

Effects of Foreign Direct Investment on Income Inequality: Do Sector and Mode of Entry Matter?

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ABSTRACT

This paper analyzes the effect of Foreign Direct Investment (FDI) on income inequality from two perspectives- the sectoral composition of FDI and the mode of entry of FDI. From the first perspective, FDI inflow is divided into three major sectors of economic activity namely primary, manufacturing and service sector. From the second perspective, FDI is divided into greenfield FDI and cross border mergers & acquisitions (M&A) FDI. Two different models have been used to estimate the results. The first model is controlled for Kuznets Hypothesis and the second model is controlled for technology, globalization and other relevant macroeconomic variables. Both the models have been estimated using OLS & Fixed Effect estimation method. The results show that total and service sector FDI increase income inequality in both short and long run whereas manufacturing and primary sector FDI has no statistically significant effect on income inequality. On the other hand, both greenfield FDI and M&A FDI increase income inequality in the long run. Moreover, human capital has a strong conditional effect on primary, manufacturing and service sector FDI in reducing income inequality.

Keywords: Foreign Direct Investment, Sectoral FDI, Greenfield FDI, Cross Border Mergers & Acquisitions FDI, Income Inequality.

JEL Classification: B27, D30, E22.

1. Introduction

Worldwide foreign direct investment (FDI) flow experienced an upsurge since the mid-1980s. It got accelerated by unprecedented technological advancement and ongoing liberal market-oriented reforms at that time. This in turn facilitated the integration of countries into the global economy and resulted in global economic growth. However, the economic growth throughout this period has not been shared equally by all segments of the economy. As a result, rising income

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inequality, in this era of financial globalization, has become a major issue of discussion to economic policymakers all over the world. FDI works as a channel of transferring not only physical capital but also intangible capital, such as technology and skills, to the host countries. On the other hand, income inequality is often found to be linked with skill gap among workers. Therefore, FDI is assumed to play a key role in affecting income inequality in the host country by widening the income gap between workers of different skill levels. Under these circumstances, an intense debate has emerged, in both academic and policy circles, on the effects of financial globalization on rising income inequality.

In comparison to the extensive body of work examining the effects of FDI on economic growth, little work on the effect of FDI on income inequality is found in the existing literature and empirical study on the effect of sectoral FDI on income inequality is even scarcer. This paper attempts to focus on this specific research gap in the existing literature. The main purpose of this paper is to empirically investigate the effects of different sector and mode of entry-wise FDI inflow on income inequality. It attempts to find answer to the following research questions:

1. Does different sectoral FDI inflow (primary, manufacturing and service sector FDI) affect income inequality in the host country differently?
2. Does different mode of entry (greenfield and mergers & acquisitions) of FDI have differential impact on income inequality in the host country?
3. Can human capital put any conditional effect while assessing FDI's impact on income inequality?

The rest of this paper is organized as follows: following the introduction in section 1, review of the literature is given in section 2, section 3 discusses the methodology and data, section 4 illustrates the estimation results and discussion on the findings and in the last section some policy implication of the study is given along with the conclusion part.

2. Literature Review

2.1 Literature on Total FDI & Income Inequality

In the literature, there are mainly two hypotheses about the consequences of FDI on income inequality. The first one is the 'developmental/ modernization hypothesis' and the second one is the 'world system/dependency hypothesis'.

According to the modernization hypothesis, foreign capital and domestic capital are homogenous goods (Tsai, 1995). This hypothesis states that inequality is a necessary precondition for the eventual enhancement of everyone's income level and sufficient output must be first produced before it can be redistributed. The inflow of foreign capital fosters economic growth by increasing the gross investment. The ongoing growth increases employment, expands the economic middle class and increases the savings rate of the poor which altogether result in reducing income inequality (Adams, 2008). On the other hand, the world system /dependency hypothesis mainly proposes that FDI increases income inequality in the host country by generating large disparities between capital and labor share of income. FDI mostly flows to capital intensive industries where utilization of labor is lower. Moreover, governments of developing countries tend to implement policies that lower the bargaining power of labor and eliminate provisions that encourage wage enhancement (Beer & Boswell, 2002).

Empirical literature shows that Velde (2003) found that FDI increased wage inequality in four economies in Latin America during 1978-2000. Many other country specific studies support this finding that FDI is associated with greater wage inequality, especially in developing economies. Feenstra and Hanson (1997), Figini and Görg (1999) and Taylor and Driffield (2005) used industry level data for Mexico, Ireland and the UK, respectively, and found a linkage between wage inequality and FDI.

Using panel studies, Choi (2006) found a statistically significant positive relationship between FDI stock and income inequality. A similar result is observed in the work of Basu and Guariglia (2007) and Tsai (1995). Jaumotte, Lall and Papagerogiou (2013) found that trade reduces income inequality, while FDI inflow increases it. Moreover, they suggest that technological progress has a greater impact on income inequality than that of trade or financial globalization. Wu and Hsu (2012) found that FDI is likely to be detrimental to the income distribution of those host countries with lower levels of absorptive capacity.

There are some empirical studies of Milanovic (2003), Sylwester (2005) and Bhandari (2007) that found no evidence of a positive relationship between FDI and inequality. In short, most of the findings of the empirical literature show that FDI increase income inequality of the host country.

2.2. Literature on Sectoral FDI & Income Inequality

The existing literature does not provide sufficient in-depth studies on the relation between sector specific FDI and income inequality. This area is comparatively unexplored mainly due to lack of availability of data regarding sector specific FDI. Suanes (2016) has analyzed the relationship between FDI and income inequality in Latin America from a sectoral perspective. Using panel data for 3 economic sectors of 13 Latin American economies for the 1980-2009 periods, he found empirical evidence of a positive effect of service and manufacturing sector FDI on income inequality and no significant effect of agricultural sector FDI. In a more recent study, Bogliaccini and Egan (2017) have used error correction models to analyze sectoral FDI data from 60 middle-income countries for the period 1989-2010 and found that FDI in services is more likely to be associated with inequality than FDI in other sectors. They argue that skill bias and changes in employment patterns associated with the service sector are the reasons behind their findings.

2.3 Study on Mode of Entry of FDI & Income Inequality

In the existing economic literature, studies regarding the impact of greenfield FDI and mergers & acquisitions FDI on income inequality is also scarce. Most of the studies focus on their impact on economic growth. In the field of inequality, the study of Zhuang and Griffith (2013) found that M&A FDI has an insignificant impact on income inequality, while FDI in greenfield projects shows a significant positive effect on income inequality. However, they also found that, in case of Latin America and Caribbean region, greenfield FDI decreases income inequality.

2.4 Research Gap

The literature study reveals that the empirical studies on the effect of sectoral FDI on income inequality and the effect of mode of entry of FDI on income inequality are scarce compared to the studies on the relationship between total FDI and income inequality. The few papers that are available on the sectoral analysis have focused only on a few countries and the time period of the studies is also limited. So, there is scope to widen the number of observation and broaden the time horizon of the study. Moreover, there is gap in the literature related to the study on finding out conditional effects of sectoral FDI on income inequality. This study has attempted to fill in these gaps.

3. Methodology & Data

3.1 Model Specification

Two different regression models are used in this estimation process. The regression models are to be controlled for relevant variables. The study by Sarel (1997) suggests some key macroeconomic factors that affect income distribution. On the other hand, the study by Jaumotte et. al (2008) focused on the technology and globalization variables which affect income inequality. Thus, in addition to the main explanatory variable, the two models include a set of control variables based on the review of the literature.

The first model is controlled for the Kuznets' curve effect and the second one is controlled for effect of globalization, technology, institution, human capital, level of financial development, unemployment rate, inflation rate and trade openness.

3.1.1 Model 1

According to Kuznets' hypothesis, inequality would follow an inverted "U" shape as it rises and then falls again with the increase of income per-capita. The first model is developed controlling for this Kuznets' effect.

$$GINI_{it} = \beta_0 + \beta_1 FDI_{Xit} + \beta_2 \ln GDP_{PCit} + \beta_3 \ln GDP_{PCSQit} + \beta_4 X_{it} + \varepsilon_{it} \dots (1)$$

where $GINI_{it}$ represents the disposable income Gini coefficient, FDI_{Xit} represents the net inflow of FDI to sector X as a percentage of GDP (in the case of analyzing the effect of sectoral FDI on income inequality) and net inflow of FDI through mode of entry X as a percentage of GDP (in the case of analyzing the effect of mode of entry FDI on income inequality), $\ln GDP_{PCit}$ and $\ln GDP_{PCSQit}$ are the natural logarithm of GDP per capita and its square, respectively. X_{it} is the vector of control variables which include human capital, rule of law and natural log of population, and ε_{it} represents the error term.

3.1.2 Model 2

The second model is specified, with some modification, following the study of Jaumotte et al. (2008).

$$\begin{aligned}
GINI_{it} = & \beta_0 + \beta_1 FDI_{Xit} + \beta_2 Institution_{it} + \beta_3 Human\ capital_{it} \\
& + \beta_4 Technology_{it} + \beta_5 Trade_{it} + \beta_6 Financial\ development_{it} \\
& + \beta_7 Unemployment_{it} + \beta_8 Age\ Dependency_{it} + \beta_9 Inflation_{it} \\
& + \delta_{it} \dots (2)
\end{aligned}$$

Where FDI_{Xit} represents net inflow of FDI to sector X as a percentage of GDP (in the case of analyzing the effect of sectoral FDI on income inequality) and net inflow of FDI through mode of entry X as a percentage of GDP (in the case of analyzing the effect of mode of entry FDI on income inequality), $Institution_{it}$ is the quality of institutions proxied by rules of law, $Human\ capital_{it}$ is derived from the Human Capital Index based on years of schooling and returns to education, $Technology_{it}$ proxies for technological change, measured by the share of information and communication technology capital in the total capital stock, $Trade_{it}$ is trade globalization, calculated by the sum of exports and imports as a percentage of a country's GDP, $Financial\ development_{it}$ is proxied by the ratio of private credit to GDP, $Unemployment_{it}$ is the unemployment rate, $Age\ Dependency_{it}$ is the ratio between number of non-working-age population to working-age population, and $Inflation_{it}$ is a proxy for macroeconomic stability measured by the consumer price index.

Two different estimation methodologies are used to test each of the two models. The first methodology is Pooled Ordinary Least Squares (Pooled OLS) and the second one is Fixed Effects estimates (Hausman test indicates that fixed-effects estimates are preferred to random effects estimates in this case). Both the models are estimated using heteroskedasticity consistent standard errors to address the issue of heteroskedasticity. An additional estimation, including interaction variables between sectoral FDI and different measures of human capital is also done.

3.2 Data

This study has used an unbalanced panel dataset. For economic activity wise disaggregated FDI data of 68 countries, the considered period is 1997-2016 (20 years). On the other hand, in case of FDI disaggregated by the mode of entry of FDI, the sample consists of 79 countries and the considered period is 2003-2016 (14 years). Definition and sources of the data can be found in the Appendix A and the summary statistics of all the variables can be found in Appendix B.

4. Estimation and Analysis of the Findings

For all of the estimated results, the standard errors are reported in parentheses and, the coefficients are estimated using heteroscedasticity robust estimations to address heteroscedasticity.

4.1 Estimation Based on Model 1 (Controlled for Kuznets' hypothesis variables)

Table 1. Estimation of relationship between (a) total FDI and income inequality; (b) sectoral FDI and income inequality and (c) FDI entry mode and income inequality (controlled for Kuznets hypothesis)

	OLS Estimates (20 years average)			Fixed Effects Estimates (Annual)		
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Inequality	Inequality	Inequality	Inequality	Inequality	Inequality
FDI _{Total}	1.7022* (0.9434)			0.4602*** (0.1362)		
FDI _{Primary}		-1.7970 (50.0487)			4.7418 (6.5654)	
FDI _{Manufacturing}		15.7121 (51.5519)			-0.07085 (0.6609)	
FDI _{Service}		1.6607* (0.9563)			0.4461*** (0.1317)	
FDI _{Greenfield}			13.5350 (25.6179)			0.9169 (1.1407)
FDI _{M&A}			31.9805 (37.1784)			-0.3405 (0.4832)
Ln(GDPPC)	28.5478* (14.6045)	30.2067** (14.4174)	-1.7235 (9.0619)	0.5427 (19.7584)	1.0355 (19.7726)	2.5169 (10.0429)
Ln(GDPPCSQ)	-1.5847* (0.8554)	-1.6765** (0.8370)	0.2201 (0.4937)	0.0601 (1.0036)	0.0330 (1.004)	-0.2603 (0.5147)
Human Capital	-3.5109 (2.5136)	-3.6286 (2.5811)	-4.9091** (1.6818)	-1.960 (2.4615)	-1.988 (2.466)	0.5692 (1.6631)
Rule of Law	-16.197*** (6.0331)	-15.950** (6.0612)	-25.006*** (4.3277)	1.4262 (1.6071)	1.3920 (1.6160)	0.6612 (1.9892)
Ln (Population)	0.8689** (0.3940)	0.8988** (0.4032)	1.2289*** (0.3761)	-8.6337 (4.5525)	-8.6044* (4.5254)	-5.5541** (2.5258)
Constant	-83.6290 (65.3386)	-91.5074 (64.4380)	41.9562(45.0 878)	174.2763 (104.5465)	171.639 (103.7514)	127.157** (62.2757)
Observations	61	61	75	674	674	874
R-squared	0.6648	0.6671	0.6142	0.1521	0.1509	0.1276
Number of country	61	61	75	61	61	75

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The results from table 1 show that there is a positive relationship between total FDI and income inequality and the relationship is statistically significant with 90% confidence level under the OLS method and with 99% confidence level under the fixed effects estimation method.

In case of the FDI disaggregated by sectors of economic activity, only service sector FDI is found to increase income inequality but the relationship is statistically significant with 90% confidence level under OLS method and with 99% confidence level under the fixed effects estimation method. Primary FDI and manufacturing FDI hold no statistically significant relation with income inequality.

The results show that there is no significant relation between greenfield FDI or M&A FDI with income inequality for both OLS and fixed effects estimator.

4.2 Estimation Based on Model 2 (controlled for technology, globalization, and other macroeconomic variables)

Table 2. Estimation of relationship between (a) total FDI and income inequality; (b) sectoral FDI and income inequality and (c) FDI entry mode and income inequality (Controlled for technology, globalization, human capital, financial development, institutions and other macroeconomic variables)

	OLS Estimates (20 years average)			Fixed Effects Estimates (Annual)		
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Inequality	Inequality	Inequality	Inequality	Inequality	Inequality
FDI _{Total}	-0.0325 (1.1610)			0.3997*** (0.1527)		
FDI _{Primary}		37.2202 (56.6095)			14.3433 (10.0623)	
FDI _{Manufacturing}		-35.3277 (57.1362)			-0.0210 (0.3922)	
FDI _{Service}		-0.2089 (1.2521)			0.3925** (0.1530)	
FDI _{Greenfield}			74.0858** (33.0917)			1.9929 (2.0513)
FDI _{M&A}			75.9036** (35.0365)			-0.6360 (0.5292)
Rule of Law	-26.149*** (5.8383)	-26.405*** (5.9002)	-30.319*** (4.9062)	1.6071 (1.3857)	1.4696 (1.3826)	2.0142 (1.6606)

Human Capital	-4.8121* (2.5855)	-4.8386* (2.7178)	-4.9412*** (1.7286)	-5.1031** (2.1499)	-5.1505** (2.1644)	-3.7225** (1.7905)
Technology	83.0635 (167.2609)	108.7615 (185.938)	19.7928 (89.3598)	125.869*** (39.1659)	124.6298*** (38.8328)	55.2958* (29.6602)
Unemployment	-0.3849 (0.2407)	-0.3447 (0.2731)	-0.1610 (0.2352)	0.1148** (0.0432)	0.1167*** (0.0427)	0.0741** (0.0335)
Inflation Rate	-0.0100 (0.1598)	-0.0139 (0.1716)	-0.1638** (0.0711)	0.0458*** (0.0122)	0.04316*** (0.0133)	0.0174 (0.0148)
Age Dependency	-0.1384 (0.0932)	-0.1314 (0.0998)	-0.1410 (0.0990)	0.0595 (0.0797)	0.0604 (0.07993)	0.1510*** (0.0473)
Financial Dev	0.0101 (0.0263)	0.0106 (0.0276)	0.0488** (0.0230)	0.0014 (0.0085)	0.0010 (0.0082)	0.0008 (0.0042)
Trade	-0.0099 (0.0201)	-0.0033 (0.0235)	-0.0230 (0.0147)	-0.0158 (0.01189)	-0.01538 (0.0114)	0.0030 (0.0058)
Constant	77.7325*** (11.9270)	76.7022*** (12.9339)	76.1540*** (8.8101)	45.6081*** (7.2937)	45.6654*** (7.3654)	36.4958*** (6.2195)
Observations	49	49	68	513	513	761
R-squared	0.6396	0.6436	0.6617	0.3470	0.3356	0.2363
Number of country	49	49	68	49	49	68

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 2 shows that there is no statistically significant relationship between total FDI and income inequality under the OLS method whereas under the fixed effects estimation method, a statistically significant positive relationship between total FDI and income inequality is found.

In case of the FDI disaggregated by sectors of economic activity, no statistically significant relationship between sectoral FDIs and income inequality is found under the OLS method. However, when the fixed effects estimator is used, we find a statistically significant positive relationship between service sector FDI and income inequality. For primary FDI and manufacturing FDI, we don't find any statistical significant relation with income inequality.

In case of FDI disaggregated by mode of entry, using OLS method we find that both the greenfield FDI and M&A FDI increase income inequality. This result also suggests that strong rule of law and human capital in the host country help to reduce income inequality. On the other hand, when we use fixed effects estimation technique for the same data and model, we find no significant relationship for both greenfield FDI and M&A FDI with income inequality.

Table 3. Robustness Check for Fixed Effects Estimates (controlling for Technology, Trade, Institution and other Macroeconomic variables)

	(3 years average)	(5 years average)	(3 years average)	(5 years average)	(3 years average)	(7 years average)
Variables	Inequality	Inequality	Inequality	Inequality	Inequality	Inequality
FDI _{Total}	0.5984** (0.2589)	0.6159*** (0.2202)				
FDI _{Primary}			31.7122 (22.5491)	28.3931 (25.686)		
FDI _{Manufacturing}			-1.0451 (1.4002)	-2.4072 (1.7077)		
FDI _{Service}			0.5483** (0.2538)	0.4148** (0.1855)		
FDI _{Greenfield}					5.9662 (4.6410)	20.7663** (8.9940)
FDI _{M&A}					-2.5056 (2.0483)	-24.6249*** (8.5638)
Rule of law	1.5692 (1.4515)	2.0519 (1.4445)	0.9767 (1.4926)	1.6191 (1.5023)	3.3698 (2.5937)	2.0299 (3.2925)
Human Capital	-5.4209* (2.8067)	-4.6382* (2.4983)	-5.4561* (2.7680)	-4.5332 (2.4209)	-3.8688** (1.8585)	-3.4866* (2.0577)
Technology	98.9212*** (36.2287)	97.9106*** (33.2693)	94.9118* (35.2795)	93.6838* (32.8774)	68.1503** (29.2706)	53.5942* (27.8433)
Unemployment	0.1586** (0.0738)	0.1588** (0.0752)	0.1593** (0.0716)	0.1643** (0.0740)	0.0839** (0.0385)	0.0938* (0.0516)
Inflation Rate	0.0516*** (0.0174)	0.03067*** (0.0247)	0.0461*** (0.0193)	0.0278*** (0.0248)	0.0295 (0.0326)	-0.0203 (0.0148)
Age Dependency	0.0521 (0.0733)	0.0531 (0.0592)	0.0611 (0.0760)	0.0531 (0.0589)	0.1451*** (0.0486)	0.1349*** (0.0455)
Financial Dev	0.0042 (0.0107)	0.0038 (0.0093)	0.0021 (0.0096)	0.0008 (0.0082)	0.0006 (0.0050)	0.0039 (0.0068)
Trade Openness	-0.0175 (0.1356)	-0.0093 (0.1744)	0.0010 (0.1393)	-0.0082 (0.1759)	0.0019 (0.0069)	-0.00005 (0.0064)
Constant	47.2695*** (13.0121)	43.5572*** (16.4524)	45.4263*** (13.3517)	43.4918*** (16.5285)	36.0082*** (6.6539)	36.3711*** (6.9522)
Observations	212	165	212	165	260	132
R-squared	0.3442	0.2765	0.2971	0.2772	0.1714	0.2154
Number of country	49	49	49	49	68	68

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

To measure the robustness of the estimated results the estimation is again done using 3 years and 5 years average data for total FDI and sectoral FDI. 3 years and 7 years average data is used in the case of mode of entry of FDI. Table 3 shows the result of all the 6 estimations.

The results show that total FDI and service sector FDI have positive relationship with income inequality. Among the other control variables, technology, unemployment rate and inflation rate also show a positive relationship with income inequality whereas human capital shows a negative association with income inequality.

In case of the effect of FDI based on the mode of entry, greenfield FDI shows a positive relation with income inequality for the 7 years average data but the relationship is not supported by 3 years average data. On the other hand, M&A FDI shows a negative relationship with income inequality only for the 7 years average data. Among the control variables, technology, unemployment rate and age dependency ratio increase income inequality, while human capital reduces income inequality.

4.3 Estimation for the Interaction Effects

Table 4 shows the conditional effects of the sectoral FDI on income inequality estimated under OLS method. The interaction term of human capital and sectoral FDI is negative with 95% confidence level for primary FDI, 99% confidence level for manufacturing FDI and 90% confidence level for service sector FDI. This result suggests that with the presence of higher human capital, FDI inflow in all the sectors lowers income inequality. It is because the benefits of foreign capital spread more broadly where host country is equipped with higher level of human capital.

Table 4. OLS estimates of interactional effects

	(1)	(2)	(3)
Variables	Inequality	Inequality	Inequality
FDI _{Primary}	377.3415 ** (157.3561)	207.5998*** (70.8652)	127.4737 (81.5770)
FDI _{Secondary}	33.0336 (44.3761)	328.9731** (114.6593)	-140.3194 (89.5215)
FDI _{Service}	0.1021 (1.3811)	-0.1590 (1.3576)	61.1013* (34.4550)
Human Capital	-6.1664 ** (2.6974)	-5.1409** (2.3829)	-5.3773 ** (2.7758)
FDI_{Primary} *HC	-122.4237 ** (50.0714)		
FDI_{Manufacturing} *HC		-185.5524 *** (55.6088)	
FDI_{Service} *HC			-16.7311* (9.4435)

Technology	-2.3466 (170.9003)	115.3279 (153.5971)	180.9584 (193.013)
Rule of Law	-17.4671** (7.9635)	-18.8259*** (6.3755)	-23.1581 *** (6.4965)
Unemployment	-0.4116 (0.2544)	-0.2919 (0.2550)	-0.3772 (0.2750)
Inflation Rate	-0.0701 (0.1897)	-0.0514 (0.1599)	-0.0225 (0.1763)
Age Depend	-0.1879 * (0.0988)	-0.1768** (0.0833)	-0.1366 (0.1059)
Financial Dev	0.0015 (0.0278)	0.0029 (0.0256)	0.0040 (0.0289)
Trade Openness	-0.0230 (0.0267)	-0.0248 (0.0257)	-0.015632 (0.0236)
Constant	80.2427 *** (11.8547)	75.4042*** (10.4177)	76.7884 *** (13.4279)
Observations	49	49	49
R-squared	0.6906	0.7159	0.6692

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4.4 Discussion on the Findings

For both the models, fixed effects estimate for annual, three and five years average data show that total FDI increases income inequality. This result is in line with previous studies in the literature (Tsai, 1995; Basu and Guariglia, 2007; Choi, 2006; Herzer, Hühne and Nunnenkamp, 2012).

According to Velde (2003), one of the main causes of income inequality generated by FDI is that foreign firms tend to invest in skill-sensitive sectors of the economy. These sectors absorb most of the benefits of FDI namely technology transfer, knowledge transfer and higher productivity. As a result, the wage gap between skilled and unskilled workers widens, and thus income inequality increases in the host economy. Skill biased technological change (SBTC) is playing a key role in defining the FDI and income inequality relationship. Table 2 demonstrates that the level of technological development (proxied by share of ICT capital in the total capital stock) is strongly associated with income inequality for all types of FDI inflow. This finding is in line with the findings of Dao et al. (2017). Their findings show that in the case of advanced economies, technological progress explains for about half of the overall decline in labor share of income (i.e. increase of income inequality between the wage earners and the capital owners) with a large negative impact on the middle-skilled

labor force. Due to technological advancement, middle-skilled labors in advanced countries are being replaced by automation contributing to job polarization toward high skill and low skill occupations. The expansion of global value chains has allowed firms to divide production process into many tasks and offshore labor-intensive tasks to emerging economies to exploit cheap labor. This process also reduces the bargaining power of the labors in the advanced economies. Thus, it contributes to reduction of labor share of income in advanced countries. On the other hand, those off-shored tasks are relatively capital intensive and skill-sensitive for the emerging economies compared with their existing tasks and thus it creates a wage gap between workers of different skill level.

In the sectoral analysis, the findings presented in Table 1, 2 and 3 show that, for both the models, only service sector FDI is strongly associated with increasing income inequality and the result is robust. This result is in line with the finding of Bogliaccini and Egan (2017).

The probable reason why the primary sector FDI is not associated with income inequality is that primary sector is mainly extractive in nature. This sector is mostly capital intensive and the scope for linkages between foreign companies and the rest of the economy is often limited. Moreover, the amount of FDI movement in this sector is insignificant in comparison with the other two sectors.

In the estimated results, the manufacturing sector FDI is not found to have any significant relationship with income inequality though most of the studies regarding FDI and income inequality focus on the skill bias in the manufacturing sector as the key source of income inequality. One possible reason why manufacturing FDI is not found to increase income inequality is that the skill gap mechanism is not working for the sample countries. This can happen if the incoming FDI is matched with the general working people's skill level or unskilled workers are given training facilities to upgrade their skill level. Another reason may be that the skill gap effect is being offset by the effect of an overall upgrade in the income level of both the skilled and unskilled workers which in turn reduces the gap between capital share and labor share of income.

Service sector FDI is found to be positively associated with income inequality and the result is robust. Literature suggests that one of the probable reasons why service sector FDI inflow increases income inequality is that this sector has the most polarized income structure among all the sectors. Moreover, this sector is heterogenous in terms of skill bias. Service sector includes both highly capital-

intensive subsectors such as telecommunications, and information technology etc. and less capital-intensive sectors like retail business, tourism, restaurants etc. Service sector FDI mainly affects income inequality through wage premium for skilled workers along with incorporating the skill biased technological changes in their operation. This sector is the most sensitive to human capital and so, skill gap plays the most influential role in raising income inequality in this sector. Another reason is that service sector workers are more vulnerable to automation and outsourcing as services are easier to be automated and outsourced. Moreover, service sector has less unionization rate compared to other sectors as the firm sizes are smaller in this sector. Thus, workers in service sector has less bargaining power which also contributes to the rising income inequality in this sector. These are all contributing factors towards the positive relationship between service sector FDI and income inequality.

In the case of greenfield FDI and M&A FDI, the result in Table 1 shows that greenfield FDI and M&A FDI do not have any significant relationship with income inequality and they do not follow Kuznets' hypothesis. Table 2 shows that both greenfield FDI and M&A FDI increase income inequality when controlled for technology, trade and institutional variables. Furthermore, the result of the fixed effect estimation based on seven years average data in Table 3 shows that M&A FDI decreases income inequality, while greenfield FDI increases income inequality. Additionally, when the annual and three years average data is used the results are no more significant.

Human capital is found to have a significant conditional effect with incoming FDI on income inequality, mainly for primary sector FDI (at 95% confidence level) and manufacturing sector FDI (at 99% confidence level). The literature suggests that greater investment in human capital results in a reduction in income inequality, especially in developing economies (Basu and Guariglia, 2007). It is understandable because increase of human capital means an increase of supply of skilled labor that are more able to get benefitted from the skill biased technological changes occurring in the worldwide production and service delivery process.

5. Conclusion and Policy Implications

5.1 Summary of Findings

One of the major findings of this study is that both in short run (estimation based on annual data) and long run (estimation based on 3 years, 5 years and 20 years

average data), total FDI increases income inequality in the host economy. In case of sectoral FDI, only services sector FDI is found to have a positive relationship with income inequality in both short and long run. FDI inflows in the other two sectors have not shown any statistically significant relationship with income inequality. On the other hand, both greenfield FDI and M&A FDI increase income inequality in the long run (estimation based on 3 & 7 years average data). Among other variables, the rule of law and human capital tend to reduce income inequality whereas technology tends to increase it. Moreover, an interaction effect analysis suggests that in the presence of better human capital FDI inflow in all the sectors, more specifically in the manufacturing sector, help reduce income inequality in the host country.

5.2 Limitations of the Study

One of the major limitations of this study is the unavailability of sector specific FDI data which limits the study to only 68 countries. Moreover, the lack of subsector data limits this analysis to only three major sectors of economic activity. Another major setback regarding the data is that most of the countries classify some portion of the total FDI to unallocated sectors when the sector of economic activity cannot be appropriately identified. Those data are excluded from this analysis.

5.3 Policy Implication for Developing Countries Like Bangladesh

This study suggests that policymakers should focus more on attracting FDI in primary and manufacturing sectors in Bangladesh. Since skill gap is one of the major causes of income inequality, government should invest more on human capital development with a focus on technology based education. This will boost up the adaptive capacity of the country and allow spillover effect of FDI to play its positive role. This technology and skill transfer in manufacturing industry can play a key role in industrial development in developing countries like Bangladesh. So, incentivizing FDI in manufacturing sector will enable technology and skill transfer from developed countries which will increase GDP growth. The policymakers may set different incentive/disincentive structures towards attracting/limiting FDI inflow to different sectors. Broader access to quality education and improvement of rule of law are to be ensured to allow a greater segment of working population to receive the benefits of FDI.

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Appendix A.

Variable definitions and Data Sources

Variables	Description	Data sources
Income Inequality	Estimate of Gini index of inequality	The Standardized World Income Inequality Database (SWIID), Version 6.1.
FDI _{Total}	The net inflows of FDI as a percentage of GDP (current dollars)	Organization of Economic Cooperation and Development (OECD) database and country sources
FDI _{Primary}	FDI inflow in primary sector as a percentage of GDP (current dollars)	
FDI _{Manufacturing}	FDI inflow in manufacturing sector as a percentage of GDP (current dollars)	
FDI _{Service}	FDI inflow in service sector as a percentage of GDP (current dollars)	
FDI _{Greenfield}	FDI inflow in greenfield project as a percentage of GDP (current dollars)	World Investment Reports(WIR), The United Nations Conference on Trade and Development (UNCTAD)
FDI _{M&A}	FDI inflow through merger & acquisition as a percentage of GDP (current dollars)	
Ln(GDPPC)	GDP per capita PPP (constant 2011 international \$)	World Bank's World Development Indicators Database
Ln(GDPPCSQ)	The square of GDP per capita PPP (constant 2011 international \$)	
Trade Openness	The sum of exports and imports as a share of GDP	
Age Dependency	The ratio of population size aged below 15 and above 65 to the working age population	
Financial Development	The percentage of domestic credit to private sector in GDP	
Unemployment	Unemployment rate	
Population	Natural logarithm of the total population	
Inflation rate	Inflation as measured by the consumer price index.	

Human Capital	Human capital index, based on years of schooling and returns to education	Penn World Table, Version 9.0
Rule of law	This index comprises of various indicators which capture the extent to which different agents of society have confidence in and abide by its rules	International Country Risk Guide (ICRG)
Technology	Share of information and communication technology capital in the total capital stock.	Jorgenson and Vu (2005). Data including updates for recent years is generously provided by Associate Professor Vu Minh Khuong (National University of Singapore).

Appendix B.

Summary statistics of all the variables used in the estimation.

Variables	Obs	Mean	Std. Dev.	Min	Max
Gini	1232	36.45	8.5838	21.2	54.60
FDI _{Primary}	951	0.0096	0.0357	-0.0203	0.3171
FDI _{Manufacturing}	951	0.0146	0.0503	-0.7460	0.7191
FDI _{Service}	951	0.0885	0.4421	-0.6442	7.1356
FDI _{Total}	951	0.1048	0.4472	-0.6429	7.1333
FDI _{M&A}	792	0.0097	0.0354	0	0.8104
FDI _{Greenfield}	792	0.0304	0.0630	0.8	0.8824
Unemployment	1340	7.9406	5.2967	0.8	37.3000
Inflation rate	1345	5.7783	9.6333	-7.11	109.6800
Age Dependency	1340	54.5846	12.7943	34.5215	109.7423
Human Capital	1170	2.7838	0.6026	1.1200	3.7343
Ln(GDPPC)	1355	9.6118	1.0214	6.2054	11.4913
Ln(GDPPCSQ)	1355	93.4299	18.9138	38.5071	132.0508
Financial Dev.	1226	68.6272	51.2267	0.1858	312.1179
Rule of law	1056	0.6748	0.2288	0.17	1.0000
Technology	950	0.0108	0.0076	0.0009	0.0601
Population	1360	16.5095	1.7630	12.3086	21.0444
Trade Openness	1345	85.5631	58.9212	0.1674	441.6038