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Foreign direct investment and human capital: evidence from developing countries

Abstract

The main aims of this study are to empirically evaluate the impact of foreign direct investment (FDI) along with some other control variables such as: GDP per capita, international remittances, and exports on human capital, measured by gross secondary school enrolment for 34 developing countries over the time period ranging from 1981-2013. The results of fixed-effects model reveal that the inward FDI has statistically positive impact on human capital. Therefore, this study rejects the null hypothesis that there is no significant positive relationship between inward FDI and human capital, where as it accepts the alternative one. Thus findings of the study suggest that policy makers need to devise conductive and investment friendly policy in order to enhance more FDI into the host countries. As a result, it will largely improve the social welfare of the people of these developing countries.

Keywords: FDI inflow, human capital, panel data.
JEL Classification: C23, F21, J24.

Introduction

Human capital plays a prime and an indispensable role in the process of economic growth and development and thereby it improves the social welfare of people. The status of human capital is theoretically and practically apparent, as the human capital appears more important comparing to the factors of production. The importance of human capital with reference to production function is explained by Rashid (2000), revealing that it is clear that the resources are generally explained by the human knowledge for the reason that the central and primary source of all wealth is human labor. It is also asserted by Berkeley (1953) that a human capability is a leading source of economic growth process. Past studies indicate that the theory of human capital has got a visible motivation in a significant style with the seminal works of Denison (1962), Becker (1962), Schultz (1963) and several other researchers. The study of Becker (1962, p. 9) states that "many ways to invest include schooling, on-the job training, medical care, vitamin consumption, and acquiring information about the economic system. They differ in the relative effects on earnings and consumption, in the amount of resources typically invested, in the size of returns, and in the extent to which the connection between

investment and return is perceived. But all improve the physical and mental abilities of people and thereby raise real income prospects".

The role of human capital to economic growth is now well recognized through massive theoretical and empirical research; whereby the human capital development, measured through possession of education and development in health condition of the population, has been recognized as a crucial source of economic growth (Mincer, 1974; Romer, 1986; Lucas, 1988)[1]. Human capital[2] is defined by Mincer (1981, p. 2) as, "Human capital analysis deals with acquired capabilities which are developed through formal and informal education at school and at home, and through training, experience, and mobility in the labor market the national level, human capital can be viewed as a factor of production coordinate with physical capital. This implies that its contribution to growth is greater the larger the volume of physical capital and vice versa". Berg (2001, p. 226) mentions that, "it is the quality of the labor force, its accumulated experience and human capital, its education system, and so on, that determines an economy's ability to create new ideas and adapt old ones". However, a study conducted by Benhabib and Spiegel (1994), empirically vindicates using cross-country data to examine the impact of human capital stocks on per capita growth rates. The empirical findings show that human capital enters statistically and insignificantly in expounding per capita growth rates.

A study by Michie (2001) exposes that for the developing countries, it is necessary to have attained certain threshold of development to be able to entirely absorb modern technologies, which is required for economic growth and development.

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[1] See Baldacci et al. (2008), and Azam and Ather (2015).
[2] A similar explanation of human capital also reported by OECD (2001).

Therefore, boosting human capital may have numerous positive effects, for instance; enriched human capital is likely to enhance productivity, where the new technologies can be duly utilized. Numerous erstwhile studies reveal that technology's transfer is also evaluated through the spillovers connected to the research and development (R&D), for example: Coe and Helpman (1995), and Engelbert (1996) indicate that foreign research and development works perform an encouraging role on the productivity of the factors of production when combined with the R&D works of the recipient country. Consequently, this interface facilitates the integration of the foreign technology and spurs the transmission process of knowledge (Ndeffo, 2010).

Notwithstanding there are many factors, that affect human capital formation, of the main focus of this study is the role of inward FDI in promoting human capital. A study by Blomstrom and Kokko (2002) indicates that after a thorough evaluation of the literature, it is evident that there is capacity for substantial "spillover effects" from FDI inflows into the recipient countries. It is observed that there is plentiful incidental indication regarding the numerous linkages between FDI inflows and human capital, where the central vehicle for international technology transmission, with reference to international trade, is foreign direct investment. While, usually FDI is carried out through the multinational corporations (MNCs) those incur superior knowledge. Nevertheless, MNCs technology may still outflow to the nearby economy through exterior effects or "spillovers" that increase the level of human capital in the recipient economy and thereby enlarge productivity in domestic firms. The MNC, through the FDI inflows, contribute in promoting higher education, as the UNCTAD (1994, p. 218) stated that the MNCs "demand for highly trained graduates manifests itself in the form of financial support, particularly to business schools and science facilities, the provision of assistance and advice through membership of advisory boards, curriculum review committees, councils and senates". Inward FDI is positively related with the level of economic growth of a country. The growing inward FDI leads to an increase in the demand for skilled labor and trained experts for the supervision of technical, managerial and professional enlarged positions. Hence forth the human capital development is crucial for sustainable economic and social development (Afza & Nazir, 2007).

The study of Subbarao (2008) expounds that the FDI inflow has been considered as a key promoter in fostering the sustainable economic growth and development in developing countries. Apparently, FDI helps: in creating job opportunities; to foster productivity, to transfer skills and technology, to improve income, to boost exports contributing to the long run economic development of the developing world. Apart from these benefits, incoming FDI plays a key role in the enhancement of human capital in all developing countries. The advanced technology, transferred by the home country to the recipient countries, creates new activities, improves existing activities in some cases, and introduces research and development environment. As a result, the transmitted technological and managerial skills lead to the growth of skills of human capital in the host countries. In another study, Hanushek (2013) also mentions that enhanced schooling has been a major part of the development plans of the majority countries and the global organizations. The study maintains that the developing world, without quality schooling systems, will remain unable to promote their long-run economic growth. Studies conducted by Azam and Ibrahim (2014) and Azam et al. (2014), also illustrate the significance of inward FDI in the development progress of a country.

The motivation of this study is to increase understanding on human capital, as a key source of economic growth and development for developing world, has got gratuitous attention among most developmental researchers. Therefore, the encouragement of both health and education components are required in order to enhance that human capital formation. The rationale of the study is based on the importance of FDI inflow in the process of human capital development, which is a key source of economic growth and development. Therefore, the central objective of the present study is to empirically evaluate the effect of incoming FDI along with some other control variables namely: per capita GDP, international remittances, and exports on the human capital for a set of 34 developing countries. List of the countries used in this is given in the Appendix Table A1 and these countries are low, lower middle and upper middle income countries. We assume that all these countries have similar characteristics. This study will contribute to the literature on the factors explaining human capital in particular the role of FDI inflow in the context of developing world.

This study will test the following hypotheses:

H_0: There is no significant positive relationship between inward FDI and human capital.
H_1: There is a significant positive relationship between inward FDI and human capital.

The rest of the study is structured as follows: Section 1 deals with the prior relevant studies, Section 2 presents data description and empirical methodology. Section 3 shows empirical results of the study and Final Section concludes the study.

1. Literature review

Review of the literature reveals that there are several studies investigating the impact of FDI on economic growth in both developing and developed countries. However, research on the effect of inward FDI on human capital which is key factor of economic growth is yet scanty[1]. The study of Blomstrom and Kokko (2002) observes that FDI inflow generate a favorable environment for the growth of human capital in East Asia and in Latin America regions. Where, in both regions domestic employees' training have enhanced and their education level boosted as a result of incoming FDI and they might employ more sophisticated technology in the production process. Arturo (2001) investigates the role of FDI inflow in enhancing the accumulation of human capital over the period of 1960-1999. The findings reveal that there is convergence in school attainment happening among countries, with human capital of low income countries increasing their human capital quicker than human capital of developed countries. In this process, FDI inflow serves as a dominant stimulus for technological change. Heylen et al. (2003) explore the impact of inflation rate on human capital formation in set of 93 countries over the period ranging from 1975-1995. The empirical results clarify that uprising inflation fundamentally accelerates human capital, however, a strong negative impact can be seen only when the inflation rates are very high. The study maintains that for inflation rates under 15%, the impact of increasing inflation on human capital looks to be insignificant. The other determinants of human capital are government expenses on education which has significantly positive effect on human capital.

A study by Sharma and Gani (2004) assesses the impact of FDI on human development (measured by the human development index) for low and middle-income countries for the period of 1975-1999. The panel estimates a fixed-effects model revealing a statistically positive influence of FDI on human development for low and middle-income countries: Bangladesh, Burundi, Burkina Faso, Cameroon, Cote d'Ivory, Ghana, Kenya, Lesotho, Nepal, Niger, Pakistan, Malawi, Rwanda, Senegal, and Zimbabwe. Egger et al. (2005) examine the effect of capital market integration on higher level education and economic growth by using inward FDI as foreign capital inflows for 87 countries during 1960-2000. The study finds that inward FDI has positive effect on higher school participation. Adenutsi (2010) finds out that international remittance flows have a significantly positive long run effect on overall human

development in 18 low-income countries of Sub-Saharan Africa during 1987-2007. Using Chinese panel data over the period of 1981-1998, the study of He (2011) suggests that FDI inflow encourages human capital accumulation in China, and better degree of financial deregulation strengthens the encouraging effect. Matano and Ramos (2013) discover that international remittances, for the families receiving allowances, raise the possibility of achieving higher education of around 33% in Moldova. Furthermore, the migrant education level has a robust, positive and statistically significant effect on family members' education.

Gittens and Pilgrim (2013) reveal that incoming FDI has a positive effect on human capital during 1970-2010. The study added that FDI inflows transform into higher human capital stocks, which may also have a profound growth impact on an overall economy and consequently on FDI enhancement. Kroeger and Anderson (2014) observe that migrant remittances have an overall positive effect on school enrollment among young children during 2005-2009; the effect was observed negative in case of enrollment among older boys and girls. Sehrawat and Giri (2014) investigate empirically the association between financial development indicators and human development in India over the period of 1980-2012. The empirical results corroborate a long-run association among the variables. The variance decomposition analysis exposes that the only financial indicators namely; broad money supply has the major contribution to fluctuations in human development in India. The study of Yildirim and Tosuner (2014) expounds that inward FDI through many ways contributes to the education level of a country. Similarly, well-educated labor force accelerates FDI inflows. The study examines the contribution of FDI inflows to the level of education in Central Asian Turkic Republics (Azerbaijan, Uzbekistan, Kazakhstan and Kyrgyz Republic, except Turkmenistan) during 1999-2011. The empirical findings show that there is no statistically significant connection between inward FDI and human capital investment measure by the level of education. In a study Azam (2015) finds that international remittances inflows, FDI and openness to trade have significant impact on economic growth in four developing Asian countries during 1976-2012. Gyimah-Brempong and Asiedu (2015) indicate that migrant remittances considerably enlarge the prospect that families enroll their children in primary and secondary schools, signifying that migrant remittances build up education human capital accumulation in Ghana.

On the other hand, the findings of Checchi et al. (2007) study find that FDI inflow dampens secondary enrolment while promoting tertiary

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[1] See Sharma and Gani (2004).

enrolment, however, the whole impact of FDI is negative during the period of 1985-2000. Though, the data on FDI used in the study looks to be attracted by existing ability of human capital, but just at the secondary level. However, in general, the presence of foreign firms in the recipient country's economy has a noteworthy influence on tertiary school enrollment, because inward FDI creates employment for skilled labor. Zhuang (2008) evaluates the impact of FDI on human capital formation in 29 provinces of China for the period from 1978-1999. The study measured human capital by using the high school, middle school, college, professionals and technical education as a percentage of population to capture the influence of FDI inflow in special export zones and economic as well as technological development zones on various education levels. The empirical results found were statistically insignificant because of broad measure used for human capital in the study. A study by Ndeffo (2010) analyzes the effect of FDI on human capital development in a panel of 32 Sub-Saharan African countries for the period from 1980-2005. The results indicate a correlation between inward FDI and the percentage of both children in full time education in primary and in secondary school. However, panel data regression results are statistically insignificant; it implies that FDI inflows led towards Sub-Saharan Africa countries yet remain unsatisfactory. However, the other variables are the domestic investment, public sector spending, life expectancy and per capita GDP growth rate have significantly positive impacts on human capital.

2. Methodology and data

This study's central aim is to investigate the impact of FDI inflows on human capital in developing countries. For this purpose, multiple regression model is supposed to be used, which can symbolically be written as follows:

$$\text{Ln}HC_{i,t} = \beta_i + \beta_1 \text{Ln}FDI_{i,t} + \beta_2 \text{Ln}Y_{i,t} + \beta_3 \text{Ln}REM_{i,t} + \beta_4 \text{Ln}X_{i,t} + \mu_{i,t}, \tag{1}$$

where HC represents human capital measured by gross secondary school enrolment, FDI is net foreign direct investment inflow, Y per capita gross domestic product, REM is migrant workers' remittances and X is exports, Ln is for log, i refers to the country and t for time period. Whereas, the disturbance term is the sum of two components i.e. $\mu_{i,t} = \upsilon_{i,t} + \varepsilon_{i,t}$, where the first term accounts for any unobservable country specific effects and the second term is assumed to be white noise. The coefficients are assumed to be positive of all variables i.e. foreign direct investment, per capita GDP, migrant worker's remittances and exports.

The specified equation represents a panel regression and is based on the decomposing error term which comprises for both the time and individual effects. One needs to select the specific model, as in panel regression different types of assumptions are often imposed on the intercept term[1]. For instance it is supposed that the intercept vary for individuals and not vary over time for the same individual. Also, assumed different intercepts for each individuals and time period, about the disturbance term is also assumed to be independent across countries and so on. These assumptions are basic to decide that the effect of model is fixed or random. Instead of the prior specification about the constant term and disturbance term, in this study at the time of estimation variant assumptions are imposed on the selected model and one is chosen that gives strong results.

2.1. Data sources. For empirical exercise, the panel data set is used which covers 34 developing countries from cross continents ranging from 1981-2013. Choice of the sample is impede by data availability and number of countries that are major recipients of foreign direct investment and worker remittances continually from eighties. Data for all variables are retrieved from World Development Indicators (2015), the World Bank database (http://data.worldbank.org/data-catalog/world-development-indicators) and for some missing values are interpolated using Eview-8. Variables included comprise gross secondary school enrolment of the countries which represent human capital as response variable, and net foreign direct investment in current US$, personal worker remittances in current US$ and exports of goods and services as share of GDP are the regressors in the study. All variables are in difference log form in order to overcome on nonlinearity problem.

Table 1 gives correlation matrix and brief summary statistics for all variables used in this study. It is evident from Table 1, that in summary statistics mean of the FDI inflows is at maximum and highly deviate from its mean than any other variables. The human capital proxied by gross secondary school enrolment indicator displays small variability than other variables. In correlation matrix, the results obtained have expected signs and support the main proposition of the study. The correlation matrix results indicate that incoming FDI is highly correlated with gross secondary school enrolment, representing human capital.

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[1] See, Greene (2002; Ch-13).

Table 1. Summary of descriptive statistics and correlation matrix

Variables	Summary statistics					Correlation matrix				
	Mean	Median	Max.	Min.	Std. dev.	HC	Y	FDI	X	REM
HC	3.81	3.96	4.73	0.97	0.622	1	0.035	0.203	0.09	0.120
Y	6.83	6.90	10.11	2.54	1.39	--	1	0.475	0.36	-0.29
FDI	17.75	18.78	24.49	5.43	4.50	--	--	1	0.52	-0.67
X	14.72	17.88	24.70	1.63	7.48	--	--	--	1	-0.65
REM	6.44	3.50	23.81	1.15	6.38	--	--	--	--	1

Source: authors' compilation, while using EViews.

3. Results and discussion

To investigate the relationship between series, panel regression is used, where there are two types of model i.e., fixed-effects (FE) and random-effects (RE). Final output of the model will be constraint to the fixed-effects test results and Hausman specification test results (Greene, 2002). Under Hausman's specification test, the insignificant *p*-values show that RE is preferred, otherwise FE is effective. In this study, the Hausman's test results support that the FE is preferred over RE because *p*-values is smaller than 5 percent in all cases. The test rejects the null hypothesis that the cross section effects are not related with the other variables in the model and it accepts the alternative (Hausman, 1978)[1]. The fixed effect test also indicates that the FE is preferable to the RE in all regressions. Therefore, we used the fixed effect model and the results are tabulated in Table 2.

In this study, five versions of equation 1 are estimated using fixed-effect model based on panel data for 34 developing countries. Table 2 columns 1-5, reveal that the empirical results found are mostly statistically significant. The significant *t*-ratios reflect partial significance of parameters while high *F*-statistic − the overall significance of the selected independent variables. The values of adjusted R^2 range from 66 percent to 83 percent which represent good explanatory power of the models. In final regression, adj. R^2 found are higher and indicates that 83 percent variation in human capital caused by the independent variables namely per capita GDP, foreign direct investment, workers' remittances and exports during the period under the study. The empirical results in Table 2 show the estimated coefficient of almost all variables used are statistically significant with expected signs, with the exception of exports variable coefficient but with expected positive sign (see Table 2, column 5). The FE-1 includes per capita GDP and FDI explanatory variables, where, the results show that both are positively related with human capital. The estimated coefficient of value 0.055 is obtained for FDI and 0.121 for per capita GDP. In this model the results indicate that human capital is highly responsive to the changes in income level and FDI inflows. In Table 2, FE-2 excludes income level and includes for workers' remittances as explanatory variable. Where, the estimated coefficient of FDI is 0.073 which is marginally higher than model 1 estimate. In FE-3, workers' remittances are included which is one of the elements of household's income. The results show that its effects are positive and significant. The estimated coefficient of exports in FE-4 model is obtained of value 0.058 which is significant at 5 percent. The coefficient of 0.067 is found for FDI in FE-4 at 1 percent level of significance. Finally, including all explanatory variables, instead of exports variables, the others all variables found are statistically significant with expected signs.

Thus the results of all five regressions suggest a positive relationship between FDI inflows and human capital in developing countries. The other variables' coefficients are also looking significant with assumed signs. The estimated coefficients are consistent with assumed signs in different regressions. The coefficient of per capita GDP is higher in first regression while coherent with the coefficient of FDI in the remaining regression. The estimates of workers' remittances and exports variables are relatively smaller than the estimates of FDI inflows. The estimates of both demonstrate minimal effects than FDI on educating people. The estimate of FDI is positively related with human capital at 1 percent in all regressions. Consequently, all regressors have positive impact on human capital to improve, however, FDI inflows play major and significant role to improve the level of human capital in the selected developing countries during the period under the study. Our empirical findings are consistent with the findings of Arturo (2001), Sharma and Gani (2004), Adenutsi (2010), Gittens and Pilgrim (2013), and Yildirim and Tosuner (2014), while contradictory to the empirical findings of Checchi et al. (2007), Zhuang (2008), and Ndeffo (2010).

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[1] See Sharma and Gani (2004).

Table 2. Panel estimates (response variable is human capital measured by gross
secondary school enrolment)

Regressors	FE-1	FE-2	FE-3	FE-4	FE-5
Constant	2.714* [0.138] (19.55)	2.426* [0.146] (16.6)	2.38* [0.1519] (15.72)	2.11* [0.233] (9.04)	2.15* [0.243](8.68)
FDI	0.055* [0.012] (4.77)	0.073* [0.009] (7.66)	0.058* [0.011] (5.48)	0.067* [0.011] (6.35)	0.053* [0.012] (4.48)
Y	0.121 [0.017] (7.02)*	--	0.057* [0.017] (3.39)	--	0.052* [0.017] (3.09)
WR	--	0.048* [0.009] (4.91)	0.049* [0.009] (5.08)	0.045* [0.009] (4.66)	0.048* [0.009] (4.97)
X	--	--	--	0.058 [0.029] (1.99)**	0.045 [0.029] (1.56)
R^2	0.685	0.816	0.846	0.820	0.849
Adj. R^2	0.663	0.797	0.825	0.802	0.827
F-statistic	30.85	44.54	40.51	43.95	39.75
Fixed-effects test {*p*-values}	30.41 [0.000]*	44.99 [0.000]*	40.84 [0.000]*	45.70 [0.000]*	41.19 [0.000]*
Hausman test {*p*-values}	22.45 [0.000]*	16.84 [0.000]*	19.91 [0.000]*	15.60 [0.001]*	17.95 [0.000]*

Notes: The values in parenthesis ( ) are t-ratios and figures in brackets [ ] are standard error. The values in curly brackets { } are *p*-values. The asterisks * and ** represent 1 and 5 percent level of significance, and FE stands for fixed effects.

Conclusion

The basic objective of this study is to evaluate the contribution of inward FDI to human capital development measured by the level of schooling year for 34 developing countries over the time period ranging from 1981-2013. Based on the Hausman's test, fixed-effects model (cross-section specific) is used for the estimation of the impact of FDI along with some other control variables namely worker remittances, per capita GDP and exports on human capital. The main findings of this study are: 1) the study finds that the effects of income level of the household is positively related with human capital in 34 countries, 2) the higher workers' remittances inflows of the countries enhance the schooling year which adds to the human capital, 3) the transfer of higher worker's remittances means more school enrollment or better human capital development, 4) FDI has positive association with human capital, and 5) the incoming FDI shows that it promotes the level of education in these countries. Thus, it is concluded that FDI inflows plays a constructive role in the enlargement of school enrollment and thereby prompting human capital.

These findings have some policy implications; therefore, based on these findings the policy makers need to increase expenditures on education sector to educate more people, while some unproductive budget should be condensed for this purpose. Similarly, policy makers need to chalk out conductive and investment friendly policy in order to enhance more FDI into the host countries. The attainment of high income level is also of grave importance for these countries in order to further increase school enrollment ultimately motivating human capital. Consequently, more rigorous human capital will widely contribute into the social welfare of these developing countries. A suggestion for future research is that it might be stimulating to conduct a fresh empirical study where to differentiate countries based on their geographical characteristics as well as income group covering Africa, Asia, and Latin America regions. The empirical outcomes are likely to be more robust and expressive for forward policy purposes.

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Appendix

Table 1A. List of selected countries used: 34 developing countries

Africa	Asia	Latin America and Caribbean
Algeria	Bangladesh	Argentina
Burkina Faso	India	Bolivia
Cameroon	Korea, Dem. Rep.	Colombia
Congo	Malaysia	Dominica Republic
Egypt	Pakistan	Guatemala
Ethiopia	Philippines	Mexico
Ghana	Portugal	Panama
Kenya	Sri Lanka	Paraguay
Morocco	Thailand	Venezuela, RB
Nigeria	Turkey	
Rwanda	Vanuatu	
South Africa		
Togo		
Tunisia		

Source: http://www.gfmag.com/global-data/economic-data/pagfgt-countries-by-income-group.