The Effects of Human Capital on Attracting Foreign Direct Investment

Hossein Varamini, Stephen McGonigle, and Dena Memari

Abstract

The main purpose of this study is to use cross sectional analysis to examine the effects of three alternative proxies for human capital on attracting FDI inflows and FDI stocks for 114 different countries. The results of this study is consistent with the market-seeking motive of FDI and supports the notion that countries with higher levels of human capital, as measured by school life expectancy or the gross enrollment at schools have been able to attract significant foreign capital into their economies.

I. Introduction

Countries around the world are striving to raise the standards of living for their citizens by inviting Multinational Enterprises (MNEs) to establish subsidiaries in their countries or form joint ventures with exiting companies. Such policies are expected to bring new technology and management skills to the host country, create employment, increase productivity, contribute to faster economic growth and even improve balance of payments. In order to increase the likelihood of attracting suitable Foreign Direct Investment (FDI), host countries must have a talented and educated workforce, commonly referred to as the human capital.

Empirical studies have used time series and cross sectional analyses to test the effects of human capital on attracting FDI. However, the results of the available literature are mixed. Several studies such as Noorbakhsh et al. (2001) and Mumit (2008) have shown that the higher level of human capital has played an important role in attracting FDI into the host nations. Many of these studies have also found the positive impact of FDI on economic growth of the host countries. However, studies by other researchers such as Tanna and Topailboul (2005) and Quazi (2007: a,b) have shown the lack of convincing evidence to support the positive role of human capital on FDI inflows or economic growth of the host nations.

One of the major reasons for different results by researchers on this topic is the challenge of accurately measuring the level of human capital for empirical tests. There are obvious challenges associated with distilling the cumulative knowledge of a population into a single factor. As such, it is important to consider multiple measures of human capital to obtain a broad perspective of how human skills draw foreign enterprises to countries. Given the lack of consistent link between a specific measure of human capital and FDI in existing literature, the main purpose of this study is to examine the effects of human capital on attracting FDI inflows and FDI stocks for 114 different countries by utilizing three alternative proxies to measure human capital for each nation under study in 2007. The results would allow other researchers to determine the differences between and the effectiveness of different measurements of human capital in their future research. In addition to examining the role of different measures of human capital on FDI, this paper tests the role of market size in attracting FDI into the countries under study.

Hossein Varamini, Ph.D. Professor of Business at Elizabethtown College, email: varaminih@etown.edu; Stephen McGonigle, Ph.D., KBA North America; Dena Memari, MBA, Amir Kabir University

The paper is organized as follows: Section II is a review of related literature; Section III explains the methodology and the data set, followed by Section IV that contains the study's empirical results. Finally, Section V provides the conclusions of the study.

II.   Review of Literature

The Organization for Economic Cooperation and Development published a study by Koji Myamoto that provided an aggregate view of worldwide trends toward the importance of human capital and development. Myamoto (2003) summarizes the literature on the subject by referring to the relationship as a virtuous circle. The study examines the current state of education and educational policy around the world. During the 1990's, there was a dramatic surge in basic, or primary, education throughout the world. Myamoto notes that while the most skilled workers are important to a country's development, the overall quality of the workforce is important as well. The study states that throughout the literature, basic education is a necessary component, although not a driver, of FDI Inflows. The key contributor that differentiates a workforce is higher-level of education. This assertion suggests that any quantitative analysis of human capital should be geared towards the examination of secondary or tertiary education as opposed to primary education.

One of the difficulties facing researchers is to agree on a universal standard for how to quantify human capital. Facing this challenge, some authors compiled their own measure of human capital in lieu of available data. Barro and Lee (2000) compiled a human capital data set that has been used in many studies. The work was originally published in 1993 and contained information on various measurements of human capital in 142 countries from 1960 to 1985. This original data set was subsequently updated to include information up to the year 2000. The variables they quantified in this study were population, the percentage that had no formal schooling, the percentage that had finished primary, secondary, and tertiary education, and school life expectancy.

School life expectancy is the average total amount of years spent in school in a given population. This variable has had significance in much of the literature written on this subject and has served as a measure of human capital in many studies, including Borenzstein et al. (1998), Nunnemkamp et al. (2002), and Barro and Lee (2000). The robustness of the variable stems from its quantification of many factors that are intrinsic to the measurement of knowledge in a society. It incorporates total years of schooling in the population, serving an absolute measurement of knowledge, but as an average it also captures the availability of education throughout a society.

Another measure of human capital, included in Barro and Lee's (2000) study, is enrollment rate. Enrollment rate serves as both a measurement of level of education as well as an important measurement of educational infrastructure. In addition to quantifying present coverage, these rates also provide a forward-looking measure of how the country is investing in its human capital stock. Those who are enrolled today become the leaders of the future. Barro and Lee note that school enrollment is likely to be a highly consistent variable in cross-sectional studies.
One of the preeminent studies on how human capital interacts with FDI and growth is the study conducted by Borenzstein et al. (1998). This study tests the effect of FDI on growth, human

capital on growth, and included measurements to capture the relationship between FDI's growth enhancing effects and the human capital stock. The authors assert that the most important growth-influencing element of FDI is technology transfer. They claim that the import of new technologies allows countries to essentially leapfrog stages of development. The study also attempts to quantify the effect of FDI on crowding out of the domestic investment.

A paper by Sailesh Tanna and Kitja Topaiboul (2005) studies the effects of human capital on economic growth. The study centers on Thailand and utilizes quarterly data from 1970-2004. They cite FDI, human capital, domestic investment, and trade as drivers of GDP growth. Much like the study conducted by Borenzstein et. al. (1998), the authors attempt to discover how human capital interacts with FDI to enhance economic growth. They presume that an economy must have a certain threshold of human capital to absorb the positive effects of FDI, such as technology transfer, job creation and the transference of management skills, etc. Their measure of human capital is School Life Expectancy. They use average years of male secondary education as the measure of human capital.

A study by Muhammed Tariq Majeed and Eatzaz Ahmad (2008) uses the illiteracy rate and health expenditures as measures of human capital and tests to see if these factors were significant determinants of FDI. In addition to these variables, they use wages, GDP, military expenditures, taxes, development assistance, remittances, urban population as a percentage of total population, and various measures of infrastructure including paved roads and vehicles per 1000 people. Their study focuses on 25 developing countries from 1970 to 2004. They find that health expenditures had a significant and positive effect on FDI inflows while illiteracy rate had a negative effect on FDI inflows.

To gain a broad perspective on the consensus of the factors that affect FDI, Chakrabarti (2003) provides an expert compilation of theories in his meta-study of the determinants of FDI. These studies have used various methodologies and have drawn different conclusions about the interaction and correlation between FDI and other economic variables.

Chakrabarti attempts to find those factors that have been regarded as significant by many studies. To test for this robustness, he utilizes extreme bound analysis to determine which variables are strongly and weakly correlate with FDI across the literature. He found that market size is highly correlated with FDI across all studies. Available literature shows that market size creates the necessary economies of scale required by foreign companies to invest in a country. This variable has been a key driver in terms of the amount of FDI inflows. However, the effects of other variables to attract FDI have been more ambiguous. The main elements of the study include openness, wages, trade barriers tax, exchange rate, trade balance, GDP growth, and tariffs. He points out that among other studies, these variables are not consistent in sign of their coefficients. He notices that openness and growth rate are more often positive than not and that trade barriers are equally positive and negative in the studies. He also observes that trade deficit, tax, wages, and exchange rate are more often negative than not.

III.   Methodology and Data

This study examines the role of different measures of human capital on FDI by using a cross-sectional analysis for 2007 for the countries under study.   The value of a cross-sectional analysis is that it provides a global view of how a country's supply of human capital influences capital inflows. This study includes data for 114 countries for which we were able to find consistent data to conduct our analysis[1]. These countries have diverse economic characteristics e.g. different rates of economic growth, population size, GDP per capita, region, etc. The year 2007 was selected due to the abundance of data available during this time frame for the countries under study. Additionally, this year marks the time period before the beginning of the global financial crisis that affected major economic variables.

Given the limitation of available literature in using a common measure of human capital, this study uses three proxies for this variable in examining its effects on attracting FDI into various countries. The dependent variables are FDI Inflows and the Stock of FDI so that we could capture not only the short-term effects of human capital, through the effect on FDI Inflows, but also the long-term effects of human capital, through the effects on FDI stock.

The equations utilized for this study are as follows:

Equation (1): $FDI_{inflows} = \propto + \ \beta_1 H_u + \ \beta_2 G_r + \ \beta_3 O + \beta_4 E_x + \beta_5 S + \ \beta_6 T + \mu$

Equation (2): $FDI_{stock} \ = \ \propto + \ \beta_1 H_u + \ \beta_3 O \ + \ \beta_5 S \ + \ \beta_6 T \ + \ \mu$

Where H_u stands for human capital, G_r stands for growth of GDP in the period, O stands for openness, E_x stands for the exchange rate, S stands for overall GDP as a proxy for the size of the market, T stands for trade balance, and μ is the error term with zero expectations.

The dependent variables are measured as total yearly FDI Inflows and total cumulative FDI Stock respectively. These dependent variables were selected to examine the effects of human capital on current inflows annually, that is, how human capital is driving capital flows; and the effects of human capital on the accumulation of foreign capital stock in a country, that is, how human capital has driven capital flows in the past. These measurements are common dependent variables in other studies on FDI. Equation (2) excludes growth rate and exchange rate as these two variables are more short-term in nature and could vary quite considerably from year-to-year.

For the independent variables, the growth of real GDP is measured as a percentage of the previous year's GDP, openness is measured by a country's imports plus its exports divided by overall GDP, the exchange rate is the value of the local currency relative to the U.S. Dollar, GDP is measured as total annual real GDP, and the trade balance is measured as a country's exports minus its imports. The selection of independent variables to test FDI are consistent with the variables in other studies, as noted in Chakrabarti's (2003) summary of FDI research findings.

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[1] The list of the 114 countries included in this study is available from the authors by request.

In both equations, multiple variables are used to quantify human capital. The three variables selected to represent human capital are primary to secondary school life expectancy, gross enrollment rate and literacy rate. These variables each capture a different aspect of human capital. School life Expectancy provides a measure of the total level of schooling within the country, gross enrollment rate provides a measure of educational infrastructure within a country and literacy rate provides a measure of quality of education. These variables were not used in the same equation because of their relation to one another. For example, a high level of school life expectancy implies a high level of literacy and a high level of gross enrollment implies a high level of school life expectancy. While the measurements are different, using them in the same equation represents a multicollinearity problem.

The measurements of human capital were obtained from UNESCO's statistical database. Information on GDP, exchange rate, and FDI were obtained from the World Bank's statistical database. Openness and trade balance were calculated using data obtained from the International Financial Statistics database.

IV.   Empirical Results

A.   FDI Inflows Tests

The study first examines the results of several variables on FDI inflows in Panel 1 in Table I. All of the independent variables are the same except we use three different measures as proxies for human capital. The results are summarized below:

1.   School life expectancy as the measure of human capital

The empirical results for using the school life expectancy as a proxy for human capital are shown in Table I, Panel1, below. According to the results of the study, the human capital and the market size are the only two significant variables in attracting FDI inflows into these countries. The coefficient of determination (R^2) is 68% and the F-value is highly significant.

2.   Gross enrollment as the measure of human capital

The results of using gross enrollment as the proxy for human capital are reported in Panel 2 in Table I. The coefficient of human capital is significant at 5% and the market size is the second significant variable in attracting FDI inflows. Both of these variables have the correct sign. R^2 is at around 68% and the F-statistic is highly significant.

3.   Literacy rate as the measure of human capital

Panel 3 in Table I reports the results of using literacy rate as a proxy for human capital. As the results indicate, when the literacy rate is used as the measure of human capital, it does not have a significant effect on FDI inflows. However, the size of the market has played a significant role in attracting FDI into countries under study.

TABLE I

Impact of Different Measures of Human Capital on FDI Inflows

	PANEL 1: School Life Expectancy	PANEL 2: Enrollment Rate	PANEL 3: Literacy Rate
$\propto_0$	- 1.7292 *	- 1.3050	- 0.6025
β_1	2.4071 **	2.1635 **	1.4216
β_2	- 0.3324	- 0.6021	- 0.9658
β_3	1.1066	0.9495	0.4940
β_4	- 0.5229	- 0.4008	- 0.5384
β_5	10.402 ***	10.1843 ***	10.0365 ***
β_6	- 0.656	- 0.5874	- 0.5283
R^2	0.6860	0.6828	0.6751
F	38.9648 ***	38.4043 ***	37.0650 ***

Numbers in the table are t-values.
*   = 10% level of significance
** = 5% level of significance
***= 1% level of significance

The overall results coincided with the available literature on the subject. In the first two tests, human capital was a significant and positive driver of FDI Inflows. In our third test, literacy rate was not a significant determinant of FDI Inflows. This result is consistent with Myamoto's (2003) study that primary education is a necessary component but not necessarily a driver for FDI.

As manufacturing becomes more complex, companies require workers with skills above the primary level. School Life Expectancy, in conjunction with a country's Gross Enrollment Rate, provide a deeper, more holistic view of the capabilities of a country's workforce as compared to literacy rate which can be viewed as a porxy for primary education. These results seem to suggest that secondary and tertiary educations are the key drivers of FDI Inflows in the period and are similar to previous studies. Additionally, the findings of this paper are consistent with available literature in identifying the "market-seeking" motive of FDI, shown by the size of the country, as an important factor in attracting FDI into many countries.

B.   **FDI Stock Tests**
The second part of the empirical tests focuses on the stock of FDI as the dependent variable. As outlined earlier, Equation (2) is tested to examine the effects of several variables on accumulated FDI.

1.   **School life expectancy as the measure of human capital**
As Panel 1 in Table II shows, the coefficients of human capital and market size were the only two significant coefficients in the model. The F-value is highly significant and R^2 is over 76%.

2.   **Gross enrollment as the measure of human capital**

Panel 2 in Table II shows that human capital as measured by gross enrollment and market size are the significant independent variables and both exhibit the correct signs. The coefficient of determination is at 85% and the F-statistics is highly significant.

3.   **Literacy rate as the measure of human capital**

Finally, the study uses literacy rate to test the effects of human capital on stock of FDI. The results, as reported in Panel 3 in Table II, indicate that both the human capital and market size have significant and positive effects on accumulated FDI for countries under study.

TABLE II

Impact of Different Measures of Human Capital on FDI Stock

	PANEL 1: School Life Expectancy	PANEL 2: Enrollment Rate	PANEL 3: Literacy Rate
α_0	- 3.1650 ***	- 2.6849 ***	- 1.5537
β_1	3.7372 ***	3.4143 ***	2.1551**
B_3	0.8676	0.6648	0.1205
B_5	- 1.529312.1557 ***	11.8305 ***	11.6291 ***
B_6	- 1.529312	- 1.4558	- 1.3645
R^2	0.7618	0.7573	0.7423
F	87.1827	85.0339	78.5076

Numbers in the table are t-values.
*   = 10% level of significance
** = 5% level of significance
***= 1% level of significance

The overall results of this part of the study show that even though the Literacy Rate is not a significant factor in driving FDI Inflows, it is a significant factor in explaining the overall FDI Stock in a country. This finding implies that past FDI Inflows were driven by a broadly educated populace equipped with the basic skills necessary to effectively assimilate to the processes and procedures of foreign businesses.

The results for School Life Expectancy and Enrollment Rate in their respective tests are stronger relative to the significance of Literacy Rate. However, the intercept is also significant in the School Life Expectancy and Enrollment Rate tests. This information indicates a more nuanced view of how human capital affects FDI stocks. Literacy rate shows how basic knowledge has permeated an economy. This dispersion of knowledge in a society helps ease the competition for talent among companies, sustaining business already located in the country while attracting new businesses. School Life Expectancy shares this characteristic and adds that countries must also have highly skilled workers. The significance of Enrollment Rate underscores the fact that countries must continually invest in their future human capital. These results are consistent with the evidence in the literature as summarized by Chakrabarti (2003). Additionally, the coefficients of the market size, as measured by the GDP of each country, were highly significant in all cases. This finding is consistent with the results of earlier studies to identify the size of the country as a "market-seeking" motive for FDI inflows and FDI stocks.

V.   Concluding Remarks and Recommendations for Further Study

Many researchers argue that an educated workforce is instrumental in attracting foreign investments into a country. However, it is fairly challenging to accurately measure the level of human capital and agree on a common definition for it. Therefore, one of the difficulties facing researchers is to agree on a common standard to quantify human capital.

The main purpose of this study is to apply cross sectional analysis to test the impact of different measures of human capital, namely school life expectancy, gross enrollment and the literacy rate, on attracting FDI to over 100 different countries by using data for 2007. The results show that human capital as defined in this study is a significant determinant of FDI in five out of the six tests. These findings are consistent with most of the empirical literature about the significant role of human capital in attracting FDI. Therefore, this study underscores the importance of investing in human capital as a matter of economic policy by countries that are interested in hosting foreign direct investment into their economies.

This study could be extended in different directions in the future. For example, the data set includes small developing countries and larger, developed countries. While this diversity is essential in capturing worldwide trends, it also creates distortion when it comes to trade balances and growth rates. The United States, for instance, has a relatively modest growth rate and runs an enormous trade deficit, but these factors have relatively little to do with the United States' ability to attract Foreign Direct Investment.

Furthermore, quantifying wage rates could be fairly important for this type of study to gain a greater view of how labor productivity and knowledge interact with the cost of production, wages. This type of analysis reflects the classic economic theory about the interaction between wages and productivity. A future study could also divide the countries into two samples of large and small nations to examine whether the role of human capital in attracting FDI is the same in small and larger economies. Finally, another extension of this paper is to replicate this study for countries with different stages of development.

One of the limitations of the study is the effect of two external shocks in 2007 that may have distorted the findings of this paper. The year 2007 produced two non-normal conditions that significantly altered the world economy. The first was the significant rise in oil prices and the second was the beginning of the global financial crisis. Those countries that have abundant oil supplies are able to export the commodity at high prices, which would aid their trade balance. At the same time, the ability of these economies to absorb and attract investment flows is limited by the size of their economy and the quality of their work force. On the opposite end of this equation, oil importers' trade balances are squeezed while their ability to absorb and attract inflows is largely unrelated to their oil imports. The symptoms of the recent financial crisis started showing some signs in 2007. The uncertainty associated with these signs may have begun to constrain investors' appetite for risk in this period. The higher growth rates experienced by developing economies may not have been enough to offset the risks investors perceived. On the contrary, companies may have been unwilling to engage in costly expansion in less proven economies at the beginning of the global economic crisis in 2007. It will be interesting for other researchers to test these tendencies in future research.

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