

The effects of FDI inflows on income inequality: Evidence from OECD countries

Lufei Teng^① Qianwen Bi^②

Abstract: Income inequality is a concerned topic that attracts academia studies for many reasons. Among the long list of factors offered by scholars that contribute to income inequality, the impact of globalization has been extensively studied. This study uses a three-step analysis to examine the influence of Foreign Direct Investment (FDI) inflows on income distribution for Organization for Economic Cooperation (OECD) countries through panel data analysis techniques. FDI flows into OECD countries are generally driven by high skilled works. FDI inflows to OECD countries increase GINI coefficients and widen income gaps due to their skill-intensive nature. A high level of education should be encouraged as indicated by its negative relationship with the GINI index.

Keywords: Income inequality; Foreign Direct Investment (FDI); Organization for Economic Cooperation (OECD)

Introduction

Income inequality within a nation is a concern shared by both developed countries and developing countries. An individual's economic status can help or hinder one's way of life in areas such as educational opportunities and quality of health care. The concern of income inequality comes from its effects on disparity in human capital, health care and so on, which may further worsen income inequality. Decades of worldwide efforts have been devoted to breaking this vicious circle of inequality, aiming to establish a virtuous circle. Besides its harmful impact on social development, increasing income inequality can also negatively affect on long-term economic growth. Estimated by the Organization for Economic Cooperation and Development

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(OECD) (2015), the growing income inequality from 1985 to 2005 has dragged down cumulative growth by 4.7% between 1990 and 2010 across 19 OECD countries. World Development Report (2006) states that Africa and Latin America have the world's highest levels of inequality according to the income and expenditure Gini coefficients. Relatively lower inequality occurs in high-income countries.

There is a long list of factors offered by scholars that contribute to the income inequality issue. The list varies from institutional to economic levels and ranges from local to international scales. Among these concerns, the impact of globalization on income inequality has been extensively studied. As an essential part of the globalization process, the emergence of foreign direct investment (FDI) within the past few decades has attracted substantial notice, especially towards its effects on income distribution. To further the series of studies on this topic, this present paper uses an OECD country sample to examine 1) the effects of FDI inflows on income inequality and 2) how the effects are related with features of FDI inflows.

With diversified purposes and motivations, FDI inflows can be expected to have varied composition from area to area, which will further lead to different effects on income distribution. As illustrated in the work of Raveh and Reshef (2016), composition of capital directly affects the nature of income inequality. For instance, labor intensive FDI causes higher demand for less-skilled labor mostly in developing countries. Higher demand for labor tends to drive up the wage level correspondingly. Hence increases in the wage level of less-skilled laborers can result, and gaps between rich and poor will be narrowed. In contrast, FDI motivated by high-skilled workers more likely drives up the income of skilled workers and widen the gap. Therefore, it is important to determine the features and types of FDI inflows before examining the effects of FDI on income inequality. In addition, this information can provide policymakers with better political implications on how to optimize one country's FDI structure.

This study will focus on the effects of FDI inflows into OECD countries. No agreement has been achieved on how FDI affects income inequality. One of the factors that contribute to this controversial situation is the diversities in sample choices. The data sample can be selected according to geographical similarities (such as African countries, European countries, etc.) or economic conditions (such as developing country groups, developed country groups or mixed). As discussed above, the features of FDI brought to different areas vary from place to place. To avoid pooling countries with different types of FDI inflows together and in order to control heterogeneity problems, OECD countries are selected as the data sample in the following empirical study.

Another reason for the choice of OECD countries is that this country sample provides a real opportunity to study the effects of skill intensive FDI on income inequality with its abundance in a skilled labor force. As indicated by Figure 2.1, OECD countries (U.S. is included) had the highest level of labor costs from 2002 to 2012. Mexico, Brazil and China, three large developing countries, hold the cheaper labor resources. Hence cheap labor cost is definitely not an advantage

that can be offered by high income OECD countries. Specified by the OECD education report (2014), about 75% of adults from 25 to 64 have received at least an upper secondary education in high-income OECD countries. In 2012, it is reported that above 30% of adults aged 25-64 have attained tertiary education, compared to less than 10% of tertiary-educated adults in South Africa. With its unique advantage in high-skill labor resource and less missing values, the OECD country sample is expected to be able to offer significant results regarding the research questions.

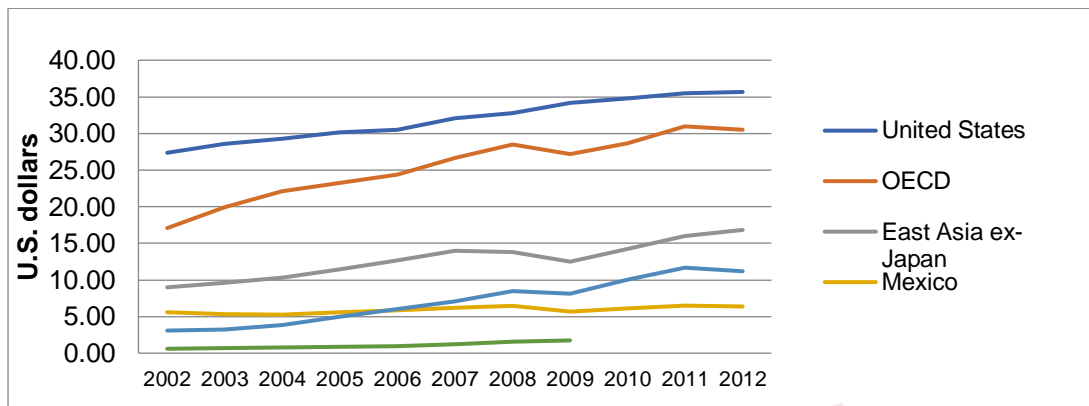


Figure 2.1 Hourly Compensation Costs in Manufacturing, 2002-2012

The purpose of the study is to examine how FDI inflows affect income inequality for OECD countries and how the effect is related with FDI features. This present study contributes to the current literature by 1) focusing on the data sample of OECD countries to avoid possible unclear results caused by heterogeneity problems, 2) examining the motivations and features of FDI inflows first, and then 3) connecting the features of FDI with its effects on income inequality.

Literature Review

Following the research questions, this section of the literature review focused on three fields of studies: FDI determinants, the effects of globalization on inequality, and the relationship between FDI and income inequality.

FDI Determinants

In essence, to study the features of FDI is to examine how FDI is determined. Summarized by Blonigen (2005), the literature on FDI determinants has evolved from partial equilibrium predictions to a general equilibrium framework.

The partial equilibrium framework mostly addresses how exogenous factors impact firm-level FDI decisions made by multinational enterprises (MNEs). Those factors summarized by Blonigen (2005) include exchange rates effects, taxes, trade protections and institutions.

Exchange rates effects are examined by a large body of studies. One group of studies assesses how the appreciation and depreciation of a given currency influences FDI flows. Froot and Stein (1991) conclude that the depreciation of domestic currency can increase FDI inflows by promoting foreign acquisitions. Blonigen (1997) further confirms this conclusion by using the sample of merger- and –acquisition FDI into the U.S. by Japanese companies. Another group of studies focuses on the effects of volatility of exchange rates on FDI decisions. By using the sample of 61 U.S. wholesale industries, Campa (1993) finds that the fluctuations of the exchange rate are negatively related to the number of foreign investments in these industries. In contrast, Goldberg and Kolstad (1994) believe that exchange rate volatility does not significantly affect investment shares when monetary shocks dominate exchange rate activity.

Tax rate is another firm-level factor that has been methodically examined. This literature is pioneered by Hartman (1984). The sensitivities to taxes of certain types of FDI is tested and the findings show that the effect of taxes on FDI is strong. A long list of studies on the effects of taxes has appeared since then. Most studies focused on corporate income taxes, but more recently they have begun to include other indirect taxes, such as, international tax treaties.

It is widely accepted by scholars that firms are more likely to pursue foreign production opportunities to avoid the costs of trade protection. Additionally, institutions are also key determinants, especially for underdeveloped host countries. It is hypothesized understandably that poor institutional conditions are negatively related to FDI inflows, which is proved by Wei (2000).

General equilibrium analysis of FDI decisions has become more prominent in recent studies. This analysis suggests three patterns of FDI activities: horizontal, vertical and export-platform FDI.

First, horizontal FDI exists when firms duplicate generally the same activities in multiple countries. Formally modeled in Markusen (1984), horizontal FDI is motivated by access to consumers and avoidance of the trade costs. Markusen (1984) suggests that R&D and marketing usually can concentrate in one location while the same innovation or R&D can be used and produced in multiple locations. This explains why multi-plant economies exist. Brainard (1993) finds that only around 13% percent of overseas production yielded by U.S. multinationals came back to the States and the remainder was mostly sold locally in the 1990s. Many U.S. multinationals are motivated by the desires to get closer access to foreign markets. Yeaple (2009) shows that more productive U.S. firms invest in a larger number of countries and generate larger sales revenue in the host countries rather than selling them back in the home country.

Second, vertical FDI exists when firms separate the production process and locate different production stages in different countries to minimize the cost. The motivation behind the vertical FDI is to get access to relatively cheap and abundant production factor endowments, such as labor or natural resources. The findings of Braconier, Norback and Urban (2005a) show that relative wage differences do effect FDI decisions. More investment is supplied in countries with

cheap and less-skilled labor, which supports the notion that vertical FDI does occur and is important to the host countries. Horizontal and vertical FDI are encompassed in the Knowledge-Capital model (KC model) in Markusen and Maskus's (2002) work. The KC model is further proved empirically by Braconier, Norback and Urban (2005b).

A third pattern is called export-platform FDI. Different from horizontal FDI, export-platform FDI is motivated by exports opportunities to markets other than host or home markets. Many studies, for example Bergstrand and Egger (2004), show the possibilities of export-platform FDI. The motivation of this kind of FDI is cheap trade cost and easy access countries other than host. Ekholm, Forslid and Markusen (2003) generate a model with three regions: two large high-cost economies and a small low-cost economy. They find that horizontal FDI takes place between large, similar countries, and vertical and export-platform FDI occur between a high-cost economy and a low-cost economy. Export-platform FDI arises when a high-cost economy has a plant in the low-cost economy to serve the other high-cost economy. More recent studies began to use spatial econometrics techniques to study the FDI location decision (for example, Blanc-Brude et al. (2014)).

The series study of general equilibrium framework offers both theoretical and empirical approaches to categorize FDI types. The implications of FDI patterns show how FDI flows are driven and motivated and they are important factors in determining the effects of FDI inflows on income distribution. Hence, in this study, independent variables will be chosen according to the general equilibrium framework.

Inward FDI and Income Inequality

The relationship between inward FDI and income inequality has been specifically and broadly studied yet remains a controversial topic. There has been no consistent and widely accepted theory or empirical evidence that confirms whether the relationship should be positive, negative or not relevant.

Tsai (1995) suggests that FDI is positively related with income inequality for developing countries, especially Asian countries. Basu and Guariglia (2007) employ a panel of 119 developing countries over the years 1970 to 1999 to find a positive association between FDI and human capital inequality. Choi (2006) finds that income inequality increases as FDI stocks increase by using pooled Gini coefficient data for 100 countries. Figini and Gorg (2006) analyze the effects of FDI on wage inequality for both developing countries and developed countries. The results indicate that wage inequality increases with FDI for developing countries and decreases with FDI for advanced host countries. Jaumotte, Lall, and Pagageorgiou (2008) find that FDI is associated with an increase in inequality.

Im and McLaren (2015) introduce an instrumental variable approach and demonstrate that FDI helps to reduce inequality. By using a sample of 18 transition countries over the period 1990-2006, Franco and Gerussi (2013) concludes that FDI is not relevant in affecting income

inequality. Panizza (2002) conducts fixed effects and GMM estimation from American data and suggests that there is no significant relationship between FDI and income inequality. Chintrakarn, Herzer and Nunnenkamp (2012) find that inward FDI has a significant negative effect on income inequality in the United States by applying panel co-integration techniques. Herzer and Nunnenkamp (2012) perform panel co-integration and causality techniques to explore the relationship between FDI and income inequality for a sample ten European countries over the period of 1980-2000. They conclude that the short-run effect of FDI on income inequality is positive and the long-run effect is negative on average.

There are some possible explanations for these ambiguous conclusions: diverse data samples are applied and FDI has different effects on different country groups; varied empirical analysis approaches are applied with different underlying assumptions. The explanations from the previous studies for their conclusions are based on time horizons, geographic factors, or developing stages. This present study tries to explain this issue from the perspective of FDI features.

Hypothesis

OECD countries constitute those with the highest economic development and openness levels in the world. Compared to other endowments, such as natural resources, potential market, and cheap input prices, one of the biggest advantages for OECD countries to attract foreign capital is their abundant skilled labor resource. As discussed above, OECD countries have the highest average education level and labor costs. Before studying how FDI affects income inequality, one should first address what factors attract FDI flow into OECD countries and what features of the FDI flows are.

The first hypothesis is that FDI inflows to OECD countries are positively associated with their skilled labor resources. The second hypothesis is that FDI inflows to OECD drive up income inequality. This hypothesis assumes that FDI into OECD countries is driven by skilled labor resources and is based on related previous theoretical work as follows:

First, Raveh and Reshef (2014) investigate how the composition of capital imports affects relative demand for skill and the skill premium by using a sample of developing countries. It is indicated that imports of R&D-intensive capital equipment will raise the skill premium, and that less R&D-intensive capital equipment will reduce the skill premium. R&D-intensive capital and skilled labor being complementary to each other provides the explanation for how trades will affect inequality. For example, developing countries tend to attract less R&D-intensive investment due to cheap labor costs. Marginal product of labor will increase faster than marginal capital by attracting labor-intensive FDI; the income gap between labor suppliers and capital owners may be narrowed in this case. This is the first study that theoretically addresses how the compositions of foreign capital affect income distribution. Previous literature about the effects of R&D-intensive FDI on income inequality specifically is fairly limited, partially because of

the limitations of data availability regarding R&D intensive FDI. Instead of deconstructing FDI, this empirical study will assess whether FDI is skill-intensive or not; it is expected that skill intensive FDI increases the income gap between skilled and unskilled workers.

Second, Initial human capital distribution is significant when discussing the effects of foreign capital on inequality. In their theoretical analysis, Basu and Guariglia (2007) suggest that countries with low initial human capital may find it difficult to catch up with the technologies induced by FDI inflows. In the short term, FDI promotes human capital inequality. In the long term, the poor may eventually gain access to the new technologies and catch up with the rich. Hence, it is concluded that the relationship between FDI and inequality may vary during transitional periods, depending on the initial human capital distributions.

Third, as indicated in Im and McLaren (2015), whether inward FDI is more skill intensive compared to domestic industries also matters. Suppose the ratio of skilled to unskilled worker is S^D for domestic industries and S^F for foreign capital. If $S^D < S^F$, the sectors with foreign capital begin to compete with domestic sectors for skilled workers. To restore the labor market equilibrium, the relative wage ratio of skilled to unskilled workers will increase and wage inequality is exacerbated. By contrast, if $S^F < S^D$, inequality is reduced. The conclusions of these studies further prove the necessity of assessing input endowments of host countries before addressing FDI's effects on inequality.

Data

Our estimation sample utilizes annual data for OECD countries from 2004 to 2012. The heterogeneity problem can be better controlled by the application of the data sample with geographic and economic similarities. As shown above, the labor force of OECD countries is featured for its high level of education and expensive compensation cost. Hence, OECD countries are an appropriate sample examined to justify how FDI inflows are driven by skilled labor resources and their effects on income distribution. There are 34 OECD countries. Six countries are deleted from the sample due to their missing value problems. Most countries in the study sample are European developed countries. A listing of countries can be found in Table 2.1.

Table 2.1 Country List

Country Name	Country Name
Austria	Belgium
Canada	Chile
Czech Republic	Denmark
Estonia	Finland
France	Germany
Greece	Hungary
Iceland	Ireland

(续表)

Israel	Italy
Luxembourg	Netherlands
Norway	Poland
Portugal	Slovak Republic
Slovenia	Spain
Sweden	Switzerland
United Kingdom	United States

This study uses the Gini index estimated by the World Bank as a dependent variable to measure income inequality. The Gini index is calculated based on the Lorenz curve, which describes the relationship between aggregate share of total wealth and cumulative fraction of population. The index of zero means perfect equality. Higher values of the index indicate higher levels of inequality.

In OECD countries, the total income of the richest 10% of the population is 9.6 times that of the poorest 10%. This ratio was about 7:1 in the 1980s and rose to 8:1 in the 1990s and 9:1 in the 2000s. The growing gap between the rich and the poor has been explained by many factors summarized by two main categories: the evolution into globalization and rapid technological progress (OECD, 2015). These processes create more demand for high-skilled workers and usually reward high-skilled workers more than low skilled workers. To reflect the two main categories, the indicators for skilled labor force (SKILL), FDI inflows (FDI) and international trade (OPENNESS) are introduced as independent variables.

In addition, to estimate how FDI inflows affect income distribution, the empirical study model includes several control variables which are known in previous related studies (Basu and Guariglia, 2007 and Im and McLaren, 2015). They are the GDP growth rate (GDPGR), the fraction of international trade in GDP (OPENNESS), population growth rate (POP) and the fraction of gross capital formation in GDP (CAP). Data of all these variables are extracted from the World Bank's World Development Indicator (WDI) database 2.

Table 2.2 below presents the descriptive statistics results of all the variables that are included in our models. The value of 31 for the GINI coefficient on average shows the relatively low level of inequality compared to the rest of the world and the narrow standard deviation shows that OECD countries have very similar income inequality levels and have remained relatively stable through the years.

In order to control the size, FDI is calculated by the fraction of FDI net inflow in GDP. On average, FDI net inflow counts for 7% of the total GDP, but the 15% standard deviation indicates the relatively high degree of variation across countries and through the years. The 2007-2008 financial crisis caused great contractions in terms of economic growth and international activities.

OECD countries were affected the most by this crisis, with a dramatic decrease in total income and an increase in unemployment. Slow recoveries from the recession were seen after 2009.

Nearly 30% of the total labor force across OECD countries holds tertiary education, representing a very high education level from a global perspective. Normally, high economic development levels are associated with high levels of education, with more public resources devoted into education improvement. Research and development is more highly encouraged and intellectual property is better protected in developed countries. Along these lines, the higher level of education is rewarded by both market and institutional systems. People are encouraged to pursue more education to seek better opportunities.

The average GDP growth rate is around 1.8% with around 4% standard deviation. The average economic growth rate is around 4% for African countries since the mid-1990s and around 7% for the largest developing countries, such as China, Brazil and India, over the last decade. However, for developed countries, a slow but stable growth rate is currently prevailing. A two percent growth rate can represent the typical economic development trend for most developed countries. A relatively high level standard deviation can be partially explained by the economic fluctuations caused by the 2007-2008 financial crisis.

OECD countries emphasize regional corporations and actively participate in international activities. The size of total trade is around 102% of GDP, which means exports and imports together are greater than the total production on average. The economies rely heavily on international trade.

Gross capital formation (CAP) measures the size of fixed assets and net changes in inventories. It is associated with FDI inflows by reflecting one country's infrastructure levels and production conditions. On average, up to 23% of GDP constitutes the fixed assets foundations with low deviations across OECD countries.

OECD countries have the lowest average population growth rate (0.62%) in the world. Negative growth can even be seen in many developed countries, such as Germany. GDP per capita is calculated by total GDP divided by population and reflects a given country's standard of living. OECD countries represent the highest level of standard of living with their substantial GDP foundation and low population growth rate.

Table 2.2. Summary Statistics

Name	Description	Number of observations	Mean	Standard deviation	Min	Max
<i>GINI_{it}</i>	Indicator of income inequality	221	31.35	4.42	23.72	52
<i>FDI_{it}</i>	Foreign direct investment net inflows (% of GDP)	252	7.23	15.25	-58.98	142.26
<i>SKILL_{it}</i>	Labor Force with tertiary education (% of Total)	238	28.53	8.3	13.1	50.6
<i>GDPGR_{it}</i>	GDP growth rate (%)	252	1.89	3.56	-14.74	10.83
<i>OPENNESS_{it}</i>	Trade (% of GDP)	252	101.62	57.25	24.29	348.39
<i>CAP_{it}</i>	Gross capital formation (% of GDP)	252	23.08	4.14	12.80	39.35
<i>POP_{it}</i>	Population growth (%)	252	0.62	-0.67	-1.69	2.89

Empirical Model

Panel data analysis techniques, Generalized Method of Moments (GMM) estimation, fixed effects model, random effects model, and pooled OLS, have been widely used in most recent studies on this subject. Efficiencies of the results generated from different models are based on how the underlying assumptions are satisfied and should be assessed by test results accordingly.

In this empirical analysis, to prove the two proposed hypotheses, the estimation process follows three steps. As illustrated by Figure 2.2, the first step addresses the relationship between FDI inflows and high skilled labor endowments to determine the features of FDI inflows in OECD countries. The second step is to decide how FDI is related to the GINI index. The third step describes the role of skilled labor endowments in effects of FDI inflows on income inequality.

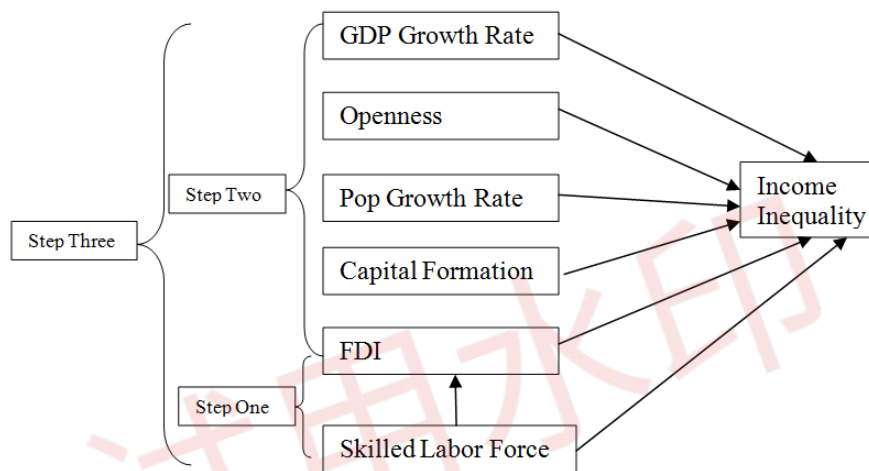


Figure 2.3 Empirical Model

The first step is designed to explore the motivations of FDI inflows to OECD countries and prove that the FDI inflows of OECD countries are skill intensive. In other words, the FDI inflows are driven by skilled workers or higher levels of human capital. Therefore, FDI inflow (FDI) is the dependent variable and the skilled labor force (SKILL) is used to measure human capital and constitutes the most important independent variable.

As illustrated in the literature review, FDI determinants are very exclusive and complicated. Basically, they can be summarized into three categories based on the general equilibrium model: 1) Access to local market (horizontal FDI). GDP growth rate (GDPGR) is introduced as one of the control variables to reflect the local market potential. GDP is equal to the total expenditures of the whole economy. Its growth rate predicts a market's potential spending ability. 2) Access to production input resources (vertical FDI). This determinant is reflected by the variable of gross capital formation (CAP) in the model. A country's capital formation is directly associated with its physical capital and production conditions, such as factories, machinery, and facilities. These inputs could be attractive factors for FDI inflows. 3) Access to the third markets (export-platform FDI).

The ratio of total international trade to GDP (OPENNESS) is used to measure a country's ability to reach third markets in the model. A platform with great openness indicates its ability to sell products not only in domestic markets but also in foreign markets, which could also attract FDI inflows. To summarize, the first step produces a regression to examine how FDI is motivated by skilled workers with GDP growth rate, capital formation and openness as control variables. It is expected that FDI inflow and share of skilled labor force is positively related. The equation is established as

(2.1)

The second step is to explore the relationship between FDI and income inequality measured by the GINI coefficient (GINI). It is expected that they are positively related due to the skill-intensive nature of the FDI inflows. The control variables used here are found in previous studies (Basu and Guariglia, 2007 and Im and McLaren, 2015). The regression equation is estimated as follows:

$$GINI_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 GDPGR_{it} + \beta_3 OPENNESS_{it} + \beta_4 CAP_{it} + \beta_5 POP_{it} + \mu_i + \varepsilon_{it} \quad (2.2)$$

Equation (2.2) will provide the empirical results that can show the relationship between FDI inflows and the GINI index. The third step is expected to provide further explanations on this relationship. Also, it may present an endogenous problem if FDI is significantly related with the variable of SKILL from equation (2.1). Therefore, the skilled labor force (SKILL) is added and an interaction term between FDI and SKILL is created in the third step. Adding the interaction term is expected to demonstrate how the interactions between FDI and the human capital factor affect income inequality. The third step equation is derived as follows:

$$GINI_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 GDPGR_{it} + \beta_3 OPENNESS_{it} + \beta_4 CAP_{it} + \beta_5 POP_{it} + \beta_6 SKILL_{it} + \beta_7 (FDI * SKILL)_{it} + \mu_i + \varepsilon_{it} \quad (2.3)$$

In the three above equations, i denotes countries and t denotes time. μ_i is the unobservable individual effect of country i and v_{it} is the remainder disturbance. The reason to include μ_i is because every country is different from each other in terms of their own geographic, demographic, and institutional characters; it is not possible to consider all in empirical studies. The necessity of including this term will be further addressed through the F-test in the following section.

Note that β_1 has different interpretations from equation (2.2) to equation (2.3). In equation (2.2), β_1 reflects the comprehensive effects of FDI on inequality as follows:

$$\frac{\partial GINI_{it}}{\partial FDI_{it}} = \beta_1 \quad (2.4)$$

In equation (2.3), β_1 is interpreted as the effects of FDI on inequality with the effects of skilled labor force included. As shown in equation (2.5), β_1 can be either positive or negative. While β_7 is expected to be positive, FDI inflows drive up the inequality through the skill level.

$$\frac{\partial GINI_{it}}{\partial FDI_{it}} = \beta_1 + \beta_7 SKILL_{it} \quad (2.5)$$

Different from regular time-series regressions or cross-section regressions, the double subscripts indicate that panel data regression should be applied. The fixed effects method is conducted through the analysis. The F-test results show that unobservable specific effects exist across countries and should be included in the panel data analysis. In addition, according to the Hausman test results, specific country effects are related with the regressors. Therefore, compared to the random effects model and pooled OLS model, the fixed effects model is more reliable.

This section shows how the appropriate model is chosen according to the test results; empirical results are presented in three-step order.

Step One Results

The results derived from equation (2.1) are reported in Table 2.3. According to the test results, the fixed effects model is more reliable. Two conclusions can be drawn from the fixed effects results. First, FDI inflows in OECD countries are attracted by their highly educated workers. FDI inflow is significantly and positively related with the portion of labor force with tertiary education. The coefficient of 0.99 indicates that the share of skilled labor and FDI/GDP ratio move together proportionally. More FDI will be attracted into countries with a growing number of skilled workers. Rather than pursuing a cheap less-skilled labor force, FDI inflows to OECD countries will more likely go to R&D intensive sectors. The first hypothesis is proved. Second, capital formation is also positively related to foreign investment inflows. Similar to domestic investment, capital formation reflects the physical foundations and production conditions of a country. The higher the level of fixed assets a country has, the more the FDI inflows are attracted.

It is generally concluded that most FDI inflows to OECD countries can be categorized as vertical FDI, as they are motivated by production factors such as skilled workers and fixed assets resources, rather than access to local and foreign markets. This is consistent with the conclusions of Ekholm, Forslid and Markusen (2003): horizontal FDI are likely to ensue among similar economies while vertical FDI likely occur among diversified economies. World Investment Report (2015) states that around 32% of the mergers and acquisitions by Multinational Enterprises (MNEs) from developing countries in 2014 targeted developed countries in 2014. Indicated by the results, the endowments of highly skilled workers and physical capital are the production factors that those investments pursue. Hence, the FDI inflows to OECD countries can be defined as skill-intensive FDI.

Table 2.3

Dependent Variable: FDI	
Variable	Fixed Effects
SKILL it	0.99** [0.49]
GDPGR it	-0.18 [0.35]
OPENNESS it	0.06 [0.11]
CAP it	0.9** [0.38]
Number of observations	238
	Prob>F=0.0387
R-square	within=0.0476 between=0.2051 overall=0.0940
Note: *p<0.05, **p<0.01, ***p<0.001	

Step Two Results

Step two is intended to establish whether skill-intensive FDI into OECD countries increases income inequality with its demand for highly skilled workers. A positive relationship between the GINI index, the dependent variable, and FDI is expected. The results of fixed effects analysis presented in Table 2.4 are consistent with this expectation. FDI inflow has a significantly positive relationship with the GINI index. Higher levels of FDI inflows are expected to drive up the income inequality for OECD countries. To explain the reasons for this, the nature of the FDI inflows must be carefully considered. Addressed in the step one results, it is suggested that FDI inflows to OECD countries stem from the desire for highly educated and highly skilled workers, whose wage levels already tend to be higher than those of unskilled laborers, widening the income gap. This result is consistent with the findings of Raveh and Reshef (2014) and the second hypothesis is also proved. However, how the effects of FDI are related with its nature is not explained by the regression (2.2) and will be further discussed in step three.

Openness is negatively related to GINI, which means it is a positive factor that can narrow income gaps. As discussed in the literature review, the effects of globalization on income distribution have been a subject of interest and widely studied for years. But no agreement has been achieved. The process of globalization includes both international trade indicated by openness and international finance indicated by FDI in our model. According to this step's findings, the effects of international trade and finance on income disparity head in different directions. Hence, to study the effects of globalization, it is also important to include the whole picture of international interactions. As with openness, population growth eases the inequality. The effects of population size could be very small due to the low population growth rate cross OECD countries. It is also found that GDP growth rate and capital formation are not significantly related with income inequality.

Table 2.4

Dependent Variable: GINI	
Variable	Fixed Effect
FDI _{it}	0.01** [0.006]
GDPGR _{it}	0.04 [0.03]
OPENNESS _{it}	-0.02** [0.01]
CAP _{it}	0.01 [0.04]
POP _{it}	-0.59* [0.31]
Number of observations	221
	Prob>F=0.0240
R-square	within=0.0660 between=0.0477 overall=0.0429
Note: *p<0.05, **p<0.01, ***p<0.001	

Step Three Results

In step two, the indicator of skilled labor force is not included, which may lead to a problem of endogeneity, especially when it is proved that FDI inflows are highly related to skilled labor force resources. Hence, the skilled labor variable is included in equation (2.3), and an interaction term between FDI inflows and skilled labor force is also added, which can extend the analysis and further access the hypothesis.

Presented in Table 2.5, the coefficient (β_1) of FDI inflows changes its sign from positive to negative but remains significant. Note that after adding an interaction term, the interpretation of the coefficient is changed. The coefficient β_1 in equation (2.2) is interpreted as comprehensive effects of FDI inflows on the GINI index. The new coefficient β_1 generated by equation (2.3) measures the effect of FDI inflows on the GINI index when the variable SKILL is equal to zero. In other words, the FDI inflows that are not driven by skilled workers tend to ease income inequality. Demand of this kind of FDI is inclined toward less-skilled workers, which will increase the wage level of the low-income group.

The total effects of FDI are represented by the term: $\beta_1 + \beta_7 \text{SKILL}_{it}$. The coefficient of the interaction term β_7 is significantly positive, which means the effects of FDI on income inequality are positive through its demand for skilled workers. This conclusion is also consistent with the expectations of both the H-O model and the Kremer and Maskin (2005) model. Due to the skill-intensive nature of labor needs, expansion of FDI in developed countries broadens the income gap. Due to the limitations of available data, it is hard to deconstruct the FDI according to whether it is skill intensive or not. However, the results here indirectly prove that whether or not it is skill intensive matters when examining the effects of FDI on the disparity in income.

The portion of skilled labor force is negatively related income inequality. The bigger the skilled labor force share, the less is the income disparity. People with lower economic status face fewer opportunities and more limited social resources. Pushing higher education creates more opportunities and a more competitive environment for lower income people. It follows that education equality leads to income equality.

Table 2.5

Dependent Variable: GINI	
Variable	Fixed Effect
<i>FDI_{it}</i>	-0.07** [0.03]
<i>GDPGR_{it}</i>	0.03 [0.03]
<i>OPENNESS_{it}</i>	-0.00 [0.01]
<i>CAP_{it}</i>	-0.01 [0.04]
<i>POP_{it}</i>	-0.61* [0.31]
<i>SKI_{it}</i>	-0.17*** [0.05]
<i>(SKI*FDI)_{it}</i>	0.002** [0.00]
Number of observations	217
	Prob>F=0.0002
	within=0.1394
R-square	between=0.0072 overall=0.0016

Conclusion

This paper examines the influence of FDI inflows on income distribution for OECD countries through panel data analysis techniques. It follows a three-step analysis. 1) Explore the features of FDI inflows to OECD countries. 2) Examine the relationship between FDI inflows and income inequality. 3) Connect the features of FDI with its effects on income equality. By applying the fixed effects model and following the three steps' analysis, several conclusions are summarized as follows:

First, FDI flows into OECD countries are skill-intensive and driven by input factors. Significant relationships are found between FDI inflows and skilled labor resources, as well as FDI inflows and capital formation. Highly educated labor resources and a higher level of fixed assets promote FDI inflows. This indicates the vertical FDI exists in developed countries, because their advanced input endowments, such as R&D resources, educated labor, and developed physical capital, are attractive factors for foreign investment from developing countries.

Second, FDI inflows to OECD countries increase GINI coefficients and widen income gaps due to their skill-intensive nature. Consistent with the previous theoretical results, the results of the empirical study show that skill-intensive FDI inflows increase income inequality due to their greater

demand for skilled workers. This finding is further verified by adding an interaction term between FDI and skilled labor into the empirical model.

Third, a high level of education should be encouraged as indicated by its negative relationship with the GINI index. A larger percentage of highly skilled workers narrows the income gap by offering more opportunities for people with lower economic status. Although FDI inflows attracted by the high-skilled worker resources negatively influence income inequality, the effects could be offset by the positive impact of an emphasis on higher education.

Further studies on the topic can consider including diversified data samples such as developing country samples from Africa, Asia or Latin America. By including more country samples, more types of FDI can be examined, such as natural resource intensive FDI, labor intensive FDI and so on. The effects of foreign capital on income distribution can also possibly be influenced by a host country's institution, an area that has not been much studied. For example, foreign investment can be motivated by access to natural resources. More unskilled labors than highly skilled laborers will be employed for mining. However, in terms of a country's institution, scarce resources can be processed by people with certain political or economic powers. The economic benefits derived from this situation may lead to a wider gap between different income groups.

Globalization has raised considerable debates about its effects on income distribution. The effects of FDI on income distribution particularly have been widely studied widely. Several practical policy implications have been generated. The main concern behind this field of literature is to achieve a balance between economic growth and social welfare maximization. It is hoped that the benefits of international trade and finance can be shared broadly across countries and social groups, and not only confined to a certain group of people or countries.

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