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Higher Education And Foreign Direct Investment: A Study Of Mexican States

Yuyinska Krystal Sanchez-Osio
University of Texas at El Paso, krystal.sanchez@outlook.com

HIGHER EDUCATION AND FOREIGN DIRECT INVESTMENT: A STUDY OF MEXICAN STATES

YUYINSKA KRYSTAL SANCHEZ-OSIO

Department of Economics and Finance

APPROVED:

_____
Nathan J. Ashby, Ph.D., Chair

_____
James Holcomb, Ph.D.

_____
Miguel Ramos, Ph.D.

_____
Bess Sirmon-Taylor, Ph.D.
Interim Dean of the Graduate School

Dedication

To my mom and dad, who have always supported and believed in me; to my brothers who have cheered me on through the whole journey; to my grandparents who have always been my patient audience; and to my godfather who has always encouraged me to keep challenging myself.

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by

YUYINSKA KRYSTAL SANCHEZ-OSIO, B.I.B.

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Abstract

Factors that attract Foreign Direct Investment in Mexico at the state level are analyzed. Special focus is placed on how human capital promotes growth by attracting more FDI flows in a state. A model that explains the amount of FDI received in Mexico in 2012 is developed at a subnational level. The main independent variable is human capital, and it is measured using percentage of university graduates. The model controls for other possible determinant factors such as population, infrastructure, wages, fiscal incentives, geographic location, ease of doing business, and past experience in attracting FDI. It is tested using ordinary least squares regression in a cross-sectional analysis. The results support the main hypothesis that higher education is associated to the amount of foreign investment received at the state level in Mexico. The percentage of college-educated people, total population in a state, and past experience in receiving FDI flows have a strong, positive and significant association with state FDI. The results also find that the variables measuring ease of doing business, time and cost, are positively associated to inward FDI, but this might be due to spurious relationships and correlations with the variables. Infrastructure, wages, and fiscal incentives proved to be insignificant in the model.

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Chapter 1: Introduction

With the emergence of globalization there has been more openness to trade of goods and services, as well as more freedom to the flow of capital between countries. The General Agreement on Trade and Tariffs (GATT), the World Trade Organization (WTO), and the International Community, have been determining change agents to promoting, facilitating, and regulating the transition into this new World trend.

Many classical economic theories assume free labor and capital mobility in their approach to international economics, but economists have noted that these assumptions do not always hold. However, it seems they are becoming a reality. The international organizations' agendas, political discourse and objectives of groups of countries (i.e. European Union), and the private sector's actions, are signaling change towards that direction. Thus, the analysis and understanding of the dynamics and impacts of free trade, labor mobility and capital flows seems necessary.

The main focus of this study will be on the flow of capital, in the form of direct investment. Issues such as the firm's decision to expand abroad, the benefits to the host country receiving FDI, and the determinant factors that firms consider when making their location choice, will be addressed. Special focus will be placed on these determining factors, emphasizing on human capital as a driver for FDI and growth.

The study will be then limited to one country, Mexico, to control for country-specific determining factors of location, and focus on within country choice. Reasons for as to why Mexico is a good case for study will be presented. Its history and current FDI composition will be analyzed.

A model for determining whether human capital attracts FDI at the state level, controlling for other possible determinant factors, will be developed and then empirically tested. The empirical results will be presented and compared to previous studies and their findings. Finally, conclusions and suggestions for further research will be provided.

Chapter 2: Literature Review

In order to address the issue of whether human capital attracts foreign direct investment at the intra-country level, and thus promotes growth, it is necessary to first research past literature. The aim is to understand why firms decide to invest abroad, what makes a location desirable for investment, why talented labor pools may be considered attractive to investors, and how human capital and physical capital investment play a role in an economy's growth model.

There are three different ways a company can expand, according to Caves (1971). It can do so through conglomerate diversification, horizontal investment, or vertical direct investment. Focus will be placed on the literature addressing vertical and horizontal investment. Vertical investments, also known as "backwards integration", are made to obtain a raw material or produce an input to their production process at home. Firms engage in vertical direct investment when there are shortages of local social overhead, capital, or entrepreneurship (Caves, 1971). Firms may be looking for more advanced technological infrastructure, processes, knowledge, or capabilities abroad (Chung and Alcacer, 2002).

Firms invest horizontally to produce the same line of goods as in the home market. When firms face high import tariffs or barriers in a market, they decide to locate production in the market where they wish to expand to avoid the high costs and implications associated to importing. This tariff-jumping is particular of the horizontal type of investment (Caves, 1971). Another reason for horizontal investment is product differentiation. According to Caves (1971), firms wish to take advantage of oligopolistic profits in a new market, when they have a differentiated product. Hymer's Market

Imperfection theory suggests that companies expand their market power by controlling or eliminating their competitors (Hymer, 1976). One way of doing so is through the transfer of capital, management, or technology. They wish to create barriers to entry to new competitors, avoid risk, and enjoy oligopolistic profits (Caves, 1971).

Firms that achieve economies of scale look to expand to other markets to keep exploiting these advantages. Businesses also seek expansion abroad when their home markets have already been exploited and are in search of new ones (Caves, 1971). Vernon's Product Life-Cycle (PLC) theory states that when a product enters its mature stage and starts to lose its competitive advantage, firms will seek to minimize costs by locating production where labor is less costly (Vernon, 1966).

Caves' (1971) Internalization theory suggests that the firm has a special asset from which it can profit by expanding into other markets, where the return depends, to some degree on local production. The special asset has the character of a public good within the firm, and can be knowledge, information, or a technique, that yield positive returns in other markets without having to incur in the initial sunk costs associated to its discovery or development.

These traits that firms possess characterize them as larger, more advanced businesses, and can reasonably explain why foreign multi-national corporations (MNC) are usually more competitive than domestic firms. Bandick and Hansson (2009) empirically find this to be true. The multinationality of firms is more important than foreign ownership.

Dunning (1988) develops the Eclectic Paradigm, where the decision for a firm to expand depends on Ownership, Location, and Internalization (OLI) factors. Ownership factors are specific to the firm, and include the possession of a unique product, patent,

trademark, or a good reputation. Internalization is associated to adding value to the firm by using internalization in the market to generate or use these assets. Other ways of adding value may be through lower transaction costs and coordination efforts. Location factors depend on the availability of raw materials, cheaper factor inputs, lower transportation costs, proximity to large markets, and the need to get around trade barriers.

When choosing where to locate their investments, multinational enterprises take country risk levels into consideration. Bouchet, Clark, and Groslambert (2003) classify the different sources of country risk into Natural, Socio-political, and Economic risk. Natural risk is mainly associated with geographic and meteorological phenomena or natural disasters. Geographic situation and land area are considered when assessing this type of risk because location and proximity to large markets is also a determinant factor.

Socio-political risk involves political events and changes in policies and authorities or government action, social movements, social situation and dynamics and other factors that endanger a foreign investment (Bouchet, Clark, and Groslambert, 2003). In the assessment of Political Risk, factors such as political regime type, military involvement, degree of participation in elections, ease of power transition, and external and internal conflicts, including wars, disputes, guerillas, and organized crime, must be taken into account. Respect for human rights, cultural ties, business networks, uncertainty avoidance and trust also play a role in the decision of the investors (Blanton and Blanton, 2007; Bandelj, 2002; Bhardwaj, Dietz, and Beamish, 2007).

Religious, ethnic, and language fractionalization, xenophobia, nationalism, willingness to compromise, terrorism, violence, civil disorder, power groups, unions, degree of freedom, poverty, wealth distribution, population structure and density, and

human development, are social indicators of a country's risk level, compiled by Bouchet, Clark, and Groslambert (2003).

Determining risk factors for measuring governance in a country include voice and accountability, government effectiveness, regulatory quality, rule of law, and control of corruption (Worldwide Governance Indicators, 2013). Expropriation, nationalization, foreign exchange controls, trade restrictions, breach of contract, and unfavorable trade agreements also pose threats to foreign investors (Bouchet, Clark, and Groslambert, 2003).

Bouchet, Clark, and Groslambert (2003) list macroeconomic risk factors such as public finances, output, inflation rates and prices, exchange rates, interest rates, foreign debt, Current Account and Balance of Payments, monetary and fiscal policy, that should be taken into account when investing abroad.

Economic risk includes microeconomic risk factors that threaten certain sectors, activities, or the transactions, management, and operations of firms (Bouchet, Clark, and Groslambert 2003). Bureaucratic delays, labor policies, corporation law, enforceability of contracts, and taxes are determinants of microeconomic risk. While there are many factors to consider when expanding abroad, it cannot be assumed that the investment will be evenly distributed throughout the host country. It is important to note that it may be the case that location preference is influenced by regional factors that apart from varying from country to country, also vary within it.

Firms make their investment location decision based on the relative factor endowments that the recipient has, such as, natural resources, labor, physical capital, and human capital to gain a competitive advantage or to minimize costs (Dunning, 1988; Chung and Alcacer, 2002). Whether firms seek low-skilled, less costly labor or highly qualified and

skilled labor in the specific region they decide to invest in is of particular interest to the present study.

It has been traditionally believed that more docile and cheaper labor in developing countries is what attracts developed countries. This traditional view of offshoring production to emerging economies can be exemplified by observing the production patterns of China, India, and the Caribbean (Banik, Bhaumik, and Iyare, 2004). Minimizing costs is a reason for investing abroad, but this does not necessarily mean that firms will choose to invest in the country or region where wages are the lowest. This relates to David Ricardo's comparative advantage theory. Firms in highly developed countries with higher wages will already be minimizing costs simply by hiring workers in a less developed country, with lower wages than theirs. Host countries may have a comparative cost advantage, but not an absolute advantage. Given that firms from developed nations will already be minimizing costs simply by not producing at home, they will not seek to invest in countries that possess the absolute cost advantage only, but also in those that have other characteristics from which they can benefit from.

Firms recognize and give greater preference to the need to access and maintain a well-trained and skilled labor pool, without disregarding that low wages remain a factor in investment decisions. MNCs tend to locate their operations near pools of highly trained labor (Jensen and Rosas, 2007), which is one of Marshall's (1920) production externalities. The concentration of MNC in certain areas also cause for knowledge spillovers, which are beneficial to the host country (Chung and Alcancer, 2002). Chung and Alcacer (2002) differentiate between cost-minimizers and knowledge-seeking industries. In their subnational study on U.S. inward FDI, they find that knowledge seeking occurs in specific

regions, and is limited to a minority of firms in research-intensive industries that are attracted to states with high R&D intensity. Blanton and Blanton (2007) have noticed that labor costs have become a less critical determinant of production costs and emphasize the role of human rights and human capital in attracting FDI. Human capital is valued by foreign firms, and it is believed to attract inward FDI.

Receiving foreign direct investment, through improving human capital, can be beneficial for the host country. FDI represents a source of income for governments through taxation (Caves, 1971), reduction in unemployment due to new job creation, alleviation of financial and technological deficits (Bouoiyour, 2007), technology transfers and spillovers, knowledge spillovers, as well as production spillovers resulting from increased productivity and competition (Caves, 1971). The positive effects of knowledge spillovers on a host location depend on their level of local capability and competition, and vary by country and industry (Blomström and Kokko, 1988). Since knowledge spillovers create more opportunities for economic growth, human capital can bring growth to a state, country or region by attracting foreign direct investment.

The relationship between growth and human capital has been studied widely in the literature, both theoretically and empirically. While some authors believe that income growth causes growth in human capital (Blis & Klenow, 2000; Schofer & Meyer, 2005), others believe that greater human capital levels attract or are complementary to investment in physical capital, and thus, directly or indirectly cause output growth.

Romer (1990) considers human capital as the key input to the research sector, leading to innovation. Growth in technology and growth in the quality of the labor force will lead to more investment in physical capital (Romer, 1990). If both skilled labor and

capital are increased, the increase in these factors of production will be reflected in an increase of total output. Human capital plays a reinforcing role in output growth because not only does it contribute to the labor factor of production, but it also enhances the growth of technology and physical capital. Therefore, higher levels of human capital will ultimately cause growth of per capita income. Nelson and Phelps (1966) regard human capital as a determinant indirect factor for growth. They argue that education facilitates the absorption and diffusion of new technologies from abroad. This process speeds the catching up of follower countries to the technological leaders.

Mankiw, Romer, and Weil (1992) develop an augmented Solow model by including accumulation of physical and human capital. Using a cross-section of countries, they first test the Solow model. Then, physical and human capital is added to it and they find that the magnitudes of the coefficients on investment and population growth with the augmented model are closer to what Solow predicts, and that the residual variance is reduced. They use the average percentage of the working-age population in secondary school as their proxy for human capital. Their results are significant for the non-oil and intermediate country groups, but insignificant for the OECD countries.

Benhabib and Spiegel (1994) modeled the effect of education on total factor productivity growth rate. They first show that when human capital enters the Cobb-Douglas production function as a factor on its own, the results of the growth accounting regressions are insignificant and have the incorrect sign. Nelson and Phelps (1966) also believe that treating human capital simply as another factor of production may be a model misspecification error. Benhabib and Spiegel (1994) consider human capital as an engine for attracting other factors, such as physical capital that contribute to growth. They find

that human capital levels, rather than growth rates, are a determinant of per capita income growth in their alternative model where a higher level of human capital causes a higher level of growth in technology. Using school enrollment rates at the primary and secondary levels in an international comparison, Barro (1991) finds that the growth rate of per capita real GDP is positively related to initial human capital, and negatively so to initial income level (1991). Once again, per capita growth is explained by higher ratios of physical capital investment to GDP, which is motivated by human capital. Hanushek and Kimko (2000) also support that growth can be achieved through improving human capital. They find that labor quality, measured through performance on standardized math and science tests contributes to growth (2000).

The idea of human capital attracting physical capital is also supported by Lucas (1990). He perceives human capital as complementary to physical capital and explains that due to the poor endowment of these complementary factors in less developed countries, physical capital fails to flow to them. Following Griliches (1969), Acemoglu (1998) views human capital and physical capital as complementary, as well. Acemoglu (1988) develops an endogenous model for growth, based on the interdependency of the individuals' choice of investing in their own human capital and the choice of the firm of investing in R&D.

Acemoglu (1998) proposes that supply of skills and demand for skilled labor are endogenous. He analyzes the changes in the college premiums in the U.S. and concludes that in the long run, college premiums increase because the directed technology effect is sufficiently strong to offset the substitution effect, caused by an increase in the supply of skilled labor. In his model, an exogenous factor causes the relative supply of skilled workers to increase. The increase in the relative supply lowers the college premium

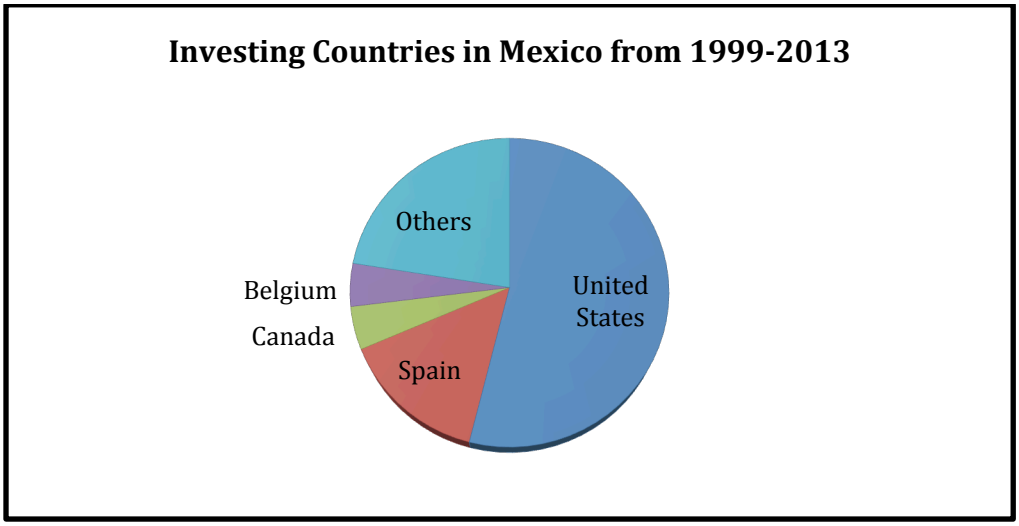
temporarily through the substitution effect. With the relatively lower price for skills, the market demand for technologies complementary to skills also increases. This is what he calls the directed technology effect. An increase in the relative demand for skilled labor raises the college premium higher than its original level, but it also creates inequality.

Lopez-Bazo and Moreno (2008), in their work on the Spanish economy, also find that a higher endowment of human capital makes it more attractive for new and existing highly capitalized firms to locate productive value-adding activities where there is a highly skilled workforce, given their foreseeability of the higher earnings they can obtain.

While many studies have tested the human capital influence on economic growth at the country level, few have focused on determining whether the same holds for intra-country variation (Molina, Fullerton, Barraza 2010; Chung and Alcacer, 2002). Availability and access to the endowments or factors that attract foreign investment can be substantially different in the various regions of a country, especially if it is large and diverse. Mexico presents itself as a good case for study because it is the only Latin American country belonging to the OECD, being the second largest economy in Latin America, and fourteenth largest in the World (World Bank, 2013). It is relatively large in geographic size, being the second largest one in the Latin American region. It is also relevant to this study because of the amount of FDI it has been receiving, especially from the United States, since it drastically opened up to trade in the mid-1980s.

Source: Secretaria de Economia, 2013

Figure 2.1 Foreign Direct Investment in Mexico from 1980 to 2012



Source: Secretaria de Economia, 2013

Figure 2.2 Investing Countries in Mexico from 1999 to 2013

Past studies on Mexico have resulted in mixed results on the impact of FDI in the economy. Jensen and Rosas (2007) find that Mexican states with increased FDI flows enjoyed less income inequality from 1990 to 2000. Since inequality is reduced in states that attract more FDI, it may be increased at the national level (Jensen and Rosas 2007). Feenstra and

Hanson (1997) find that the increase in foreign direct investment received in the 1975-1988 period, especially by MNC outsourcing production to Mexican border states, created a higher relative demand for skilled labor, leading to a higher labor share of wages for skilled workers, and probably to greater inequality as well.

Hanson (2003) also believes that Mexico has experienced rising inequality, since it opened up to foreign investment and trade in the mid-1980s, and that it is associated with rising returns to skill. He finds a sharp increase in returns for males to high levels (13-15 years) of schooling, equivalent to some college. Rising returns to schooling for women in Mexico were found at all education levels (Hanson, 2003). The sustained increase in returns to skill in the country has led to an overall increase in wage inequality in Mexico. Wu (2001) suggests that skill-biased inward FDI creates inequality, while labor-biased FDI can reduce the relative wage for skilled labor as well as income inequality. It can be inferred that Mexico's wage and inequality patterns reflect that the type of technology it has received through FDI is skill complementary.

Aitken, Harrison, and Lipsey (1995) suggest that two thirds of the wage differential between foreign and domestic firms can be explained by industry distribution, but these higher wage premiums offered by foreign plants are most significant for skilled workers. In their comparison of Venezuela, the United States and Mexico, they find that in Mexico, the positive impact that FDI has on the wages of unskilled workers is significantly lower than for the skilled labor force. In a sample of eighteen Latin American countries, Mancorda, Sanchez-Paramo, and Schady (2010) find that Mexico is the only country where the supply of college-educated workers increased faster than secondary schooled workers in the 1980-1990 period. They also find that demand-side trends strongly favor skilled workers

in Mexico and Chile than they do in Argentina and Brazil. Donaubauer, Herzer, and Nunnenkamp (2012) find that foreign aid that is directed to education in Latin American countries has a significant, positive strong effect on FDI.

Akin and Vlad (2011) test the Zhang-Markusen theory of an inverse-U relationship of education and FDI for 165 countries between 1980-1999. They find a negative relationship between education and FDI in low-income countries and high-income countries, but a positive relationship between in middle income and upper-middle income countries. Akin and Vlad's (2011) research mainly observes primary through tertiary school enrollment and the positive impact on FDI received is greater when measured with tertiary school enrollment.

Kottaridi and Stengos (2010) find non-linearity on FDI's effects on growth. By assessing the joint effect of FDI and human capital on growth in middle-income countries, they discover that for medium levels of schooling there is no effect on growth, but that low and very high education levels can be beneficial to a country's growth. More specifically, Molina, Fullerton, and Barraza (2010) examine the relationship between educational attainment, foreign direct investment, and regional economic conditions in Mexico. Through the interaction term of FDI and years of schooling, they find that education and foreign investment are complementary in positively affecting output in Mexican states.

It has been noted that Foreign Direct Investment in the recipient country or region has positive benefits and can lead to economic growth. There are many factors that firms consider when making the decision on where to place their investments. Many studies have tried to determine which of these factors that vary from country to country are the most significant, but few studies have focused on the characteristics that investors look for at the

regional level. In order to be able to control for country variable variation, an analysis of a single country can shed light on explaining which intra-country traits investors from abroad are seeking.

Chapter 3: The Model

It is the aim of this paper to discover which factors attract FDI at the state level in the case of Mexico. It is believed that human capital endowments positively affect the amount of FDI a state receives. Past studies have focused on measuring growth, FDI and human capital relationships and effects (Caves, 1971; Romer, 1990; Benhabib and Spiegel, 1994; Barro and Lee, 1993; Feenstra and Hanson, 1997; Blanton and Blanton, 2007; Lopez-Bazo and Moreno, 2008; Aitken, Harrison, and Lipsey, 1995; Hanson, 2003; Acemoglu, 1998). They have measured human capital especially through education, using proxies such as literacy rates, primary and secondary enrollment rates, average years of schooling, performance on standardized tests, among others (Barro 1991; Akin and Vlad, 2011; Kottardi and Stengos, 2010; Molina, Fullerton, and Barraza, 2010; Hanushek and Kimko, 2000). The results have been mixed, and therefore inconclusive. The impact college education has had on attracting FDI inflows has not received much attention, and much less at a regional level. It is then necessary to determine if there is intra-country variation in the location choices of firms, and the extent to which human capital in the form of higher education plays a role in this decision. The main hypothesis is that in Mexico, the university-educated population in a state positively affects the amount of FDI it receives. The expected findings are that human capital will positively affect FDI inflows into Mexican states, thus, states with a higher percentage of college-educated population will have higher FDI levels. Knowing what factors within a country attract investment from abroad can aid policy makers in making efficient resource allocation for boosting economic growth in their regions.

Low wages in Mexico or cheaper labor is one of the main reasons investors from abroad decide to invest in it. Once this investment decision is made, then what are investors looking for at the state level within Mexico? Investors value human capital because usually, as human capital increases, its wage rate increases along with it. Therefore, it is anticipated that foreign investors will not be attracted to lower wages in their intra-country decision-making process.

Attention has also been paid to the states' competitiveness in the business environment. The World Bank (2009, 2012), through its Doing Business in Mexico reports, has focused on the state's ability to shorten the time it takes to open a new business, the initial cost associated with it, among other factors that measure ease of doing business at the state level. Mexican institutions, especially the Instituto Mexicano para la Competitividad (IMCO) have participated in the creation of the competitiveness data as well. These reports rank the states from the most to the least competitive one on the overall ease of doing business and on each variable individually. The state governments then strive to improve their scores and rankings by changing some processes and requirements, in order to become more desirable to investors. This study will test whether these efforts have actually increased Foreign Direct Investment, or if the investors are simply seeking something else.

The expected findings of this study are that, at the intra-country level, investors are not driven by obtaining the lowest wages; ease of doing business indicators are insignificant in their investment decision; and that they are mainly seeking talented labor pools. It is believed by the author of this study that the political and financial risk assessment is first made at the country level, where ease of doing business and cost factors,

such as wages and business start-up costs are taken into account. Once this decision has been made, investors become indifferent of these factors at the intra-country level because their focus shifts to obtaining the most talented human capital. They are willing to pay an extra premium for talent at the subnational level because they are already reducing costs by offshoring to another country. The difference in wages is marginal to them, and they benefit from having more talented labor and skills.

The present study analyzes the Foreign Direct Investment flows received in the year 2012 for each one of the federal entities in Mexico. It is cross-sectional. The unit of analysis is each Mexican state. Since there are thirty-two states in Mexico, there are thirty-two observations. STATA 13 was the statistical software tool employed.

The model aims at explaining Foreign Direct Investment as a function of the percentage of college-educated people in a state, controlling for population, infrastructure, whether the state borders the U.S. or not, average wages, fiscal incentives, previous experience in attracting FDI, and ease of doing business.

The main hypothesis is:

H1: In Mexico, professional population positively affects the amount of Foreign Direct Investment a state receives.

Ho: In Mexico, professional population does not affect the amount of Foreign Direct Investment a state receives.

The equation for the model is the following:

$$FDI = \beta 1 + \beta 2college + \beta 3population + \beta 4infrastructure + \beta 5time + \beta 6cost + \beta 7wages + \beta 6fiscal + \beta 6border + \beta 6experience + u,$$

where *FDI* is the amount of FDI received in a state during a certain year; *college* is the percentage of the population that holds a four-year University degree in that state; *population* is total population in a state; *infrastructure* stands for an infrastructure index; *cost* represents the percentage of national income that it takes to open a new business in a particular state; *time* stands for the amount of days it takes to open a business in that state, *wage* is the average wage in that state, *fiscal* represents tax breaks offered by the state, *border* is a dummy variable of whether a state shares a border with the United States, *experience* represents the state's past experience with foreign investors, or propensity.

The dependent variable is the amount of Foreign Direct Investment each state received in the year 2012, in millions of U.S. Dollars. It is labeled as "FDI2012" throughout the rest of the study. The data for this variable were obtained from *Secretaría de Economía*.

The main independent variable is the percentage of the population of each state that is eighteen years or older, and holds a bachelor's degree or equivalent university-level studies. This variable was created by dividing the number of college-educated people in a state, by its total population to compute the ratio. Then, it was multiplied by one hundred to convert it to percentage format. It is labeled as "Profpop10". The data for number of college-educated people were obtained from the most recent 2010 Population Census, which can be retrieved from *Instituto Nacional de Estadística, Geografía e Informática*

(INEGI). This variable aims at measuring the human capital pool a state has to offer foreign investors.

It is important to control for other factors that may affect the amount of FDI a state receives, such as total population, ease of doing business, wages, infrastructure, fiscal incentives, whether it shares a border with the U.S., and how much FDI it has attracted in the past. The total population data were also obtained from the most recent 2010 Population Census, by the *Instituto Nacional de Estadística y Geografía* (INEGI), and is labeled as "Pop2010". The most recent data that can be obtained for the main dependent variable and the population variable is from 2010. This allows for a two-year lag between these variables and the independent variable.

The ease of doing business control variables include cost of opening a business, and time needed to open a business. Cost and time to open a business were extracted from the World Bank (2012) subnational report *Doing Business en México 2012*. Though the report was published in 2012, it utilizes data from 2011, allowing the present study to have these control variables lagged for a one-year period. The cost is the percentage of per capita Gross National Income that is needed to open a new business in each state, and is labeled as "OpenCost11". The time is calculated as the average number of days needed to obtain all the permits to legally operate in each state. This variable is labeled as "OpenTime11". Data on average wages in 2011 were obtained from *ProMexico* with data from *Secretaría del Trabajo y Previsión Social.* Average wage is expressed in Mexican Pesos as a daily wage. The variable is labeled as "Wage2011".

In order to measure infrastructure, the percentage of advanced highways, number of airports, seaports, and railroad kilometers there are in each state were taken into

consideration. The scalar data were collected from INEGI and then compared and pondered, in order to create an index. The infrastructure index score variable is labeled as "Infrastructure" in the model.

Fiscal Incentives and tax breaks granted by each state were considered in order to create an index measuring this aspect. This index measuring how much each state promotes investment through tax breaks is labeled as "Fiscal". The information used to create such index was obtained from *ProMexico* with data from *Secretaría de Desarrollo Económico (SEDECO).* The border variable serves to control the influence that sharing a border with the U.S. might have upon FDI flows, and is a dummy variable, labeled as "Border". Data on FDI from 2007 and 2002 were also obtained from *Secretaría de Economía.* They are used to control for past experience in attracting FDI flows and are labeled as "FDI2002" and "FDI2007" in the models.

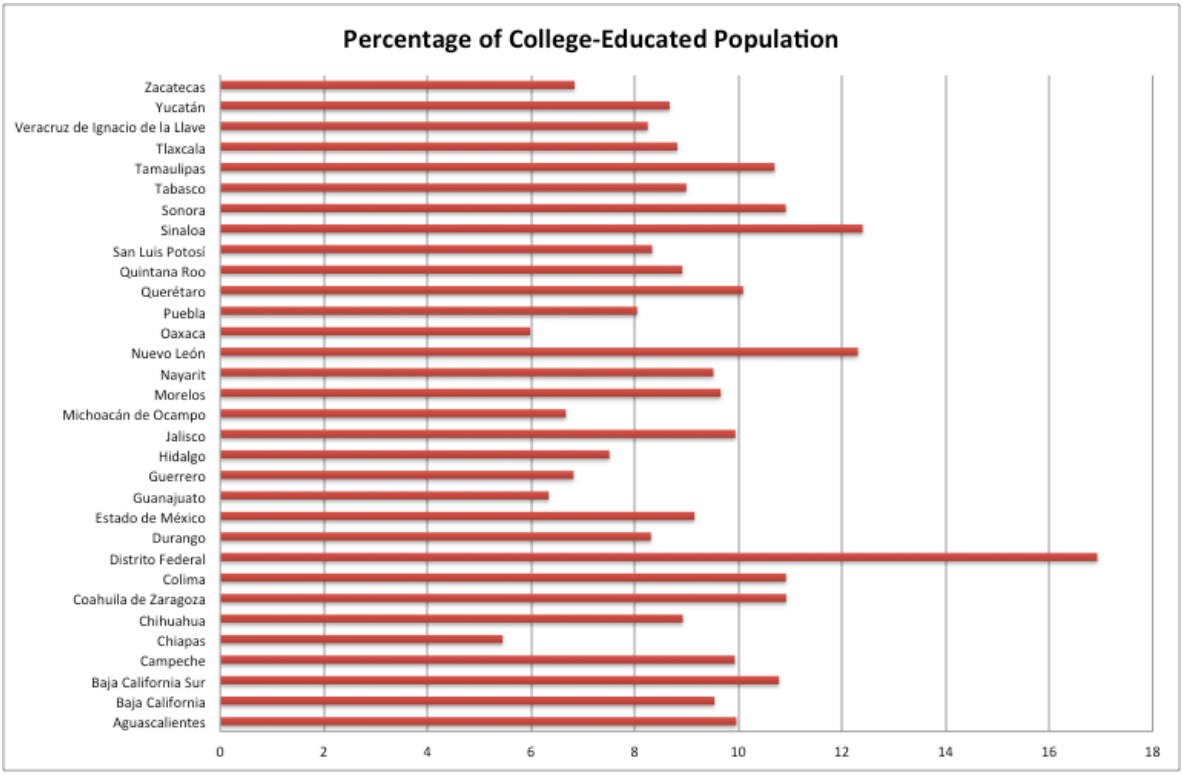
Knowing the data before interpreting results is useful to grasp a better sense of the whole scenario. Table 3.1 shows the means or simple averages of the variables, their minimum, maximum, and median points, as well as their standard deviations.

Table 3.1 Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max	Median
FDI2012	488.17	912.08	-62.58	5,059.48	294.58
Profpop10	9.27	2.23	5.45	16.93	9.07
Pop2010	3,510,517	2,981,381	637,026	15,200,000	2,706,705
Infrastructure	22.66	12.55	6.44	56.23	19.44
OpenTime11	13.81	8.66	6.00	49.00	12.00
OpenCost11	11.90	5.15	6.00	26.60	9.75
Wage2011	224.65	34.53	181.70	335.44	214.75
Fiscal	0.54	0.27	0.00	1.00	0.50
Border	0.22	0.42	0.00	1.00	0.00
FDI2002	748.17	2,917.76	-17.15	16,561.93	80.18
FDI2007	988.36	3,083.24	-51.27	17,493.82	237.85

The average amount of foreign direct investment the states received in 2012 was 488 million dollars. The minimum value is negative, which indicates a net capital outflow in a state. Both Chiapas and Hidalgo had capital outflows in 2012. The maximum amount of FDI a state received in 2012 was 5.06 billion dollars (5,060 in millions) in Distrito Federal.

The mean percentage of people with a college education in a state is 10.5%. The state with the lowest college-educated population percentage is Chiapas, with only 5% of professional population. The state with the highest college-educated population is Distrito Federal, with 19.1% of professional population. Figure 3.1 depicts a comparison of the percentage of college-educated population the states have.

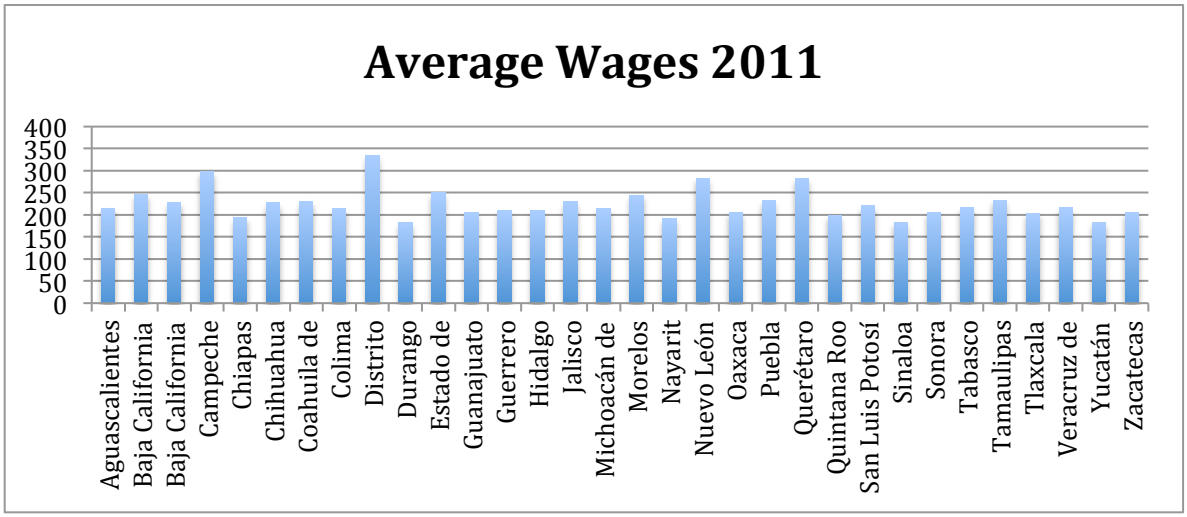


Source: INEGI, 2014

Figure 3.1 Percentage of College-Educated Population

The mean population in a state is 3,510,517. The state closest to the mean is Chihuahua. The state with the median value is Coahuila, with around 2.7 million people. The mean is larger than the median in this case because the high population in states such as Mexico and Distrito Federal.

The average wage for 2011 was computed by taking the average of the reported daily wage for each of the months in 2011. It is expressed as daily earnings in Mexican Pesos. Distrito Federal had the highest wage of 335 pesos per day, on average. Yucatan had the lowest daily wage of 181 Mexican Pesos. The median for this variable is 215 pesos. Aguascalientes, Colima, and Veracruz had average wages close to the median value in 2011. Figure 3.2 illustrates the states' average daily wage in Mexican Pesos for 2011.

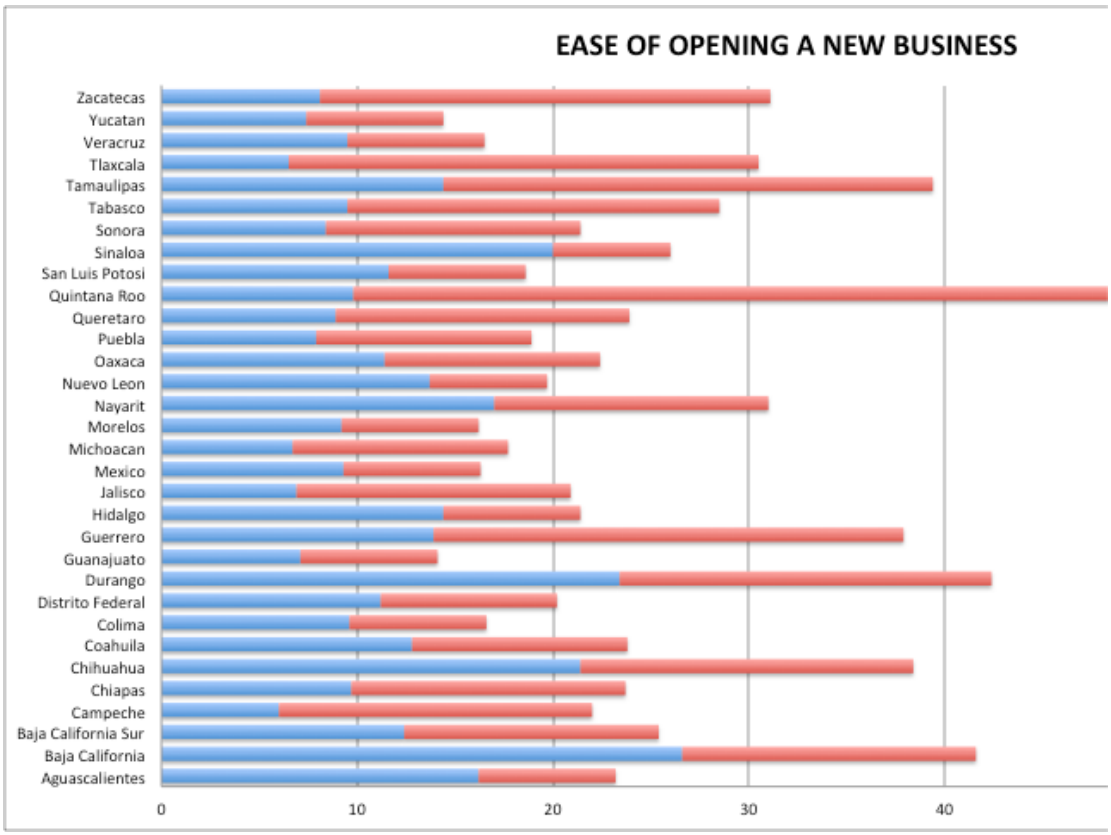


Source: ProMexico, 2014

Figure 3.2 Average Wages in 2011

The average time it takes to open a business is 14 days. The states with the shortest times are Nuevo Leon and Sinaloa, where it takes six days. The state where it takes the most time to open a business is Quintana Roo, where 49 days are needed. The average cost

of opening a business is 11.9% of GNI. The state with the lowest cost is Campeche (6% of GNI). The state with the highest cost is Baja California, where 26.6% of GNI is needed. Figure 3.3 shows the cost and total number of days it takes to open a business in each state.



Blue= Cost (as a % of GNI), Red= Time (in days)

Source: World Bank, 2012

Figure 3.3 Ease of Opening a New Business

In order to input infrastructure into the model without losing too many degrees of freedom, a weighted infrastructure index was computed[1]. The index considers the number of airports, seaports, railroad kilometers, and the percentage of advanced highways that a state has. It assigns a 54% weight on the highway variable because this is the average

[1] See "A.1 Infrastructure Index" in Appendix

percentage of usage this transportation mode has for all of Mexico's imports and exports[2]. The seaport variable is assigned a 30% weight, the railroad a 10%, while the remaining 6% is for airports. These weights were assigned following the same criterion as before: the percentage of import and export goods that are moved by transportation mode. The state with the most railroad kilometers is Chihuahua (2,655km), but the state with the most advanced highway percentage is Distrito Federal (D.F.). Forty-seven percent of the highways in D.F. are considered advanced. On the other end of the spectrum, in Oaxaca, only 1.14% of the highways are advanced, which makes this state have the lowest infrastructure index score. The state with the most seaports is Baja California Sur, which has 16. The amount of airports in a state range from zero to five, but the average number of airports a state has is two. The two states with the best infrastructure index score are Distrito Federal and Quintana Roo. Zacatecas and Chiapas are the states with the poorest infrastructure score.

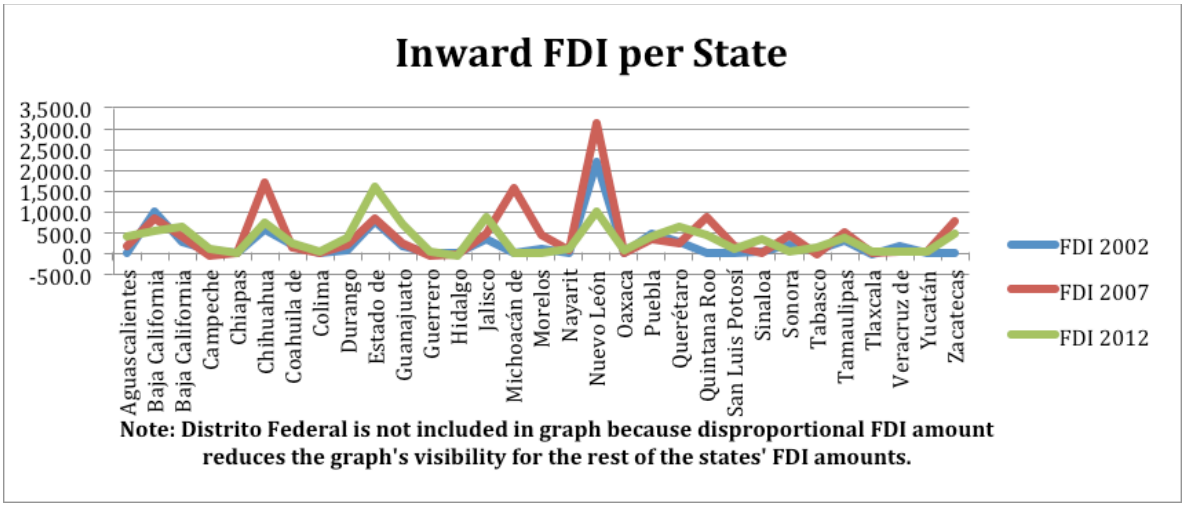
The fiscal incentives index was created by using the count of incentives a state offers its investors out of a list of seventeen types of exemptions, or temporary tax breaks[3]. The states that offer the most incentives are Sonora in the first place, followed by Nuevo Leon, and Baja California. Baja California Sur and Queretaro offer no incentives from this list of seventeen, and Zacatecas only has two tax exemptions. The border variable is a dummy variable that equals zero when a state does not share a border with the United States, and

[2] See SCT, 2012 "Manual Estadístico del Sector Transporte" (pages 24-27) for more on transportation mode usage for imports and exports.

[3] See appendix for "A.2 Fiscal Incentives Table" and complete "List of Fiscal Incentives"

assigns a value of one when it does. Six out of the thirty-two states share a border with the U.S.: Baja California, Sonora, Chihuahua, Coahuila, Nuevo Leon, and Tamaulipas.

Past experience is measured as the state's capability of attracting FDI in the past. Two models will be used: one that uses 5 years previous experience in attracting direct foreign investment, and another that takes 10 years of previous experience in FDI attraction. Since the dependent variable is the amount of FDI received in 2012, the past experience variables to be employed in the models are FDI received in 2007, and 2002, respectively.



Source: Secretaria de Economia, 2013

Figure 3.4 Inward FDI per State

The graph in figure 3.4 shows that states that received high FDI flows in the past, are the same ones that are receiving high FDI flows at a later point in time.

The main prediction for the model is that human capital, measured through the percentage of college-educated population, will have a strong positive effect on attracting FDI flows into a state because of the assumption that firms are "skill-seeking". It is

anticipated that wages will be positively associated with higher foreign direct investment in the short-run because a more talented labor force will demand higher wages. The population of a state is also believed to positively influence the amount of FDI a state receives due to the larger amount of available labor. If a state has a larger, more skilled talent pool, foreign investors will be interested in taking advantage of having highly prepared people at an already lower wage than in their own countries, and will place their investments in that state.

Tax exemptions and other fiscal incentives are predicted to have a positive coefficient because of the firm's cost-saving approach to their outsourcing decisions. Another factor that is considered in this study to be a strong determinant of inward investment is a state's experience in dealing with foreign investors in the past.

It is expected that, contrary to common sense, the time and cost of doing business variables will be irrelevant to investors when deciding where to place their investments within Mexico because other factors, such as a skilled labor pool and previous commercial relations, have a stronger weight on their decision. The same reasoning is used for the infrastructure variable, and it is anticipated that it is not a decisive factor in the investors' decision-making process.

Proximity to the U.S. border might have been a decisive factor for investing in a state in the past, when Mexico first opened its borders for free trade in the mid 1980's. Investors first established companies along the northern states, but throughout the years, they have been going further into central and southern Mexico. In this study, it is not expected to find that sharing a border with the U.S. is an important determinant of attracting FDI at the state level in Mexico, more recently, in 2012. However, it is predicted that states that in the

past have been receiving large FDI flows, such as these northern border ones, and others including Jalisco, Quintana Roo, and Distrito Federal, will have large FDI inflows in 2012 as well because of their previous experience.

Chapter 4: Empirical Results

The main hypothesis was empirically tested and two versions of the cross-section model were developed. They both include the aforementioned variables, but the propensity variable varies in that the first model considers five years of previous experience in attracting FDI and the second one takes the data from ten years of past experience. The results for these regressions are presented in tables 4.1 and 4.2.

Table 4.1 Regression Model 1 Results

Regression Model 1						
FDI2012	**Coeffieicent**	**Robust Std. Error**	**t**	**P>t**	**[95% Conf.**	**Interval]**
Profpop10	90.63302	38.92268	2.33	0.029	9.912318	171.3537
Pop2010	0.000085	0.0000147	5.76	0.000	0.0000544	0.0001155
Infrastructure	-5.960362	0.0000147	-1.10	0.285	-17.24521	5.324488
OpenTime11	10.14339	5.950604	1.70	0.102	-2.197406	22.48419
OpenCost11	16.80013	7.769573	2.16	0.042	0.6870246	32.91324
Wage2011	0.9631259	1.198263	0.80	0.43	-1.521919	3.448171
Fiscal	-258.5711	225.5921	-1.15	0.264	-726.4204	209.2782
Border	-78.00205	119.7796	-0.65	0.522	-326.4097	170.4056
FDI2007	0.2104584	0.0201064	10.47	0.000	0.1687603	0.2521565
_cons	-1123.904	556.7983	-2.02	0.056	-2278.633	30.82515

Table 4.2 Regression Model 2 Results

Regression Model 2						
FDI2012	**Coef.**	**Robust Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
Profpop10	79.51597	37.7199	2.11	0.047	1.289686	157.7423
Pop2010	0.000083	0.0000154	5.40	0.000	0.0000511	0.0001149
Infrastructure	-6.228506	6.001775	-1.04	0.311	-18.67543	6.218414
OpenTime11	12.06606	6.360552	1.90	0.071	-1.124915	25.25704
OpenCost11	14.25128	8.161483	1.75	0.095	-2.674599	31.17716
Wage2011	0.632217	1.14133	0.55	0.585	-1.734756	2.99919
Fiscal	-262.0504	206.1073	-1.27	0.217	-689.4908	165.39
Border	-5.207214	129.657	-0.04	0.968	-274.0994	263.6849
FDI2002	0.2323393	0.0209423	11.09	0.000	0.1889076	0.2757709
_cons	-909.5895	496.7124	-1.83	0.081	-1939.708	120.5289

Both models have an R-squared of 95% and their F statistic is well above 0, which indicates goodness of fit. The regression models were both tested for multicollinearity, and are heteroskedasticity-corrected, using robust standard errors.

Table 4.3 Goodness of Fit

	R-Squared	F Statistic	Observations
Model 1	0.9515	47.94	32
Model 2	0.9508	47.27	32

In both models, the percentage of college-educated population, the main independent variable, is positive and significant at the 95% confidence level. A one percentage point increase in the percentage of the college-educated population is associated with a 90 million dollar increase in the amount of FDI received in 2012 in the first model, and an 80 million dollar increase in the second one. These empirical results support the main prediction that human capital is closely related to FDI at the intra-country level in Mexico

These results are similar to Romer (1990). He uses initial level of literacy as a measure of human capital to show how it positively affects the rate of investment, but does not differentiate between domestic and foreign investment. Benhabib and Spiegel (1994) find that human capital levels play an important role in attracting physical capital and absorbing technology from abroad using primary, secondary, and tertiary school enrollment rates for measuring human capital. Barro (1991) also finds a positive relationship between investment in physical capital and human capital levels, using primary and secondary school enrollment. He differentiates private and public investment, but does not do so for domestic and foreign investment. The present study differs from

Romer, Benhabib and Spiegel, and Barro, in that rather than comparing countries, it compares states within the same country.

Lopez-Bazo and Moreno (2008) have a regional approach in their research. For Spain, they find that higher levels of human capital increase the returns to physical capital, and suggest that this makes it more attractive to investors to invest in places where a higher percentage of the population is more educated. Though this assumption is logical, their study falls short in proving if, in fact, there was more investment in physical capital due to the increase in returns.

Lopez-Bazo and Moreno (2008) use average years of schooling in each region in their analysis. Molina, Fullerton, and Barraza (2010) also use average years of schooling of the labor force as their variable for human capital. Their results support the hypothesis that human capital and investment in physical capital directly contribute to economic growth. This study differs from the present one because the present study analyzes the indirect effect of human capital on growth, through growth in investment. Molina, Fullerton, and Barraza (2010) find that per capita FDI and average years of schooling positively affect per capita GNP in Mexico, at the state level.

The unit of analysis used by Molina, Fullerton, and Barraza (2010) is the same as the one in the present study, and the case of Mexico is also being used to control for inter-country effects. However, none of the aforementioned studies measure human capital using percentage of the population that holds a four-year university degree.

Akin and Vlad (2011) test the inverse-U relationship between FDI and human capital, and find that for rich and low income countries, FDI and human capital have a negative relationship, while they have a positive one in middle income and upper middle

income countries. Using primary, secondary, and tertiary school enrollment rates, they find that only tertiary education is significant, and it also has a strong positive effect. Their findings support the theory that rich countries look for a more specialized workforce when outsourcing their companies and decide to place their investments abroad in middle income and upper-middle income countries, like in the case of Mexico. Kottardi and Stengos (2010) have similar findings for middle-income countries. They found that the range of schooling years from two and a half to six has negative effects on growth, but lower and higher education levels outside this range lead to more economic growth.

Other studies that have found similar results as the present one for the effect of human capital on FDI (see Blanton and Blanton, 2007 and Hanushek and Kimko, 2000) have used other composite measures of human capital, such as life expectancy and education, performance on standardized math and science tests, and count of doctorates in Science and Engineering fields. Measuring human capital through the percentage of the population with a Bachelor's degree or equivalent is a form of creating a threshold in what is considered to be a "skilled" worker. Using the differentiation between skilled and unskilled workers supports and strengthens the hypothesis that foreign firms are "skill-seeking".

Ivelvs and De Melo (2012) find a negative relationship between the relative supply of skilled labor and FDI levels. They found that human capital emigration is related to more FDI being received by the country sending human capital. This does not necessarily mean that a smaller relative supply of human capital is what investors are attracted to, and the authors point this out in their study. A higher relative change could mean lower initial

levels of the variable, and following the neoclassical growth model where low-income per capita countries attract vertical FDI, then, their results are consistent with the theory.

Feenstra and Hanson (1997) found that growth in FDI accounts for fifty percent of the increase in the relative skilled labor wage share. This reflects an increase in the relative demand for skilled labor in FDI-concentrated regions. The results presented in this study find that a college-educated population, which can be considered as a "skilled" population, and the amount of foreign direct investment received are significantly and positively associated. In this aspect, the study is similar to Feenstra and Hanson (1997).

The regression results show the average wage variable to be insignificant. Average wage is insignificant in both models, but has a positive coefficient. The model also considered minimum wages and weighted minimum wages, but the variable was insignificant in all cases. Further research may try to obtain wage data from non-government sources. Income in Mexico may be underreported. It may be common practice of employers to report a lower wage for their employees in order to pay less Social Security fees to the Instituto Mexicano del Seguro Social (IMSS), and it may be in the interest of the employees to do so for tax evasion purposes.

Another possible explanation for the insignificance of the wage variable may be that a higher wage threshold rather than a lower one, such as minimum wage or average wage, is what really makes the difference. This threshold may be correlated with the same college education threshold used in this study, so collinearity issues may arise.

Past experience in attracting FDI and population are significant at the 95% confidence level in both models, and have strong positive marginal effects, as anticipated. A one million dollar increase in the amount of FDI received in the past is related to an

average 200,000-dollar increase in the amount of FDI received in 2012. A person increase in a state's population is associated with an average 85-dollar increase in the amount of FDI received in 2012.

In the first model, cost of opening a business is positive and significant at the 95% confidence level, and at the 90% confidence level in the second one. The time it takes to open a business is positive and significant in both models at the 90% confidence level. On average, for every extra day it takes to open a business, 10 million more dollars were received in 2012, and 12 million in the second model. The average amount of FDI received in 2012 also increases with cost increase. A percentage point increase in the percentage of GNI that it takes to open a business attracted 16 million more dollars in the first model, and 14 million in the second one. Higher costs and time it takes to open a business do not seem to deter foreign investors from investing in a state, and are surprisingly, positively associated with the amount of FDI received. It does not seem logical that investors would choose a state because of its higher start-up costs or times, so there must be an alternative explanation to the positive coefficients. Higher costs could also be associated with location and income, which could all be correlated in a spurious way. The states with the highest costs are the states in the northern part of Mexico. It might be that these states attract more FDI because of their location, rather than because of their higher start-up costs. This provides insight on other controls that may be used in future research. The model may be improved if instead of controlling for a dummy border variable, a regional variable is used.

An alternative explanation to the positive association of number of days it takes to open a business and inward FDI could be that the volume of new businesses is higher in FDI-attracting states than in less attractive states that it simply takes the regulating

institutions more time to process all the permits, and complete all requirements, thus increasing the duration of the start-up process.

Infrastructure, border, and fiscal incentives have negative coefficients and are insignificant in both models. These results suggest that human capital, population, and previous experience in attracting FDI are the most important factors that foreign investors consider when making the decision of investing in a certain state in Mexico.

Chapter 5: Conclusions

Firms engage in vertical or horizontal direct investment abroad when they wish to obtain a comparative advantage and become more profitable. They do so when they have a special asset from which they can benefit by offshoring their business to a location where certain factors can add value to their production.

Certain factors make a location more or less attractive to foreign investors. Country-risk in the form of social, political, and economic conditions of a country play an important role in the firms' decisions on which country to offshore to. Though there are many factors that make a country attractive for investment to foreigners, it cannot be assumed that investment will be evenly distributed within the country. Within country location choice has not been reviewed in depth in the literature, and the present exploratory study attempts to provide insight on such matter. A subnational approach controls for country risk factors, and enables the study to focus on other determinants that investors take into account that are not associated with country risk variance.

Using Mexico as an upper-middle income Latin American country for a case study, it has been found that human capital development may indirectly promote economic growth by attracting foreign direct investment at the state level. Human capital was measured using the percentage of people in a state that have received a four-year university education. This information was analyzed as the main independent variable in order to create a threshold between skilled and unskilled workers, and test whether having a talented labor pool in a state entered into the equation positively and significantly, and thus, mattered in the investors' location decision. The results were as expected, and it is concluded that having a larger supply of skilled labor in a state is associated with a larger

amount of FDI it receives. Further research may be done to determine causation as there are endogeneity issues surrounding this matter. It is unclear whether it is education that leads to increases in FDI or if higher FDI levels, which cause economic growth and better job opportunities, lead to migration of the higher educated workforce to these areas.

Other macro and micro determinants, such as population, infrastructure, time it takes to open a business, start-up business costs, average wages, fiscal incentives, propensity to invest, were input into the model. As expected, population and previous FDI experience proved to be positive and significant, and both have a strong marginal effect. This means that, as the classical growth model shows, Labor availability in general (L) is also a determinant factor in location choice. These results also suggest that Human Capital (K) development does not crowd out Labor (L) in Mexican states. Previous studies on wage inequality in Mexico reinforce this idea by finding that both skilled and unskilled workers are better off in states where more, rather than less, FDI has been received.

Fiscal incentives, infrastructure, and the wage variable were insignificant in the model, which leaves room for further research. Perhaps better data could provide alternative explanations. The time it takes, and start-up costs associated with opening a new business entered positive and significantly in the model. This does not mean that investors prefer to spend more time and money to open a business, but it could mean that states that are more attractive to invest in are also the ones where doing business is more expensive and time-consuming precisely because of its larger demand. The results also suggest that increased start-up time and cost do not deter investors from choosing a particular state in Mexico.

Future research can build on the present one by analyzing the effect of human capital and FDI at the regional level, by industry, in order to gain more knowledge on what types of firms are the ones that are more "talent-seeking", and which of the other determinant factors play an important role in the investors' intra-country location decision, depending on the type of industry. Future studies may also include more time periods in their econometric analyses, once more data for all the control variables are available.

The findings of this study are useful in aiding public policymakers in defining what aspects of their municipalities and states to target and allocate more resources to if it is in their agenda to increase foreign direct investment, and thus economic growth, in their region. It may also be convenient for investors that are considering placing their investments in Mexico to know which determining factors other investors have been focusing on in the past when making this intra-country location decision.

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Appendix

A.1 Infrastructure Index

	% of Advanced Highways			Airports			Seaports			Railroad			INDEX SCORE
State	% of Adva	Index Score	54%	# of Airports	Index Score	1%	Seaports	Index Score	34%	Railroad Km	Index Scor	11%	100%
Aguascalientes	8.57	16.09	8.69	1	20	0.2	0	0	0	223	8.399247	0.9239171	9.81
Baja California	12.11	23.74	12.82	4	80	0.8	8	50	17	223	8.399247	0.9239171	31.54
Baja California Sur	2.93	3.86	2.08	3	60	0.6	16	100	34	0	0	0	36.68
Campeche	1.70	1.20	0.65	2	40	0.4	14	87.5	29.75	416	15.66855	1.7235405	32.52
Chiapas	1.56	0.90	0.48	5	100	1	1	6.25	2.125	557	20.97928	2.3077213	5.92
Chihuahua	14.30	28.49	15.38	2	40	0.4	0	0	0	2655	100	11	26.78
Coahuila	14.91	29.80	16.09	3	60	0.6	0	0	0	2218	83.54049	9.1894539	25.88
Colima	10.66	20.60	11.13	2	40	0.4	3	18.75	6.375	239	9.001883	0.9902072	18.89
Distrito Federal	47.33	100.00	54.00	1	20	0.2	0	0	0	274	10.32015	1.1352166	55.34
Durango	10.49	20.24	10.93	1	20	0.2	0	0	0	1153	43.4275	4.7770245	15.91
Estado de México	7.82	14.45	7.80	2	40	0.4	0	0	0	1284	48.36158	5.319774	13.52
Guanajuato	8.44	15.79	8.53	2	40	0.4	0	0	0	1085	40.86629	4.4952919	13.42
Guerrero	6.87	12.39	6.69	2	40	0.4	5	31.25	10.63	94	3.54049	0.3894539	18.11
Hidalgo	5.42	9.26	5.00	0	0	0	0	0	0	865	32.58004	3.5838041	8.59
Jalisco	9.67	18.46	9.97	2	40	0.4	2	12.5	4.25	1109	41.77024	4.5947269	19.21
Michoacán	6.92	12.50	6.75	4	80	0.8	1	6.25	2.125	1242	46.77966	5.1457627	14.82
Morelos	9.60	18.31	9.89	1	20	0.2	0	0	0	259	9.755179	1.0730697	11.16
Nayarit	9.09	17.21	9.29	1	20	0.2	5	31.25	10.63	394	14.83992	1.6323917	21.75
Nuevo León	16.49	33.23	17.95	2	40	0.4	0	0	0	1092	41.12994	4.5242938	22.87
Oaxaca	1.14	0.00	0.00	4	80	0.8	4	25	8.5	649	24.44444	2.6888889	11.99
Puebla	5.51	9.45	5.10	2	40	0.4	0	0	0	1057	39.81168	4.3792844	9.88
Querétaro	10.38	20.00	10.80	1	20	0.2	0	0	0	476	17.92844	1.9721281	12.97
Quintana Roo	19.66	40.10	21.65	3	60	0.6	14	87.5	29.75	0	0	0	52.00
San Luis Potosí	8.08	15.02	8.11	2	40	0.4	0	0	0	1235	46.51601	5.1167608	13.63
Sinaloa	15.59	31.27	16.89	3	60	0.6	6	37.5	12.75	1195	45.00942	4.9510358	35.19
Sonora	11.80	23.07	12.46	5	100	1	7	43.75	14.88	2008	75.63089	8.3193974	36.65
Tabasco	2.68	3.32	1.79	1	20	0.2	5	31.25	10.63	300	11.29944	1.2429379	13.86
Tamaulipas	6.86	12.38	6.69	5	100	1	4	25	8.5	937	35.2919	3.8821092	20.07
Tlaxcala	5.98	10.46	5.65	0	0	0	0	0	0	352	13.258	1.4583804	7.11
Veracruz	8.69	16.33	8.82	4	80	0.8	10	62.5	21.25	1807	68.06026	7.486629	38.36
Yucatán	3.53	5.17	2.79	2	40	0.4	12	75	25.5	609	22.93785	2.5231638	31.22
Zacatecas	3.46	5.02	2.71	1	20	0.2	0	0	0	671	25.27307	2.7800377	5.69
Total	308.23			73.00			117.00			26678.00			

A.2 Fiscal Incentives

State	# of Incentives	Score
Aguascalientes	13	0.76
Baja California	16	0.94
Baja California Sur	0	0.00
Campeche	10	0.59
Chiapas	10	0.59
Chihuahua	6	0.35
Coahuila de Zaragoza	6	0.35
Colima	14	0.82
Distrito Federal	5	0.29
Durango	14	0.82
Estado de México	10	0.59
Guanajuato	8	0.47
Guerrero	15	0.88
Hidalgo	11	0.65
Jalisco	6	0.35
Michoacán de Ocampo	4	0.24
Morelos	8	0.47
Nayarit	10	0.59
Nuevo León	16	0.94
Oaxaca	4	0.24
Puebla	8	0.47
Querétaro	0	0.00
Quintana Roo	9	0.53
San Luis Potosí	7	0.41
Sinaloa	13	0.76
Sonora	17	1.00
Tabasco	8	0.47
Tamaulipas	7	0.41
Tlaxcala	12	0.71
Veracruz de Ignacio de la Llave	8	0.47
Yucatán	15	0.88
Zacatecas	2	0.12

A.3 List of Fiscal Incentives

1. Temporary exemption of state taxes and duties
2. Temporary exemption of Payroll tax (ISN) for newly created companies
3. Exemption of duties for the Public Registry of Property and Trade
4. Exemption of payment of land use permit
5. Exemption of payment of construction permit
6. Exemption of duties on potable water and sewer connection
7. Reduction on state taxes and duties
8. Reduction on duties for the Public Registry of Property and Trade
9. Reduction on Payroll tax (ISN) for companies that create new jobs
10. Temporary reduction on Payroll tax (ISN)
11. Reduction on property tax
12. Reduction on real estate acquisition tax
13. Reduction on the payment of fees for issuance of construction permits
14. Reduction on the payment of fees for connection to the drinking water and sewage system
15. Special incentives for technology research and development projects
16. Special incentives for projects outside the metropolitan area
17. Temporary reduction on public lighting fees

Curriculum Vita

Krystal Sanchez-Osio received her Bachelor in International Business degree, with concentration in International Logistics and Negotiation in 2011 from Instituto Tecnologico y de Estudios Superiores de Monterrey (ITESM), at the Chihuahua Campus. In 2012, she enrolled at the University of Texas at El Paso to obtain her degree as Master of Science in Economics. During this period she worked as a teaching assistant in the Department of Economics and Finance. She is currently working in the logistics field as a Supply Chain Manager.

Permanent address: 200 N Festival Dr. Apt 408

El Paso, Texas, 79912

This thesis was typed by Krystal Sanchez-Osio