third of the invested global property universe. So for foreign institutional investors, U.S. commercial real estate investment is a critical element in order to achieve desired diversification in their real estate investment portfolio.



### Who Invest in U.S. Real Estate

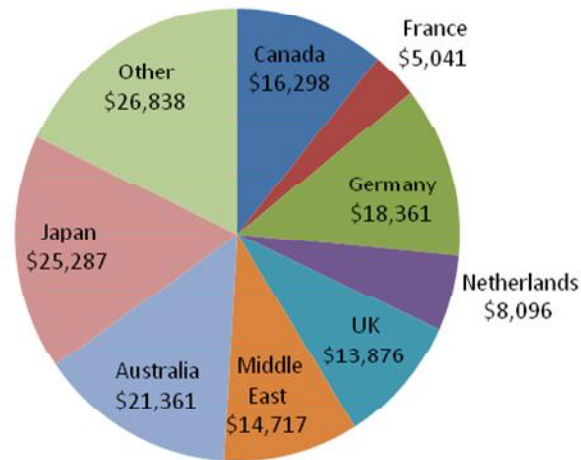
As the globalization of national markets has progressed since 1980s, foreign ownership of the U.S. real estate assets has increased significantly (Graham and Krugman, 1989). Foreign investment in U.S. real estate comes from many different countries, but several dominate. According to BEA data, major ownership of the commercial real estate in the United States consists of developed countries, such as Canada, Germany, the Netherlands, the United Kingdom, Australia, and Japan as shown in the *Figure 1.3 and Figure 1.4*. These six countries accounted for almost 70% of foreign ownership in U.S. foreign real estate in 2006. The entities are mostly institutional investors such as insurance companies, banks, corporations, and pension funds.

*Figure 1.3: Major foreign countries that own U.S. commercial property in 2002 (million USD)*



Source: Bureau of Economic Analysis

Figure 1.4: Major foreign countries that own U.S. commercial property in 2006 (million USD)



Source: Bureau of Economic Analysis

Japan had the largest capital investment in the U.S. in the late 1980s and 1990s since the passage of the Yen/Dollar agreement in 1984, which liberalized and opened Japanese financial markets to allow free capital outflows (Gerlowski, Fung, Ford; 1994). *Figure 1.3 and 1.4* however, show a slight decrease of Japanese position from \$27.7bn to \$25.3bn in this period despite the increase of the total value of FDIRE. Investments made by Europeans have also comprised a significant portion of FDIRE in the U.S. since 1980s. Traditionally, the UK, the Netherlands, and Germany played large roles. However, the data suggest that the level of direct investments in U.S. commercial properties of major European countries such as the UK and Germany dropped slowly from 2002 to 2006.

A noticeable trend in the same period is the increase of FDIRE from Australian and Middle East investors by approximately \$11bn and \$5bn, respectively. Of special note is that the investment from Australia more than doubled, making its portion comparable to that of Japan, Germany, or the UK, the traditional major investor countries. Investment from Latin America decreased slightly in the same period.

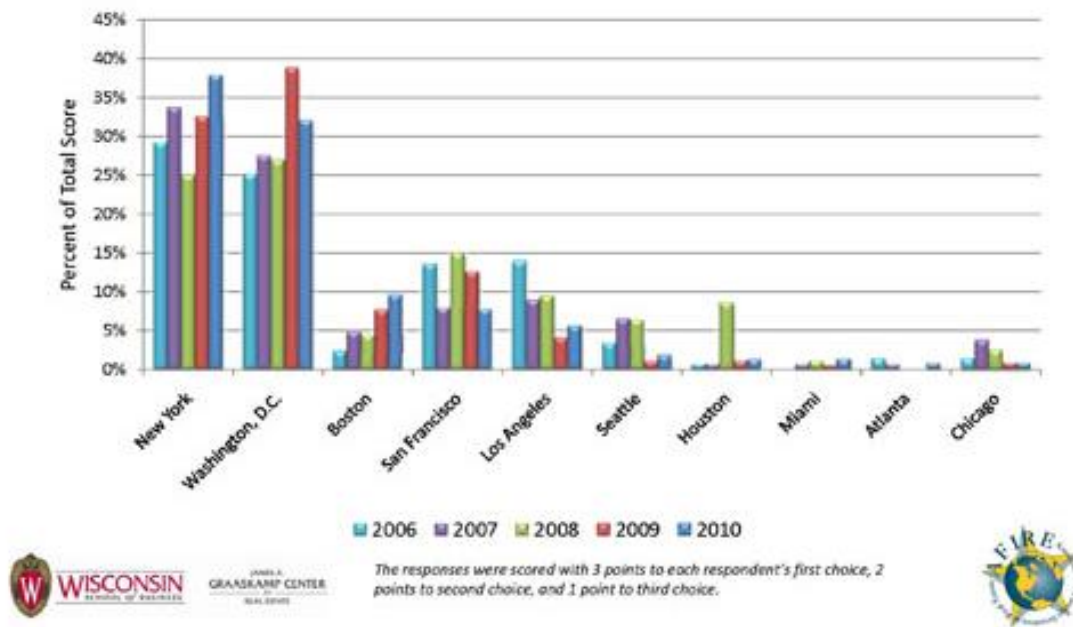
Furthermore, the investments of other countries increased from approximately \$23bn to \$27bn, accounting for a greater portion than in the past in total level. This implies that the FDIRE in the U.S., which was mainly dominated by the major developed countries, seems to be gradually diversified among more countries in the world.

One interesting but obvious finding about the data is that each country shows a different pattern of direct investment due to its distinct intrinsic macroeconomic situation and the physical and cultural differences from the host country. For example, developed countries in Europe show similar patterns while Australia and Japan show distinct patterns because of their physical and cultural distance from the U.S.

### **Where Foreign Investors Invest**

FDIRE in the U.S. historically has been clustered along coastal areas, focusing on larger, well known states and cities due to the availability of investment opportunities, the convenience of the location, the familiarity with the location, and traditional business or family ties. According to surveys from AFIRE, the top ten U.S. cities for real estate investments were New York, Washington D.C., Boston, San Francisco, Los Angeles, Seattle, Houston, Miami, Atlanta, and Chicago in 2010 (*Figure 1.5*).

Figure 1.5: Ranking of USA cities of real estate investment



Source: AFIRE Surveys

Table 1.1 and Table 1.2 below display the percentage distribution of FDIRE at the state level in 1999 and 2007, respectively. The data confirm that top recipients of foreign direct investment in real estate were mostly coastal states such as California, New York, Texas, and Florida. Between 1999 and 2007, there were only two changes to the top ten FDIRE recipients: Michigan dropped off the list of top ten and was replaced by Washington D.C. and Hawaii as replaced by Ohio.

While the list of top ten recipients was very stable from 1999 to 2007, there was an interesting development in the geographic distribution of FDIRE. In 1999, the top ten destination states accounted for 72.05% of total foreign-owned commercial real estate in the U.S. In 2007, the share of top 10 recipients dropped to 67.52%, indicating that foreign investors had been dispersed their real estate investment across more states during that time period.

Table 1.1: Percent distribution of FDIRE stock at gross book value by state in 1999

State	FDIRE (mil \$)	Percentage of National Total
California	35,117	19.51%
New York	26,195	14.56%
Texas	14,975	8.32%
Florida	12,458	6.92%
Illinois	8,904	4.95%
Hawaii	8,439	4.69%
Georgia	6,655	3.70%
Michigan	5,906	3.28%
New Jersey	5,633	3.13%
Massachusetts	5,391	3.00%
Rest of the states	50,294	27.95%
<b>National Total</b>	<b>179,967</b>	<b>100%</b>

Source: Bureau of Economic Analysis

Table 1.2: Percent distribution of FDIRE stock at gross book value by state in 2007

State	FDIRE (mil \$)	Percentage of National Total
New York	26,718	16.55%
California	26,125	16.18%
Florida	11,168	6.92%
Texas	11,007	6.82%
Illinois	8,662	5.37%
Ohio	6,456	4.00%
Georgia	5,061	3.13%
New Jersey	5,035	3.12%
Massachusetts	4,865	3.01%
Washington D.C.	3,917	2.43%
Rest of the states	52,439	32.48%
<b>National Total</b>	<b>161,453</b>	<b>100%</b>

Source: Bureau of Economic Analysis

### Variations in Location Preferences by Nationality - “Port of Entry” Theory

One theory of foreign investment location preferences is that foreign investors tend to invest in those areas where their nationals most commonly arrived at some point (Levine and Segev,

2004). To see if this theory holds for the investment in real estate and to find out if there are distinctive location preferences for investors from different geographic regions, we further examined the BEA data from 2002 to 2006 by aggregating major countries (as previously mentioned) into three groups: Europe, Asia, and Latin America. Then we listed the top five destination states for FDIRE from each region. Due to the publication issue when only one company owns holdings, the value of the holdings is not disclosed to protect the company's privacy. In this case, we substituted the value with value from the previous year, given the trend showing stable and modest growth in FDIRE between 2002 and 2006. *Table 1.3* shows the results of the analysis.

*Table 1.3: Top 5 states of commercial property ownership by foreign investors in 2006*

	Europe			Asia			Latin America		
	States	FDI		States	FDI		States	FDI	
		mil \$	%		mil \$	%		mil \$	%
1	New York	8,364	14	California	14,836	28	Florida	866	25
2	California	8,116	14	New York	5,213	10	New York	693	20
3	Florida	3,666	6	Illinois	3,786	7	California	651	19
4	New Jersey	3,503	6	Hawaii	3,558	7	New Jersey	537	15
5	Texas	3,218	5	Florida	2,506	5	Texas	351	10
	Total	59,163	100	Total	53,156	100	Total	3,504	100

*Source: Bureau of Economic Analysis*

Although the investment of three groups similarly clustered in the coastal areas, there are some variations in location preferences for investors from different regions. The Asia group including Japan and Australia noticeably tends to invest in Hawaii and the West Coast, especially in California, Washington (\$1,129M compared to \$754M by Europe in 2004), and Oregon (\$588M compared to \$121M by Europe in 2004). Although the states on the East Coast, such as New York and Florida, also show high levels of FDIRE, California (\$14,836M) was by far the largest

recipient of FDIRE from Asian investors, almost triple that in New York (\$5,213M), the second largest one.

European investors, however, seemed to have chosen to invest more in East Coast areas such as New York, Florida, New Jersey, Georgia (\$2,330M compared to \$883M by Asian in 2006), and Washington D.C. (\$1,178M compared to \$465M by Asian in 2005). A noticeable location feature of Latin American investment is the relative preference for the southern parts of the United States, such as Florida, Texas, and South Carolina (\$142M). Another major investor who is not included in the above groups, Canada, has a strong preference for California, Florida, and Texas (Gerlowski, Fung, and Ford, 1994)

Some of U.S. states out of the coastal areas are also attractive because of the favorable investment environments of their cities and the demand for specific types of properties. Illinois with Chicago and Colorado and Utah for ski resorts are representative examples. In summary, the findings above seem to suggest that the “port of entry” theory does at least partially explain the location choices of foreign investors in U.S. commercial real estate.

## **1.2 Research Objectives**

Given the growing importance of FDIRE, a number of studies have been done to examine the reasons, benefits, and location choices of FDIRE. This study builds on earlier research and tries to further our understanding of FDIRE. First of all, this study uses more recent data in order to identify new trends; second, it looks both at the origin countries’ point of view and destination states’ point of view to understand where the investment has come from and where the investment has gone. We try to answer the following questions:

**Question 1:** What macroeconomic factors affect levels of FDIRE in the U.S.?

**Question 2:** What are the location characteristics that affect levels of FDIRE at particular states?

The results of our investigation are of interests to national and local economic development agencies and policy makers who try to attract more FDIRE inflows to the U.S. and to particular areas.

Our research is organized as follows: Chapter 2 reviews relevant studies of foreign direct investment in U.S. commercial real estate and location decisions of FDIRE. Chapter 3 presents the research questions and hypotheses. Chapter 4 discusses our research methodology and models. Chapter 5 presents the data used in the models. Chapter 6 presents results and discusses findings. Finally, Chapter 7 summarizes the study. Each of these sections is structured as first discussing issues pertaining to both research questions, then discussion especially focused on Question 1 is presented, followed by discussion specifically aimed at Question 2.



## Chapter 2. Literature Review

### 2.1 Literature Review of Determinants of FDI

Since little research specifically focused on the FDI in real estate has been conducted to date, our literature review is not limited to FDI in the real estate sector because of the assumption that significant determinants to FDI in finance and even manufacturing sectors could also significantly affect the FDI in the real estate in the macroeconomic perspectives.

Traditionally, there have been two major streams of FDI theory that explains the global phenomenon: microeconomic approach by Hymer (1976), Kindleberger (1969), Caves (1971), and Trevino & Daniels (1994) and the macroeconomic approach by Aliber (1970), Rohatyn (1989), and Froot & Stein (1991). The former focus on internal attributes of investors, and the latter emphasize why net investment among groups of nations tend to flow in certain patterns. Since our thesis focuses more on the patterns of FDIRE between *home country* (where investments come from) and *host country* (where the investments take place), we are following the microeconomic approach.

Previous microeconomic approach studies frequently address several important factors that can influence home countries in the investment decision of FDI, such as GDP, GDP growth, exchange rate, interest rates, export or import level. Most studies suggest that home country's growth of economy is one of the most significant determinants in influencing outward FDI, indicating its association with export and import level. According to Dunning's IDP (International Development Path) theory (1981), a country's FDI position changes in phases as it develops, where the level of development is measured by GDP. As a country develops, it becomes better equipped for advantages from the FDI such as ownership, location, and internalization advantages, thus encouraging more outward FDI over inward FDI. For example,

the growth of economy brings import-oriented firms new technology and marketing expertise from developed countries, and thus, eventually gives them competitive advantages in establishing foreign production, resulting in more FDI outflows. That is, GDP or GDP growth has a significant positive relationship with outward FDI. Also, Grosse & Trevino (1996) indicated that significant negative influences were associated with home country's import level, the cultural and geographic distances from host country, and the exchange rate relative to host country.

Many studies have succeeded in finding a significant correlation between the exchange rate and FDI level. A growing number of theoretical and empirical studies explained the substantial fluctuations of FDI into U.S. in the 1980s and 1990s in terms of the real exchange rate on FDI. Aliber (1970) argued that firms from countries with strong currencies are able to support financially their foreign investment with better terms than firms from countries with weak currencies and the appreciation of the home country currency lowers the capital requirements of foreign investments in domestic currency units, enabling firms investing abroad to raise capital easier than in the case of a depreciated currency. Also, Froot and Stein (1991) suggested that the depreciation of the currency value of a host country tends to attract more FDI by making the assets and labor cost in the host country cheaper to foreign investors. More specifically, a 10 percent depreciation of the value of U.S. dollar (USD) generated additional FDI inflows of about \$5 billion (with a standard error of less than \$2 billion) based on the data from 1973 to 1990. In addition, among the forms of gross capital inflow into the United States, such as direct investment, foreign investment in U.S. Treasury securities, and foreign portfolio investment in corporate stocks and bonds, FDI is the only type that has statistically negative correlation with the value of the dollar.

However, FDI is not merely impacted by exchange rate level but by the uncertainty (or volatility) of exchange rate as a number of countries adopted the floating exchange rate system. Kiyota and

Urata (2004) suggested that the depreciation of the host country currency attracts FDI while large volatility in real exchange rates discourages FDI. Furthermore, Bénassy-Quéré (2001) and Ruiz (2005) indicated that real exchange rate volatility has a direct deleterious effect on FDI inflows, generating an air of uncertainty as the variance of expected profits rises and its net present value falls.

Hymer (1976), Lall (1980), and Grubaugh (1987) indicated that interest rate is also a significant determinant of the FDI outflow and Kyrkilis and Pantelidis (2003) emphasized its importance especially when the FDI is undertaken in capital-intensive sectors. The low interest rates of a country can induce capital abundance in its country, thus enabling the investors who take advantage of lower cost of financing to expand their operation abroad or seek investment opportunities. Additionally, the capital inflows into the host country will put a downward pressure on the high interest rate, resulting in the stabilization (NAR Report, 2007).

Trade liberalization or trade openness to the host country is another important factor influencing positively the outward FDI from home countries because the liberalization of capital controls allows more funding of investments abroad (Scaperlanda & Mauer, 1973; Scaperlanda & Balough, 1983)

## **2.2 Applicable Current Trends of FDIRE in U.S. Residential**

A recent NAR research (2010) introduces a good example showing that the pattern of FDIRE in residential in the U.S. has strong correlations with the macroeconomic determinants as mentioned above: home country and host country economy, exchange rate, and interest rate. Even though the type of properties in the research is residential property, which is different from BEA data we used in this thesis, the macroeconomic trends are intuitively expected to have similar effects on both.

The research suggests that the combination of low residential price to income ratio (1.8, below historical norms of 2.1) and historically low 30-year mortgage interest rate of 5% due to relative weak economic circumstances in the U.S. creates a very favorable environment in the residential market to foreign investors. “For the twelve months from April 2009 to April 2010, foreign purchases of US residences totaled \$64bn, which is almost twice the \$36bn in foreign transactions that took place during the twelve months ending April 2009.”<sup>1</sup>

Figure 2.1: Ratio of home price to income and 30 year conventional mortgage interest rate

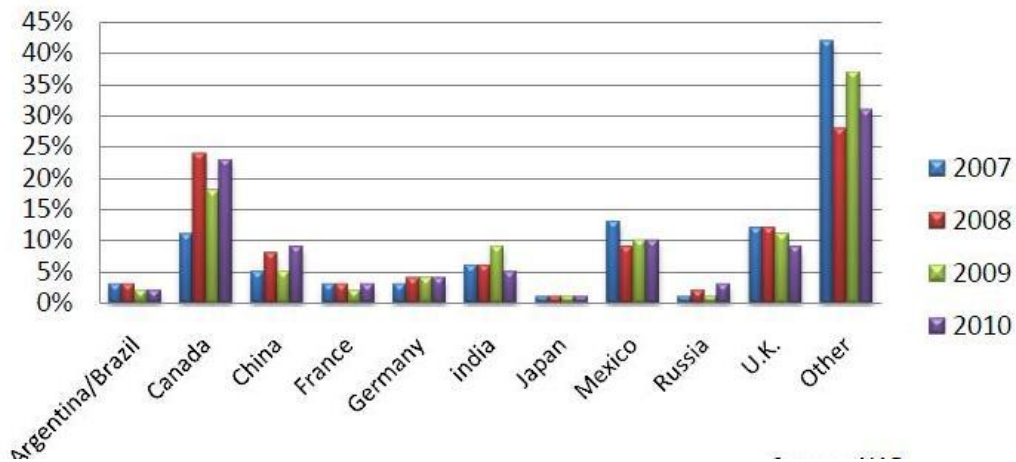


Source: NAR

Among the foreign investors in U.S. residential market, Canada, accounting for almost 30% in total international transactions, was the largest one in 2010, followed by the UK, Mexico and China as shown in the *Figure 2.2* below.

<sup>1</sup> NAR Research Division 2010, *Foreign Investment in U.S Real Estate: Current Trends and Historical Perspective*, pp.12

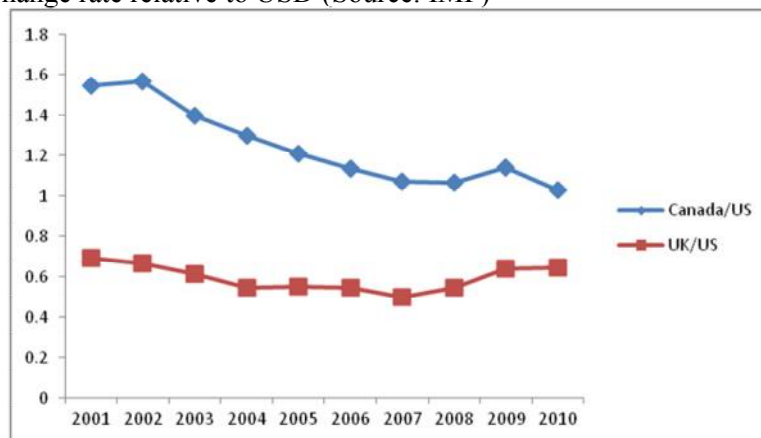
Figure 2.2: International purchases of U.S. residential RE by home country (% of total)



Source: NAR

It is plausible that the increase of FDIRE in the U.S. residential market is attributable to the relative depreciation of the U.S. dollar against the Canadian dollar, Mexican peso, and British pound by 16%, 11%, and 8% respectively between the first quarter of 2009 and the first quarter of 2010. The graph below (*Figure 2.3*) clearly shows the relative appreciation of the Canada dollar and British pound to USD from 2007 to 2009. Therefore, the expectation of continuous appreciation of foreign investors at that time might have attracted even more FDIRE in 2009 and 2010.

Figure 2.3: Exchange rate relative to USD (Source: IMF)



The combination of historically low US real estate price, low mortgage rates, and especially in the case of Canada, a depreciating USD contributed to the increase of foreign investment in U.S. residential property assets from 2009 to 2010.

### **2.3 Literature Review of FDIRE Location Preferences**

Once foreign investors have selected the United States as the destination for their direct investment in commercial real estate, they must choose a specific location in which to invest. A number of studies have investigated issues relating to location preferences of FDI in general, and several researchers have investigated the location preferences of FDIRE in particular. These studies can be divided into two groups: (1) analyses based on questionnaire surveys and interviews of foreign firms and investors, and (2) empirical analyses based on the aggregate data of foreign direct investment. Since this study uses an empirical research method, we focus the literature review on the second group of research.

Bagchi-Sen and Wheeler (1989) examined the spatial distribution of FDI in the United States for the periods 1974-1978 and 1979-1983. The researchers measured the effects of population size, population growth rate, and per capita retail sales on numbers of foreign direct investment transactions. The study concluded that foreign investors preferred larger centers and major growth centers for their direct investment. Furthermore, the study suggested that foreign direct investment shifted from the manufacturing sector to services sector (finance, insurance, and real estate) and dispersed from Northeastern areas to the South and the West during the study periods, especially in the second time period, 1979-1983.

Bagchi-Sen (1991) examined the location pattern of FDI activities in finance, insurance, and real estate (FIRE) in the United States. The study analyzed completed transactions of foreign direct investment in the United States from 1974 to 1989. The researcher examined the effects of the

share of employment in the domestic FIRE sector, the share of metropolitan population in a state, the rate of change in population, and the value per parcel of commercial and industrial property on levels of FDI in FIRE. The study suggested that foreign investors preferred to invest in areas that had a large share of employment in domestic FIRE sector in order to benefit from the economies of scale. The study also concluded that population growth was a predictor of FDI in FIRE. Finally, the analysis found that the effects of property value demonstrated certain regional variations: An increase in property value in the South reflected the faster growth and would encourage FDI while an increase in property value in the Northcentral might discourage FDI activities in FIRE sector.

Gerlowski, Fung, and Ford (1994) examined location preferences of commercial real estate investors from United Kingdom, Canada, and Japan for the time period 1980–1989. Using a random effects model, the study investigated the effects of variables representing general economic conditions, local taxes conditions, and real property market conditions. The researchers found that foreign investors preferred states with large, developed economies while avoiding states with higher taxes and higher priced properties. The study also provided some evidence of variations in location preferences of investors from different countries.

He, Wang and Cheng (2009) examined the foreign direct investment in real estate development in China for the 1979 to 2003 time period. The researchers found that labor costs had significant negative effects on foreign direct investment inflows. Also, the study concluded that market size, free trade, and level of economic development significantly affected levels of foreign direct investment in real estate development. In addition, the research suggested that human capital, infrastructure level, and transportations were all important location determinants for the foreign direct investment in real estate development in China.

### **Chapter 3. Research Questions and Hypotheses**

#### **What macroeconomic factors affect levels of FDIRE in the U.S.?**

According to previous research, several macroeconomic factors are significantly associated with the levels of a country's outward FDIRE. This thesis attempts to investigate which factors have greater influences on the investment decision, to what degree, if any, they affect the decision, and what relations they have. Using the latest available data, we construct models to test following hypothesis:

- Levels of FDIRE in U.S. have a positive relation with home country's GDP, GDP growth, and investment level.
- Levels of FDIRE in U.S. have a negative relation with exchange rate change and interest rate spread between home country and host country (U.S).

#### **What are the location characteristics that affect levels of FDIRE in particular states?**

According to previous researchers, certain location characteristics significantly affect the levels of FDIRE in particular states. In this study, we select a set of state characteristics and examine potential relations between levels of FDIRE and those characteristics. Using the latest available data, we construct models to test the following hypothesis:

- Levels of FDIRE have a positive relation with population size, personal income per capita, commercial real estate completion rate, change in population, and change in personal income per capita.
- Levels of FDIRE have a negative relation with commercial real estate vacancy rate.



## **Chapter 4. Methodology**

We use both pooled data regression and panel data regression methods in this study. Data sets for both Question 1 and Question 2 are organized as panel data format. Using panel data, we can estimate individual effects (in this case, countries or states), time effects, or both. A pooled regression model is constructed without regard to those effects. On the other hand, the fixed-effects model (LSDV: Least-squares Dummy Variable Mode) controls for individual and time effects so that the model estimates the true relationship between dependent variable and independent variables within a unit in a time period.

By considering individual and/or time effects that should affect the dependent variable, we can control for omitted variables that differ between individuals and/or time periods. With a two-way panel regression model, we control both the unit's effects and time effects. And in the one-way panel regression model, we control only the unit effects.

Panel data analysis endows regression analysis with both a spatial (cross-section) and temporal dimension (time series). With the panel regression model, the sample size is increased, and the estimates are more robust.

### **4.1 Methodology and Models for Question 1**

Our study initially specified simple pooled regression model (Country model A) to examine whether a country's economic size or growth rate affects the FDIRE decision. However, using only simple pooled regression has a limitation because the simple pooled regression model is naturally designed to ignore the effects caused by difference between each groups (home countries), which is actually observed in the previous research. So, by considering the effects in

the model, we can have more accurate estimates. That is, systematic variation embedded in the error term of the pooled regression should be further captured with some country-specific or year-specific effects.

For the reason stated above, we extended the pooled regression model to the panel data regression model (Country model B) and compared the results, mostly the coefficients of the variables from both models to derive meaningful implications. In the panel regression, the cross-sections are the 11 countries (Canada, the UK, France, Germany, the Netherlands, Sweden, Switzerland, Italy, Mexico, Australia, and Japan) and the time series is from 2002 to 2007.

By using two models, it was possible to make two comparisons between groups: the comparison between a home and a host country (U.S.) as well as the comparison between home countries (cross-country). In the panel data model (Country model B), we initially used both country effects and time effects, and then we also tested with another model that only had country effects (Country model C) with the assumption that there is little or no structural break of the movement of FDIRE with respect to time.

### ***Pooled regression model***

#### **Country Model A**

The FDIRE1 and variables of interest have the following linear relationship:

$$FDIRE1_{it} = \beta_0 + \beta_1 GDP_{it} + \beta_2 GGDP_{it} + \beta_3 EXCHG_{it} + \beta_4 BSPRD_{it} + \beta_5 INVST_{it} + u_{it}$$

where  $i$  represents the  $i^{th}$  cross-sectional unit (country) and  $t$  the  $t^{th}$  time period (year).

### ***Panel data regression models***

#### **Country Model B**

Linear model with cross-section (country) and time (year) fixed effects (LSDV: Least-squares

Dummy Variable Model<sup>2</sup>)

$$FDIRE1_{it} = \alpha_0 + \lambda_0 + \beta_1 GDP_i + \beta_2 GGDP_i + \beta_3 EXCHG_i + \beta_4 BSPRD_i + \beta_5 INVST_i + \sum_{i=1}^{10} \alpha_i Country_i + \sum_{t=1}^5 \lambda_t Year_t + u_{it}$$

where  $\alpha_i$  indicates the coefficient of the  $i^{th}$  country dummy variable, and  $\lambda_t$  the coefficient of the  $t^{th}$  year dummy variable.

#### **Country Model C**

Linear model with the country effects

$$FDIRE1_{it} = \alpha_0 + \beta_1 GDP_{it} + \beta_2 GGDP_{it} + \beta_3 EXCHG_{it} + \beta_4 BSPRD_{it} + \beta_5 INVST_{it} + \sum_{i=1}^{10} \alpha_i Country_i + u_{it}$$

where  $\alpha_i$  indicates the coefficient of the  $i^{th}$  country dummy variable.

## **4.2 Methodology and Models for Question 2**

Real estate investments are deemed local economic activities because of the real estate product's heterogeneity, illiquidity, high transaction costs, and location fixity features. Therefore, FDIRE is expected to show different location patterns from FDI activities in general. To test FDIRE location patterns, we model FDIRE inflows as a function of the state's characteristics representing market size, market growth potential, and real estate market conditions.

Four location models for FDIRE inflows are specified as follows: Two pooled linear regression models without regarding country and year specific effects, Location Model A and Model B, are

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<sup>2</sup> Gujarati, Damodar N. 2005, *Basic Econometrics* 4<sup>th</sup>, McGraw-Hill, pp.636-655

constructed to evaluate the total stock of FDIRE (FDIRE2) and annual net flows of FDIRE (FDIRE2FLOW), respectively. In Location model C, we use a two-way fixed effects panel regression model pooling cross-sectional and time-series information for each state, to estimate the FDIRE2 variable again. Finally, we construct a one-way panel data regression model (Location model D) without time dummy variable to test if there is a pattern across states during the study period. Since there are some missing values, our data set is an unbalanced panel in this study. In the fixed effects panel regression, the cross-sections are the 50 states and the time series is from 1999 to 2007.

With two-way panel regression model (Location model C) we control both state effects and time effects. After controlling for the state and year effects, the coefficients of interest can be interpreted as the effect on the FDIRE within a representative state during a specific time period (in this case, a year). And in the one-way panel regression model (Location model D) we only control for the state effects, so the model D explores the FDIRE pattern across states during 1999 to 2007 time period.

### ***Pooled regression models***

#### **Location Model A**

The FDIRE2 and variables of interest have the following linear relationship:

$$FDIRE2_{it} = \beta_0 + \beta_1 POP_{it} + \beta_2 PIP_{it} + \beta_3 VAC_{it} + \beta_4 COMP_{it} + \beta_5 POPCHANGE_t + \beta_6 PIPCHANGE_t + u_{it}$$

where  $i$  represents the  $i^{th}$  cross-sectional unit (state) and  $t$  the  $t^{th}$  time period (year).

#### **Location Model B**

The FDIRE2FLOW and variables of interest have the following linear relationship:

$$FDIRE2FLOW_{it} = \beta_0 + \beta_1 POP_{it} + \beta_2 PIP_{it} + \beta_3 VAC_{it} + \beta_4 COMP_{it} + \beta_5 POPCHANGE_{it} + \beta_6 PIPCHANGE_{it} + u_{it}$$

where  $i$  represents the  $i^{th}$  cross-sectional unit (state) and  $t$  the  $t^{th}$  time period (year).

### **Panel data regression models**

#### **Location Model C**

Linear model with cross-section (state) and time (year) fixed effects (LSDV: Least-squares

Dummy Variable Model<sup>3</sup>)

$$FDIRE2_{it} = \alpha_0 + \lambda_0 + \beta_1 POP_i + \beta_2 PIP_i + \beta_3 VAC_i + \beta_4 COMP_i + \beta_5 POPCHANGE_i + \beta_6 PIPCHAGNE_i + \sum_{i=1}^{49} \alpha_i State_i + \sum_{t=1}^8 \lambda_t Year_t + u_{it}$$

where  $\alpha_i$  indicates the coefficient of the  $i^{th}$  state dummy variable, and  $\lambda_t$  the coefficient of the  $t^{th}$  year dummy variable.

#### **Location Model D**

Linear model with the state effects

$$FDIRE2_{it} = \alpha_0 + \lambda_0 + \beta_1 POP_i + \beta_2 PIP_i + \beta_3 VAC_i + \beta_4 COMP_i + \beta_5 POPCHANGE_i + \beta_6 PIPCHAGNE_i + \sum_{i=1}^{49} \alpha_i State_i + u_{it}$$

where  $\alpha_i$  indicates the coefficient of the  $i^{th}$  state dummy variable.

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<sup>3</sup> Gujirati, Damodar. N. 2005, *Basic Econometrics*, 4<sup>th</sup>, McGraw-Hill, pp.636-655

## **Chapter 5. Data**

### **5.1 Variables Definition for Question 1**

The first question we should empirically answer to find the determinants of FDIRE is what influences a home country's decision on its destination country, or so-called host country. Since only a few studies about FDI in real estate have been done, we plan to test those macroeconomic factors that have been found to significantly influence the general FDI and to see if these factors have similar effects on the FDIRE in U.S. We will not test certain factors that specifically influence manufacturing industry, such as technology and human capital. Furthermore, we preclude some factors that are potentially important but are difficult to quantify, such as openness of the economy and tax issues in this analysis.

#### **Dependent variable**

FDIRE1: Position of FDI in real estate, which consists of the gross year-end book value of all commercial buildings and associated land that are owned by affiliates of foreign-owned firms and that are either used or operated by the affiliates or leased or rented to others. Commercial buildings include apartment buildings, office buildings, hotels, motels, and buildings used for wholesale, retail, and services trades, such as shopping centers, recreational facilities, department stores, bank buildings, restaurants, public garages, and automobile service stations. The data come from U.S. Bureau of Economic Analysis.\*

To examine the research Question 1, we choose, as a dependent variable, the levels of FDIRE inflows in U.S. from eleven major home countries: Canada, France, Germany, the Netherlands, Switzerland, Sweden, Italy, Mexico, Japan and Australia. The data cover the period of 2002 to 2007 so that the time series model is performed in the same period.

### **Independent variables**

GDP and GDP growth: In the case of a host country, GDP or GDP growth representing the market potential is estimated to have significantly positive correlation with FDIRE1 inflows. However, it seems arguable whether the home country's GDP or GDP growth positively influences FDIRE1 outflows. According to previous studies (Dunning, 1993; Grubaugh, 1987), growth of economy brings firms new technology and marketing expertise, and thus eventually gives these firms competitive advantages in establishing foreign production, resulting in more FDI outflows. Therefore, our expectation is that higher GDP level of a country is associated with greater outward FDI activities from this country. Two proxies representing home country economy size and growth rate, GDP and GDP growth (GGDP) are employed as primary independent variables. Both serve as scale variables for the comparison purposes.

Investment rate per GDP: we believe that GDP and GDP growth are not entirely enough to support the hypothesis that the size and growth rate of economy in a country allow more FDIRE outflows. Even though the economy of a country grows, the actual investment portion in the GDP may not grow or may even decrease. In this sense, we exploit each country's investment rate relative to GDP to examine the existence of a positive correlation with FDIRE. We further hypothesize that the previous year's investment level is more influential on the decision of FDIRE1 than the investment level of the current year so that we use one year lagged investment level ( $INVST_{t-1}$ ) in our estimation.

Exchange rate changes: As discussed in the literature review, exchange rate relative to the host country currency is considered one of the most important determinants in FDI. In this test, we choose not only exchange rate level but also annual difference of the exchange rate level (EXCHG) as independent variables to see how investors respond to both the actual value of currency and the expectation of currency movement relative to USD. It is expected that the

expectation of currency movement in the future plays a more influential role in the investor's decision.

Interest rate: Foreign operations require significant commitment in capital, especially if they are undertaken in capital-intensive sectors where production is characterized by extensive economies of scale, as the case is for most FDI (Kyrkilis and Pantelidis, 2003). In addition, capital abundance, which will drive outward FDI, is closely associated with lower interest rates in a home country because of the lower cost of financing. Clegg (1987), Prugal (1981), Lall (1980), and Grunbaugh (1987) suggested that the lower the interest rates of the home country, the higher the country's preference for outward FDI.

Similarly, in FDIRE, the interest rates seem to be an important factor because real estate investment heavily relies on debt financing so that the relatively lower interest rates will provide advantages to the home countries. The value that we should pay attention to is the relative interest rate to the equivalent of the host country. Therefore, as another independent variable, we employ the 10-year government bond yield spread (BSPRD) of each home country and the host country (U.S.), expecting that the higher bond yield spread (equal to the yield of home country minus that of host country), the lower the FDIRE1 from the home country in the U.S.



Table 5.1: Description of dependent and independent variables

	Variables	Definition	Expected sign	Source
Dependent variable	<i>FDIRE1</i>	Inventory level of foreign direct investment in the U.S. commercial real estate (mil \$)		BEA
Independent Variable	<i>GDP</i>	GDP of a home country (bn \$)	+	IMF
	<i>GGDP</i>	Annual percentage growth rate of GDP of a home country (%)	+	World Bank
	<i>INVST</i>	Percentage of gross investment in GDP (%)	+	IMF
	<i>EXCHG</i>	Annual difference of a home country currency's exchange rate relative to USD	-	IMF
	<i>BSPRD</i>	Home country's 10-year government bond yield spread to US Treasury note yield (%)	-	World Bank

## 5.2 Variables Definition for Question 2

### Dependent Variables

FDIRE2: Consists of FDIRE position at state level for the time period of 1999 to 2007. The data are from BEA and FDIRE definition is the same as defined in the dependent variable section of research Question 1 above (\* note)

FDIRE2FLOW: Change of FDIRE2. It measures the annual net flow of FDIRE2 at particular states. Formula for the variable is:  $FDIRE2FLOW_{it} = FDIRE2_{it} - FDIRE2_{it-1}$ , where  $i$  represents the  $i^{th}$  cross-sectional unit (state) and  $t$  the  $t^{th}$  time period (year).

In the BEA file, some FDIRE2 data points are suppressed to avoid the disclosure of data of individual companies, creating some NA observations in the data set. To estimate the impact of these NA observations, we created an adjusted FDIRE2 data set by assuming that there is no

change from the previous period, i.e. replacing the NA with value from the previous period. We ran the Location model A, B, C, and D using this adjusted FDIRE2 data set. The regression results from the adjusted FDIRE2 data set were not significantly different from regression results from original FDIRE2 (simply dropping the NA observations). So, in this study, we only use the original FDIRE2 data without adjustments for our analysis. Since there are some missing values, our data set is an unbalanced panel in this study.

### **Independent Variables**

State population (POP): Measure of market size and is generally thought to be an important determinant of FDIRE2. According to Ajami and Ricks (1981), the size of market and proximity to skilled labor and technology are the two basic location reasons for foreign investments. Larger population size usually implies more economic activities hence more opportunities for real estate investment, both for domestic and foreign investors. The state population data are obtained from U.S. Census Bureau.

Personal income per capita (PIP): Measure of wealth and represents a more refined proxy of potential demand for commercial real estate. It is expected to be positively related to levels of FDIRE2. The data are obtained from U.S. Census Bureau.

Commercial real estate vacancy rate (VAC): Direct indicator of commercial real estate activities and indirect indicator of the real estate investment return. There are two competing interpretations for the effects of commercial real estate vacancy rate. First, higher vacancy rate usually indicates lower asking rents, lower net operating income from the property, and lower return to the foreign investors. Hence foreign investors may reduce their real estate investment allocation to markets with higher vacancy rate due to the expectation of lower returns. On the other hand, higher vacancy rate may provide opportunities to certain type of foreign investors, such as opportunistic

funds or distressed investors, who are looking for higher risks and higher returns in their investments. Those investors may actually increase the allocation to the markets with higher vacancy rates if they expect the market conditions to improve in the future. The vacancy rate data are obtained from Torto Wheaton Research.

Commercial real estate completion rate (COMP): Percentage growth of commercial real estate stock each year and serves as a proxy for construction activities and real estate market conditions. Again, there are two competing interpretations for the effects of completion rate on levels of FDIRE2. Fast-growth areas typically encourage expansion of constructions, leading to higher completion rate. So, high completion rate can be viewed as a proxy of higher market potential, and hence, attracts more FDIRE. Alternatively, higher completion rate means more supply in the market, which will depress the future rent level and reduce investment return. So, foreign investors may avoid markets with high completion rate. The completion rate is calculated based on the commercial real estate stock data collected from Torto Wheaton Research.

POPCHANGE: variable that measures change in state population each year. It serves as a proxy of the growth of market size. The variable rate of growth in different states offers different investment opportunities in commercial real estate. It is expected that foreign investors will prefer to invest in fast-growth areas rather than in stagnant areas. So, this variable is expected to be positively related to levels of FDIRE2.

PIPCHANGE is the variable that measures absolute change in personal income per capita year over year. Similar to the POPCHANGE variable, it indicates the market growth potential, and it is expected that foreign investors will wish to invest in areas with higher personal income growth rate.

*Table 5.2: Description of dependent and independent variables for Location models*

	<b>Variables</b>	<b>Definition</b>	<b>Expected sign</b>	<b>Source</b>
Dependent variables	FDIRE2	Inventory level of foreign direct investment in the U.S. commercial real estate (mil \$)		BEA
	FDIRE2FLOW	Net flow of foreign direct investment in the U.S. commercial real estate (mil \$)		BEA
Independent variables	POP	Population	+	U.S. Census Bureau
	PIP	Personal income per capita (\$)	+	U.S. Census Bureau
	VAC	Commercial real estate vacancy rate (%)	-	Torto Wheaton Research
	COMP	Commercial real estate completion rate (%)	+	Torto Wheaton Research
	POPCHANGE	Change of population	+	U.S. Census Bureau
	PIPCHANGE	Change of personal income per capita (\$)	+	U.S. Census Bureau

## Chapter 6. Results and Findings

### 6.1 Results and Findings for Question 1

#### Correlations Analysis and Descriptive Analysis

Before the performance of time-series regression analysis, it is recommended to check the correlation between the independent variables to identify *multicollinearity*, where two or more predictor variables are highly correlated so that the coefficient estimates may change erratically in response to small changes in the model or the data.<sup>4</sup>

Table 6.1: Correlations

	<b>FDIRE1</b>	<b>GDP</b>	<b>GGDP</b>	<b>EXCHG</b>	<b>INVST</b>	<b>BSPRD</b>
<b>FDIRE1</b>	1.00					
<b>GDP</b>	0.70	1.00				
<b>GGDP</b>	-0.13	-0.21	1.00			
<b>EXCHG</b>	-0.08	-0.06	-0.05	1.00		
<b>INVST</b>	0.03	-0.06	0.24	0.04	1.00	
<b>BSPRD</b>	0.19	0.00	0.01	-0.06	-0.28	1.00

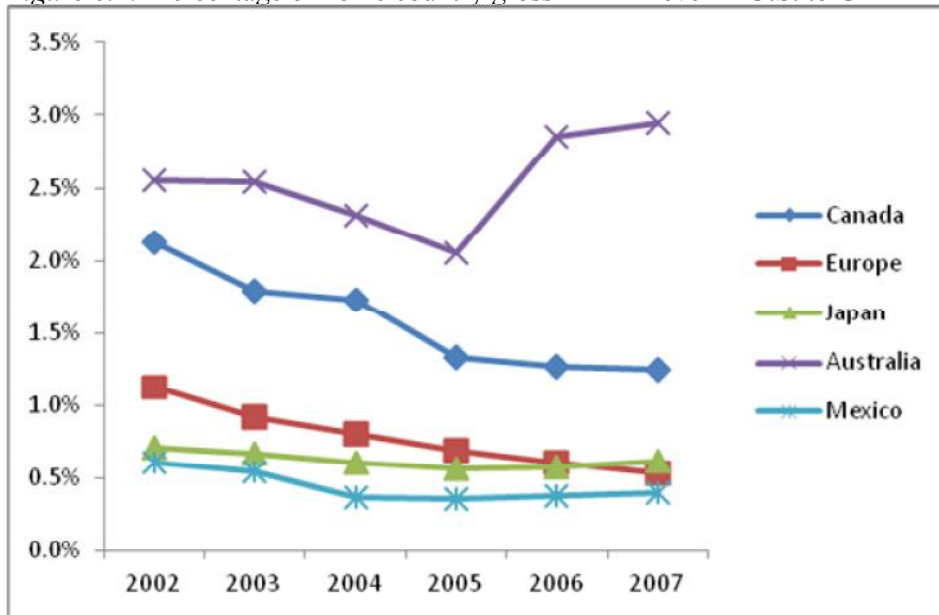
The result suggests that there are no highly significant correlations between explanatory variables. Also, it suggests that FDIRE1 and GDP have significantly positive correlation; GDP and GDP growth (GGDP) have negative correlation; GDP growth (GGDP) and investment level (INVST) have positive correlation.

For the next step, by using the charts, we examined the macroeconomic variables of representative home countries in the same period (2002-2007) to observe the presence of common trend as well as distinctive features of each country.

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<sup>4</sup> Gujarati, Damodar. N. 2005, *Basic Econometrics*, 4<sup>th</sup>, McGraw-Hill, pp. 341-356

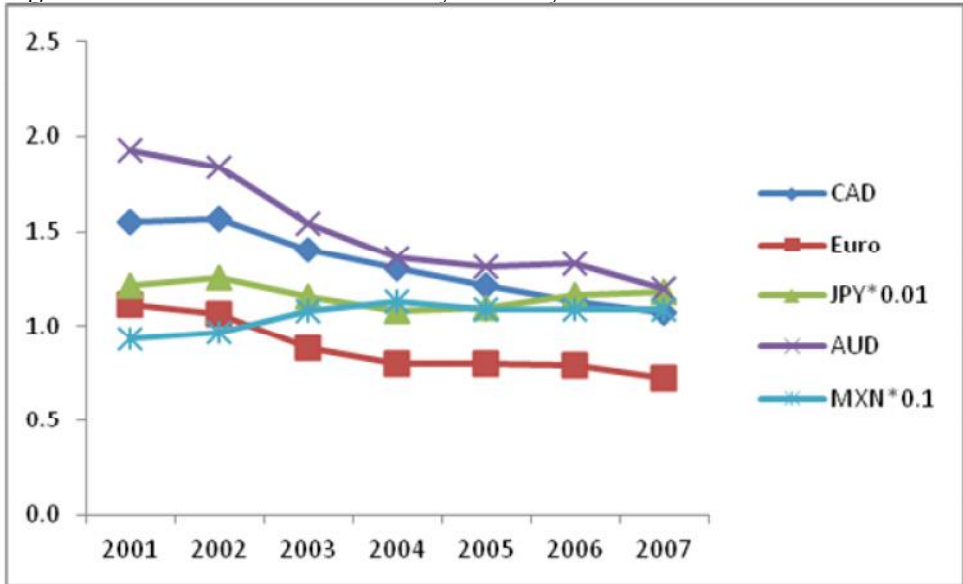
Figure 6.1: Percentage of home country gross FDIRE level in U.S. to GDP



Source: IMF and BEA

For the comparison of preference for FDI in real estate in the U.S. relative to home country GDP between countries, the value of FDIRE1 divided by its GDP (FDIRE/GDP) is employed. First, Australian investors demonstrated the strongest preference, showing not only the highest level of FDIRE1 per GDP over the period than any other country but also the rapid spike from 2005. In contrast, Canada and Europe, once the most active investor countries, have been gradually reducing the proportion of FDIRE to GDP. An interesting finding is that most foreign investors seem to maintain a relatively constant proportion of FDIRE to GDP, which seemingly ranges between 0.5% to 1.5%.

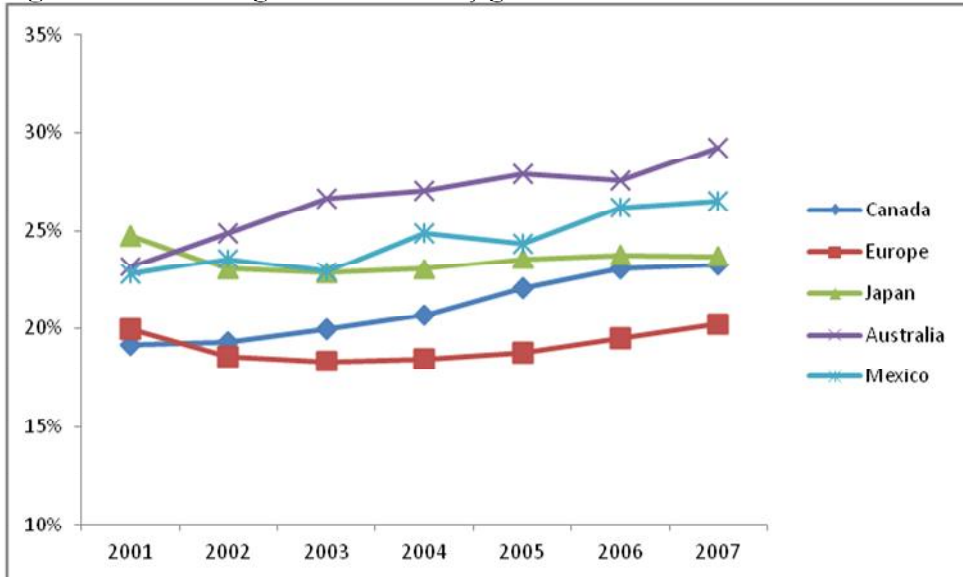
Figure 6.2: The ratio of home country currency to USD



Source: World Bank

For the convenience of comparison, we adjusted Japanese yen (JPY) and Mexican peso (MXN) by multiplying 0.01 and 0.1, respectively. Data show that from 2001 to 2007 U.S. dollar value had slightly appreciated relative to other currencies except for MXN. Given the trend, the FDIRE1 in the U.S. is expected to have decreased in the same period.

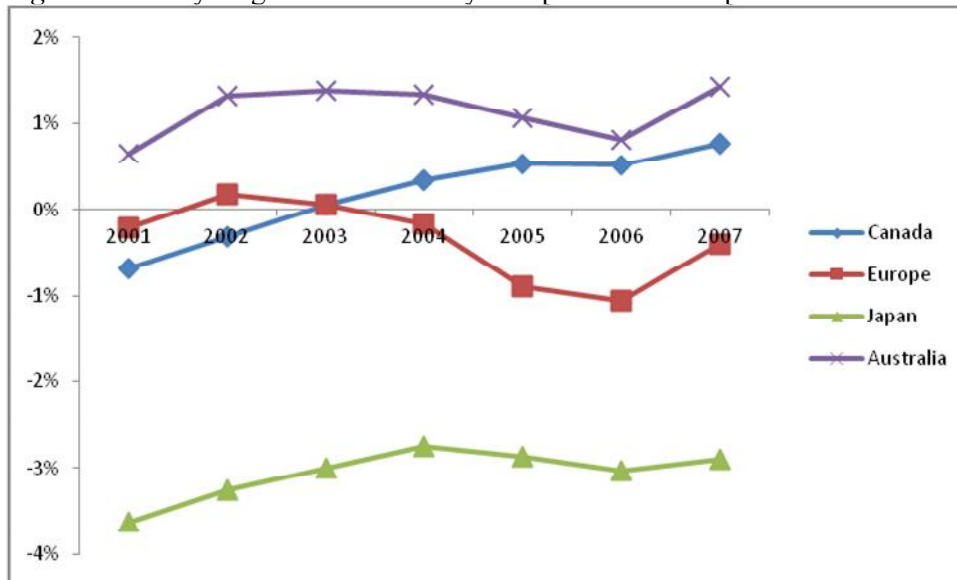
Figure 6.3: Percentage of home country gross investment level in GDP



Source: IMF

According to the data above, most countries seemed to have continuously increased investment level relative to GDP until the recession in 2008. Such a global trend might have positive effects on the FDIRE in U.S., offsetting the negative effects from a high US dollar value. However, the index includes both foreign and domestic investment so the results should be interpreted cautiously.

Figure 6.4: 10-year government bond yield spread to U.S. equivalent



Source: World Bank

Data of interest rate show three different tier groups of government bond yields. Japan has the lowest yield, while Europe and Canada have similar levels, and Australia has the highest yield. As many previous studies have suggested, foreign investment preference can be identified by the different level of interest rates. Furthermore, the data indicate that the yield spread to U.S. bonds has increased gradually until 2006 and suddenly rose after 2006. Considering the hypothesis that low interest rates in home countries and high interest rates in the host country are ideal for FDIRE1 in the host country, we can expect lower FDIRE1 in the U.S. after 2006.



## Regression Results for Question 1

Table 6.2: Regression results of Country model A

Variable	Coefficient	Std Error	T-Stat	Significance
Constant	-6913.395445	6309.425913	-1.09572	0.27788921
GDP <sub>t</sub>	4.996555	0.664382	7.52060	0.00000000
GGDP <sub>t</sub>	2.516453	658.502460	0.00382	0.99696449
EXCHG <sub>t</sub>	-133.900260	430.277369	-0.31120	0.75680773
BSPRD <sub>t</sub>	421.025069	178.724495	2.35572	0.02201358
INVST <sub>t-1</sub>	505.667502	296.019465	1.70822	0.09313302
Centered R <sup>2</sup> = 0.54				

Table 6.3: Regression results of Country model B

Variable	Coefficient	Std Error	T-Stat	Significance
Constant	0.0000000	0.0000000	0.00000	0.00000000
GDP <sub>t</sub>	-3.3974026	1.5191711	-2.23635	0.03083122
GGDP <sub>t</sub>	-741.3719170	390.6306445	-1.89788	0.06476738
EXCHG <sub>t</sub>	-256.7849043	114.6606465	-2.23952	0.03060787
BSPRD <sub>t</sub>	-25.6230323	62.2267702	-0.41177	0.68265383
INVST <sub>t-1</sub>	778.7876014	284.1256599	2.74100	0.00903310
Centered R <sup>2</sup> = 0.98				

Table 6.4: Regression results of Country model C

Variable	Coefficient	Std Error	T-Stat	Significance
Constant	0.0000000	0.0000000	0.00000	0.00000000
GDP <sub>t</sub>	-1.3063618	0.8980280	-1.45470	0.15254241
GGDP <sub>t</sub>	-204.5204912	226.7716108	-0.90188	0.37181949
EXCHG <sub>t</sub>	-217.4613607	103.2287700	-2.10660	0.04063703
BSPRD <sub>t</sub>	-9.0366570	60.7040963	-0.14886	0.88231163
INVST <sub>t-1</sub>	833.6154029	224.2370730	3.71756	0.00054454
Centered R <sup>2</sup> = 0.98				

At a glance, one of the noticeable results from both the pooled regression model (Country model A) and the panel data model (Country model B and C) is the existence of clear discrepancy, which is the opposite signs of coefficients of independent variables such as GDP and GDP growth (GGDP) between the two models at a relatively significant level. Another interesting

observation is an obvious contrast of significance level in the bond yield spread between the two models.

### **GDP**

GDP is significant in both results (Country model A and B). From the result of the pooled data regression model, which shows a positive sign of the coefficient, we find that the countries with larger economies tend to invest more in FDIRE in the U.S. than countries with smaller economies do, all else being equal. However, the result from panel data regression model (Country model B) unexpectedly indicates a negative sign of coefficient at a relative significant level of P-value.

### **GDP Growth**

The result from the pooled data regression model (Country model A) suggests that countries with faster growth in the economy generate more FDIRE in the U.S. than slower growing countries do. However, according to the result from panel data regression model (Country model B), the growth of a given country's GDP has an inverse relationship with its FDI in real estate in the U.S. at a significant level. Combining the interpretation resulting from GDP variable, we argue that, the faster a given country grows, the more its level of FDIRE in the U.S. diminishes.

These empirical results about GDP and GGDP are somewhat inconsistent with the findings from earlier studies (Dunning, 1981). One possible explanation is that as the economy of a given home country grows, investors in that country tend to turn around toward higher returns from domestic investments rather than foreign investments. However, such interpretation can be a conjecture only to explain the negative sign of coefficient. It is possible that the negative sign was caused erratically by multicollinearity from highly correlated independent variables, GDP and GGDP.

### **Investment rate of GDP**

The result expectedly shows a very significant, positive correlation between the investment rate of GDP and the FDIRE level. Especially, when we give a one-year lag into the equation, the significance becomes much stronger. The result also shows that the effect of the country's investment rate holds up in both models. Thus, countries with a high investment rate invest more in U.S. real estate, and over time as a given country's investment rate rises, FDIRE level goes up as well.

### **Exchange rate change**

At the initial experiment when we employed exchange rate level of local currency relative to USD (LC/\$), the result from both models showed a positive sign of coefficient, meaning that depreciation of value of USD attracted more FDIRE in the U.S., which is consistent with a number of previous studies.

However, the impact was not significant, so we decided to use the annual change of exchange rate (derived from current year value minus previous year) to examine how investors react to the expectation of future currency movement. The result from panel regression (Country model B and C) suggests that a given country increases its FDIRE in the host country when the value of its currency is appreciating relative to USD. In other words, FDIRE in the U.S. becomes more when the value of USD depreciates. Also, the pooled data regression (Country model A) result suggests that different relative values between currencies across home countries have little impact on the decision of FDIRE in U.S.

### **Bond spread**

The pooled data regression (Country model A) results suggest that investors from countries with low bond yields relative to U.S. bond yield tend to invest more in the U.S. than investors from

countries with higher bond yields do, and the relation is significant. The lower interest rate encourages firms to invest in foreign countries with lower capital costs of financing in the home countries, whereas higher interest rates usually lead domestic firms to invest in a local area rather than in a foreign country due to higher returns, and hence restrain the expansion of FDI outflow (Kueh, Puah, and Liew, 2010).

Likewise, FDIRE firms in a country with lower interest rates tend to invest in the foreign countries with higher interest rates because of two advantages: lower financing cost in the home county and the depreciation of value in real properties in the host country. In the U.S., one NCREIF research clearly shows that the 10-year Treasury note yield moves very closely with the commercial real estate cap rate. Therefore, foreign investors in a country with lower interest rates prefer the higher cap rate in real estate investment. However, the results from panel data regression (Country model B and C) suggest that the finding does not hold within countries across time. As U.S. interest rates rise relative to home countries, there is no effect as a determinant of FDIRE.

## **6.2 Results and Findings for Question 2**

### **Correlations analysis**

*Table 6.5* provides the correlations between variables. They give us a first glance at the relations between these variables. The correlation between FDIRE2 and independent variables are mostly positive, which is consistent with our hypothesis. One exception is the correlation between FDIRE2 and VAC, which has an unexpected positive sign. The correlation between FDIRE2 and POP equals 0.89, which indicates a strong correlation between inventory of FDIRE and state population. Correlation between FDIRE2 and POPCHANGE equals 0.62, indicating a strong positive correlation between inventory of FDIRE and population growth.

On the other hand, correlations between FDIRE2FLOW and independent variables are mostly negative but not very strong, except for correlation between FDIRE2FLOW and POP, which equals -0.11.

Table 6.5: Correlations between variables

	<i>FDIRE2</i>	<i>FDIRE2FLOW</i>	<i>POP</i>	<i>PIP</i>	<i>VAC</i>	<i>COMP</i>	<i>POPCHANGE</i>	<i>PIPCHANGE</i>
<b>FDIRE2</b>	1.00							
<b>FDIRE2FLOW</b>	-0.01	1.00						
<b>POP</b>	0.89	-0.11	1.00					
<b>PIP</b>	0.23	0.01	0.14	1.00				
<b>VAC</b>	0.13	-0.03	0.30	0.13	1.00			
<b>COMP</b>	0.03	-0.01	0.08	-0.12	0.13	1.00		
<b>POPCHANGE</b>	0.62	-0.10	0.76	0.01	0.27	0.26	1.00	
<b>PIPCHANGE</b>	0.07	0.00	-0.03	0.56	-0.23	-0.10	-0.03	1.00

### Regression analysis

Table 6.6: Regression results of Location model A

<b>Variable</b>	<b>Coefficient</b>	<b>Std Error</b>	<b>T-Stat</b>	<b>Significance</b>
Constant	-2786.592764	1083.64433	-2.5715	0.0107193
POP	0.000973	0.000035	27.49632	0
PIP	0.186316	0.032712	5.6957	4E-08
VAC	-31897.03113	4812.53109	-6.62791	0
COMP	-1779.446345	9856.1618	-0.18054	0.8568773
POPCHANGE	-0.007286	0.002572	-2.83258	0.0050032
PIPCHANGE	-0.704378	0.268258	-2.62575	0.0091923
Centered R <sup>2</sup> = 0.87				

Table 6.7: Regression results of Location model B

<b>Variable</b>	<b>Coefficient</b>	<b>Std Error</b>	<b>T-Stat</b>	<b>Significance</b>
Constant	442.717292	379.050421	1.16796	0.24415187
POP	-0.000022	0.000012	-1.85214	0.0654154
PIP	0.005104	0.011351	0.44959	0.65346947
VAC	-1067.29774	1673.999024	-0.63757	0.52444908
COMP	2181.735995	3481.032827	0.62675	0.53150737

POPCHANGE	-0.000023	0.000849	-0.02753	0.97805948
PIPCHANGE	-0.307927	0.090589	-3.39917	0.00080942
Centered R <sup>2</sup> = 0.11				

*Table 6.8: Regression results of Location model C*

Variable	Coefficient	Std Error	T-Stat	Significance
Constant	0	0	0	0
POP	-0.000716	0.000261	-2.74961	0.00653058
PIP	0.028849	0.056182	0.5135	0.60818571
VAC	138.713821	3885.335213	0.0357	0.97155677
COMP	1794.230333	5609.21529	0.31987	0.74940966
POPCHANGE	-0.001051	0.001826	-0.57561	0.56554411
PIPCHANGE	-0.0241	0.126201	-0.19096	0.8487555
Centered R <sup>2</sup> = 0.99				

*Table 6.9: Regression results of Location model D*

Variable	Coefficient	Std Error	T-Stat	Significance
Constant	0	0	0	0
POP	-0.000704	0.00026	-2.7076	0.00736386
PIP	0.021662	0.021884	0.98987	0.32343555
VAC	-2466.49774	3350.487019	-0.73616	0.46249529
COMP	-7065.8855	5142.170161	-1.37411	0.17094681
POPCHANGE	-0.001184	0.001843	-0.64244	0.52132557
PIPCHANGE	-0.093687	0.104672	-0.89505	0.37183587
Centered R <sup>2</sup> = 0.99				

### **Pooled regression analysis**

The pooled linear regression results for the FDIRE2 (Location model A) show a pattern of generally stable FDIRE levels that vary greatly across states.

The POP and PIP variables are significantly positive. This result clearly indicates that foreign investors prefer bigger and wealthier states for their direct commercial real estate investments.

These empirical results are consistent with the findings from earlier studies (Bagchi-Sen and Wheeler, 1989; Gerlowshi, Fund, and Ford, 1994).

The coefficient of VAC variable is significantly negative, which is consistent with the first interpretation of VAC's effects on levels of FDIRE presented above. The result suggests that foreign investors prefer states with lower vacancy rates and may suggest that foreign investors adopt more of a core investment strategy than opportunistic strategy for their direct commercial real estate investment in the U.S.

The coefficients of POPCHANGE and PIPCHANGE variables are significantly negative, which is unexpected. One possible explanation is that FDIRE is still heavily concentrated in traditional centers in the Northeast and the Midwest areas, which have been growing more slowly compared with states in the West and the South during the study period.

Variable COMP is not significant for the selected sample period in this research, which is also unexpected.

In pooled linear regression Location model B, the dependent variable is FDIRE2FLOW, annual net flow of FDIRE2 in each state. In model B's regression results, the stable patterns found in the results of location mode A disappear. There is evidence in the empirical results that foreign investors are moving toward smaller states (significant negative coefficient for variable POP) for their commercial real estate investment, which is consistent with the observation from the *Table 1.1* and *Table 1.2* presented in the introduction section of this study. All the other coefficients are insignificant in this model.

### **Panel regression analysis**

Location model C, the fixed effects panel regression, has similar results as the linear regression model B. The fixed effects (dummy variables) account for all of the differences across the states. In the regression results, variable POP is significantly negative, which indicates that foreign investors have been diversifying toward the smaller states for their real estate direct investments. All the other variables are not significant in this model.

The Location model D, which controls state effects, has an R square value very close to that of the two – way the fixed effect model, Location model C, (0.9897 vs. 0.9970). This suggests that there is no consistent pattern in levels of FDIRE across different states for the study period.



## **Chapter 7. Conclusion**

FDIRE brings important economic and social benefits to the recipient areas. Therefore, it is important to understand which factors affect the inflows of FDIRE in particular areas. This study advances our understanding of the factors that influence the foreign investors' decision to invest in the United States and their location preferences.

Interestingly, our analysis suggests that GDP and GDP growth in a home country have a negative correlation with the country's FDIRE as opposed to Dunning's theory (1981) that a country increases outward FDI as its economy develops. We can reasonably interpret our findings in a different perspective that the economic growth of a country encourages more domestic investment in real estate than foreign investment to take advantage of higher domestic return. However, it is true that this interpretation can be a conjecture to explain the negative signs of the coefficients. There could be other reasons that caused the negative signs.

For the rest of the factors, the results are consistent with previous studies. Investment level of GDP is significantly associated with outward FDI, meaning that the foreign direct investment increases as the gross investment level increases. We also observe that expected appreciation (and also high levels) of the value of the host country currency are associated at significant levels with reductions in the inflow of U.S. FDI in real estate. In FDIRE, firms in a country with lower government bond yield are more likely to expand abroad to seek investment opportunities with their abundant capital from lower financing cost in the home country. These investors choose the destination country with higher government bond yield, which is significantly positive related to the cap rate.

Our empirical analysis on the location preferences finds that foreign investors prefer larger, wealthier states. This finding is consistent with suggestions from earlier researches. Bagchi-Sen and Wheeler (1989) suggested the foreign direct investment preferred larger centers for their investment the United States. Gerlowksi, Fung, and Ford (1994) found that foreign investors preferred states with large, developed economies. Our research confirms the similar location preferences. This study suggests that there is evidence of foreign direct real estate investment dispersing toward smaller and poorer states during the study period. Bagchi-Sen and Wheeler (1989) found similar trend of foreign direct investment dispersing from Northeast areas, the South, and the West during the time period of 1979 to 1983. Furthermore, this study finds that foreign investors prefer states with lower vacancy rates in commercial real estate while commercial real estate completion rates have no significant effects on foreign investors' location choices. There was no earlier research that specifically tested these two factors.

For the future research, examination of tax issues should be conducted as one of the most important determinants for home countries because in the real world, higher taxes in some instances are offset by the numerous fiscal incentives commonly offered by state and local governments.

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