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FDI AND INCOME INEQUALITY; EVIDENCE FROM DEVELOPING COUNTRIES, USING FMOLS APPROACH

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Abstract
The paper is an attempt to scrutinize the possible long run relationship of FDI and income inequality for 32 developing economies for 1973-2014. Using panel co integration technique we found that FDI is positively and significantly related with income inequality and the results are robust for alternative inequality data set (EHII inequality) of income inequality.

Key word: income inequality, Gini index, FDI, Pedroni, Kao.

1. Introduction

Irrespective of their development stage, countries consider Foreign Direct Investment (FDI) as a vital source for; economic growth, development, employment, and most importantly modernization (Herzer et al. 2014). Developing countries liberalize their FDI regime and implement other policies to magnetize foreign investment. They mainly addressed the issue of how best to practice domestic policies to take full advantage of foreign existence in the domestic economy. Herzer and Nunnenkamp 2011; Bengoa et al. 2003; Li and Liu 2005 are among others who claim that in host country, FDI is positively related with development and productivity, however "*what is generally neglected is the issue of equality*" (Figini and Gorg 2006). Surprisingly, in developing countries context , distributional effect of FDI's evidence is mainly limited (Herzer et al. 2014).

The impact of FDI inflows on income depends upon the economic conditions of the country (Te Velde, 2003). As the FDI inflows is one of

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the types of international trade in which the main players are mostly related to the Multinational Corporations (MNCs) which motive is to enlarged profits, so they will pick locations through which they achieved the corporate objectives (Kaya & Walker, 2009). Corporate will never want to move to less developed countries or regions with cheap labor only, as they seek for "skilled labor especially when the production process involved in skill-based technology" (Mah, 2006; Lipsey & Sjöholm, 2004). As a result, this situation widens the income gap across and within the regions in the host country. Moreover, Choi (2006) also concluded that the positive correlation between income inequality and intensity of FDI will create labor market division in which skilled worker is paid a higher wage as compared to unskilled workers, thus wage inequality will increase.

More recently Mihaylova (2015) argued at lower levels of human capital and economic development, FDI has the prospective to put forth influence on income inequality in central Eastern Europe (CEE) FDI leads to increase income inequality. Further, Faustino and Vali (2011) probed the association among income disparity and economic globalization in the OECD for the period over 1995-2007, by applying fixed-effects model they conclude that FDI is positively related to inequality (Reuveny and Li 2003).

Herzer & Nunnenkamp (2011) in their study found that FDI increased income inequality but only in the short run whereas in the long run (LR), FDI is inversely related to income inequality for Europe. Further Herzer et al. (2014) finds that, FDI deepeneds the income inequality in the LR.
Second strands of literature suggests that FDI is inversely related with income inequality in the developing countries. Jensen and Rosas (2007) concluded that FDI leads to a decrease in income inequality at the state level in Mexico. By using time series data on Pakistan, Hussain et al. (2009), probed the relationship between globalization and income distribution for 1972 to 2005, and concluded that FDI is inversely related with income inequality. More recently, Mushtaq et al. (2014) analyzed the association between inward FDI and income distribution in five South Asian Association for Regional Cooperation (SAARC) countries over the time period 1980 to 2011.The researchers used fixed effect

technique for estimation. The results suggest that inward FDI is inversely but significantly related with income inequality.

The third strand of literature, which establishes statistically insignificant relationship between FDI and income inequality, added the doubt in observed literature on the question (Mihaylova 2015). Milanovic (2002) in his paper claimed that FDI has no effect on income distribution. Sylwester (2005) also failed to find evidence of a distributional impact of FDI. For developing countries Mahler et al. (1999) and Mah (2006) suggested an insignificant relationship between FDI inflows and income inequality.

The FDI and income inequality relationship discussed so far in the literature, is fussy and unclear. Hence, against the back ground of unclear findings the present study try to find the LR relationship between FDI and income inequality for 32 developing countries for the time span 1973-2014.

2. Model and Empirical Methodology

The main focus of this analysis is to evaluate the LR relationship between FDI and income inequality for 32 developing countries for the time period 1973-2014.

2.1. Model

The analysis follows Herzer,2008; Herzer, and Nunnenkamp 2011, Pedroni, 2004 and Chintrakarn, et al., 2011 methodology and estimate a bivariate model for LR relationship between FDI and income inequality for 32 developing countries.

$$lGini_{it} = \beta_0 + \beta_1 FDI_{it} + \varepsilon_{it} .....i$$

Where $lGini_{it}$ is used as a proxy for income inequality ranges from 0-1 of a country in year t. FDI_{it} Represent net FDI received per capita. The coefficient β_1 is explained as long run elasticity of income inequality with respect to FDI.

Model supposes that a LR bivariate relationship exist between FDI and income inequality. So, no other variable is required to generate unbiased estimate of FDI and income inequality. However, a necessary condition, for the correct description of the data is both variables should be integrated at same order I (1) that is sufficient condition to form a co integrated pair of FDI and inequality (Herzer and Nunnenkamp 2011; Chintrakarn et al. 2011).

Theory that inherent with Eq. (i) is that "*income inequality is endogenous in the LR, changes in FDI leads for changes in income inequality*" (Herzer and Nunnenkamp 2011). E.g. high inequality may reveal that the real wages of low-skilled workers are lower. For under this situation in order to take advantages of lower wages of un-skilled or low skilled workers, MNCs establish their low-skilled performance in countries which have inequality of higher level (vertical FDI). Conversely, with greater levels of income inequality foreign investors may shrink back from countries (fear of social clash and political instability). It's concluded that higher inequality could be the cause because of decreased or increased of FDI activities in a developing host country. The empirical implication of Eq. (i) is that, dealing with the time-series properties of the variables of interest, confirming either variables are co integrated or not, it's crucial to compact with possible endogenity problem.

2.2. Empirical Methodology

The ordinary least square (OLS) estimates do not show trustworthy results. As they suffer from many problems which are not mainly discussed in the literature for instant most of the macroeconomics variables are most probably nonstationary, OLS estimates can be biased due to the presence of hetrosedakcity, autocorrelation (Asteriou, and Hall, 2004). Hence, it's imperative to examine the presence of a unit root of all included variables in the analysis. The present study used Levin Lin and Chun (LLC) and IM Pesaran (IPS) test to confirm the order of integration. LLC and IPS test are based on the principle of ADF. After confirming the necessary condition of co integration the analysis will apply Pedroni and KAO test to check the co integration among variables. And then FMOLS technique is applied for estimation as FMOLS account for endogenity and auto correlation (Nadeem, M.; 2009)

2.3. Data

A recently published data set of SWIID3C 2015 has been used, whereas for the robustness of our results we utilize the EHII (Estimated Household Income Inequality) data set. For FDI variable we used measured in FDI net inflow % of GDP and data is collected from World Bank 2016. 32 developing countries are included for which, data are accessible over an adequately long period of time i.e. 1973-2014

3. Theoretical Frame Work

The empirical model usually claims positive and significant association between FDI and income inequality because of; FDI inflows, increased demand for skill workers, and increased wage of the group, i.e. expecting the more wage disparity (Lundqvist, 2014). Besides this, FDI increases the use of physical capital in previously labor-intensive production thus creating unemployment among unskilled workers also creates differences in earnings (Tsai 1995). However, some models speculate the opposite results (Mushtaq.et al 2014; Jensen and Rosas 2007) According to their view, FDI is the same like all other capital, which enhances growth, and benefits every single person in society (Tsai 1995). Empirical research seems to support the theory which suggests FDI increases income inequality (among others choi 2006; clark et al. 2011; and jaumotte 2013).

H_1 = FDI increase income inequality.

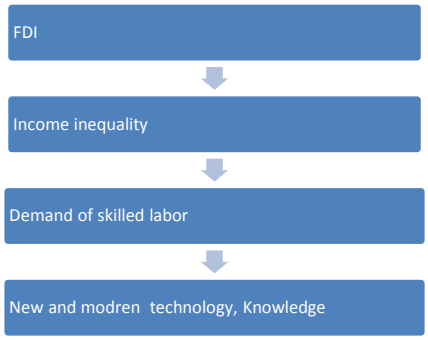

Figure 1-Conceptual frame work

Source Author self-extract from literature

4. Results and Discussion

We begin our analysis by stationary checks. Different tests are there to check the co integration with all have the same null hypothesis that each individual[1] series are non-stationary and alternative hypothesis varies test to test. We applied LLC test and IPS test to check the unit root. From table 1 and 2 we can conclude that our lGini and in ward FDI flows are non-stationary at level and stationary at first difference. These results confirm our assumption of Model.

Variables	Level		First difference		Outcome
	T. Statistics	P. Value	T. Statistics	P. Value	
L. Gini Index	0.461	0.677	-7.825	0.0000	I(I)
FDI	5.270	1.000	-7.825	0.0000*	1(1)

*H_0: each individual time series contains a unit root :*implies significance at 1% level*

Table 1: Levin Lin and Chun Panel Unit Root

Variables	Level		First difference		Outcome
	T. Statistics	P. Value	T. Statistics	P. Value	
L. Gini Index	-0.214	0.415	-17.046	0.0000	I(I)
FDI	-2.310	0.101	-09.357	0.0000	1(1)

*H_0: each individual time series contains a unit root :*implies significance at 1% level*

Table 2: IM Pesaran and shin 2003 Panel Unit Root

4.1. Co-integration

As all variables are stationary at first difference, which lead us to scrutinize the LR relationship between FDI and income inequality. Pedroni (2004) tests are employed in order to investigate the co integration between inward FDI and inequality**.** Table 3 results report that 9 out of eleven statistics are significant which lead us to reject the H_0 of no cointegration and confirms that variables are co integrated.

H_1: individual AR Coefficients.(within dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v statistics	-4.328	1.000	-4.285	1.000
Panel rho-Statistic	-5.679	0.000*	-5.899	0.00*
Panel PP-Statistic	-5.407	0.000*	-5.579	0.00*
Panel ADF-Statistic	-2.803	0.003*	-2.813	0.00*

Alternative hypothesis: individual AR coefs(between dimension)		
	Statistics	**Probability**
Group rho-Statistic	-2.535706	0.0056*
Group PP-Statistic	-5.416327	0.0000*
Group ADF-Statistic	-2.486520	0.0064**

*H_0: No co-integration, trend assumption: No deterministic trend, *,** ,*** represent 1%, 5% and 10% level of significance.*

Table 3: Pedroni Test Results

Variables	Coefficient	S.E	T Statistics	P value
FDI	0.621	0.03	20.277	0.000*

**, implies 1%, level of significance*

TABEL 4: FM-OLS Results

Variables	Coefficient	S.E	T statistics	P value
FDI	0.051	0.024	2.151	0.032**

*** implies 5% a level of significance*

TABEL 5: FM-OLS Results ***(EHII Inequality Data Set)***

4.2. FDI and Income Inequality

As far as the relationship between FDI and inequality is concerned FDI estimated coefficient value is positive and significant. The positive relationship between FDI and inequality indicates that inward FDI related with widening income inequality in developing countries. In fact, developed countries transferred new modern technologies to developing nations through FDI channel. Inflow of FDI, increase the demand and resultantly wage for skill workers, i.e. more wage disparity is expected (Lundqvist 2014). Secondly, FDI likewise increases the use of physical capital in previously labor-intensive production, thus creating unemployment among unskilled workers also create differences in earnings (Tsai 1995). Thirdly, the impact of FDI inflows on income depends upon the economic conditions of the country. To check the robustness of our results we used EHII income inequality data set from 1972-1997 for 18 developing[2] countries reported in table 5, we also find FDI has positive effect on income inequality. Our results support (Milanovic 2002; sylwester 2005) findings.

5. Conclusion and Policy Implications

The LR relationship between FDI and income inequality for 32 developing countries for the time period 1973-2014 has been analyzed by using panel cointegration technique. The FMOLS analysis results revealed that FDI is positively and significantly related with income inequality. According to the Feenstra-Hanson model (1997) in developing countries hosting FDI increases the demand for skilled labor. This signify a most important policy challenge for developing host countries, where education has been ignored and the ratio of skilled labor is low. In order to narrow down the gap between the demand and supply of sufficiently skilled labor, better schooling and improving the ability and qualification of the labor force must figure high on the policy agenda. "*This sequentially will allow for a smoother transition to a new technological paradigm*" (Aghion and Howitt 1998).

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Notes:

[1] individual series' means "the series of one variable for all countries"

[2] Bolivia, chilli, Ecuador, Egypt, India, Indonesia, Israel, Kenya, Kuwait, Malaysia, Malta, Mexico, phillpine, Singapore, turkey, Venezuela, Zimbabwe, Pakistan