Does Foreign Direct Investment Raise Income Inequality in Developing Countries? A New Instrumental Variables Approach*

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Abstract

We investigate the effects of inward FDI on income distribution and the poverty rate in developing countries using panel data. We address the problem of endogenous FDI through time-varying instruments based on shocks to the attractiveness of investment in neighboring countries as well as oil discoveries in the host country. Without

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instruments, FDI appears to have no effect on income inequality and a small positive effect on poverty, but with the instruments, in contrast to previous findings, we find that FDI helps decrease both inequality and the poverty rate in the host country.

1 Introduction

Can encouraging FDI into a developing economy fight poverty? Although it is difficult to imagine a more important question for development policy, a clear answer is elusive. Economists have devoted much more attention to the effects of FDI on productivity (see Javorcik (2004), for example), but that is a different question, because if the pie grows but the share of the poorest in that pie falls there is no assurance that they will benefit. Therefore, research that targets the effect of FDI on income inequality is needed. There is a literature on this question, but as we will note below, it is plagued by endogeneity problems.

The question continues to be politically charged, as illustrated by recent events in India. Two decades of liberalization including opening most sectors to FDI were accompanied by a surge of growth that has since stalled, and some commentators have expressed worry about the emergence of 'two Indias,' with a mostly rural impoverished majority left behind by economic progress (Kotwal et al, 2011, p. 1196). Voters became disillusioned with reform, and 'the climate turned positively

hostile for foreign investment'[1] giving an advantage to the opposition BJP party, which in 2014 won a majority in the parliament by running on a populist message, complaining about the government's 'blood sucking policies' that had 'made the poor poorer',[2] and specifically promising to halt the proposed opening up of the retail sector to FDI.

This paper addresses the effects of FDI on inequality and poverty in developing countries directly, zeroing in on the endogeneity of FDI with a novel set of instrumental variables based on large-scale oil discoveries in the host country; shocks to neighboring countries (natural disasters and civil conflict); and the stock of FDI in neighboring countries. These instruments vary not only across countries but also over time, permitting us to examine the causal effects of FDI in a panel setting. We use these in different combinations and check on the exogeneity of the instruments and address concerns about weak instruments. To anticipate results, we find that before correcting for endogeneity, FDI has no significant association with inequality and a modest positive association with poverty rates. After correcting for endogeneity, FDI has a strong negative association with inequality and poverty, significantly raising the income share of the second and third quintiles and lowering the income share of the top quintile. This supports an optimistic view that encouraging inward FDI can be a powerful anti-poverty tool.

Before turning to our approach in detail, we review some of the

[1] Joshi (2014).
[2] *New Indian Express* (January 24, 2014)

main theoretical ideas and existing literature. In Section 2, we explain the empirical model along with instruments and describe identification strategy in instrument estimation and data. We discuss the results on income inequality and poverty and present a series of robustness checks in Section 3 and conclude in Section 4.

1.1 Theoretical ideas.

There are many reasons inward FDI could increase income inequality and many reasons it could have the opposite effect. Here we mention three different mechanisms as examples.

(i) *Inward FDI could compete with domestic capital for domestic workers, pushing down the income of domestic capitalists and raising the incomes of domestic workers.* This is the idea behind the political argument of Pandya (2014) that the median voter should typically be in favor of policies to welcome FDI. One simple model in which this outcome emerges is as follows. Home is a small open economy with multiple industries, each producing some tradable output by combining labor and capital with constant returns to scale. The capital for each industry is sector-specific, meaning that it can be used only for that industry, and it is available in a fixed amount. There is an exogenous supply of homogeneous workers, who can switch from one industry to another costlessly. Each citizen has one unit of labor, but some in addition own some capital, creating income inequality. An increase in inward FDI to any of the industries raises the marginal

product of labor in that industry, raising aggregate labor demand and the equilibrium wage. This decreases income per unit of capital in each industry (since output prices are determined on world markets and remain unchanged). As a result, incomes of low-income citizens (who have only labor income) rise proportionally more than the incomes of higher-income citizens (who receive income gains on their labor but income reductions on their capital). In this model, inward FDI unambiguously reduces income inequality.

(ii) *Inward FDI could shift the mix of tasks performed in the economy in the direction of increased skill intensity.* This mechanism is developed in detail in Feenstra and Hanson (1996) (a similar story with a slightly different mechanism emerges in Zhu and Trefler (2005); and Raveh and Reshef (2014)). In that model, there is one manufactured good that requires a continuum of inputs to produce. Each input requires high-skilled labor, low-skilled labor and capital to produce, and can be produced either in North or in South. Each country has an exogenous endowment of all three factors, and the ratio of high-skilled to low-skilled labor is higher in North. The inputs differ in the ratio of high-skilled and low-skilled labor required to produce them.

In equilibrium, the ratio of high-skilled to low-skilled wages is higher in South, so it is more expensive to produce very skilled-labor intensive inputs in the South than in the North, and *vice versa* for very low-skilled-labor intensive inputs. Therefore, there is a cutoff input such that inputs that are more skilled-labor-intensive than the

cutoff are produced in North and less skilled-labor-intensive inputs are produced in South. Now, if FDI transfers some capital from North to South, the cutoff input changes: The increased productivity of Southern labor expands the range of inputs produced in the South, so that the new cutoff is more skill-labor intensive than the old one. Consequently, the least skilled-labor intensive inputs that had previously been produced in North are now produced in South, where they become the most skilled-labor intensive inputs produced in South. As a result, the relative demand for skilled labor goes up in both countries, increasing wage inequality.

The result is that in this model, inward FDI reduces the income of South's capitalists, which in and of itself lowers inequality; but it increases wage inequality, which pushes in the other direction.

(iii) *Inward FDI could be more or less skill intensive than domestic businesses in its own demand for labor.* Consider the following illustrative model. Home is a small open economy, with a range of industries, each producing a traded good combining skilled and unskilled labor with constant returns to scale. To keep the argument as simple as possible, suppose that all of these industries have the same production function.[3] In addition, there is a sector that requires foreign capital to produce, in combination with both kinds of labor. Think,

[3]This is not essential to make the point. If different industries differ in their skilled-labor intensities, then analyzing labor demand is complicated by the fact that the mix of products produced will be endogenous, as varying the skilled-wage-to-unskilled-wage ratio will move the economy from one cone of specialization to another. But this is only a complication and does not affect the main point under discussion.

for example, of an oil field that requires foreign technology to exploit, or an assembly operation that will use foreign machines plus local labor to produce products for export. For simplicity, suppose that the foreign-capital-using sector uses skilled workers in a fixed ratio, S^F, to unskilled, and that all capital is foreign-owned.

Suppose that initially there is no foreign capital at all, and the economy's exogenous ratio of skilled to unskilled labor is $\bar{S}$. Now, allow a small amount of inward FDI, so that the foreign-capital-using sector begins hiring local workers, S^F skilled workers for each unskilled worker. If $S^F > \bar{S}$, the labor left over for the domestic industries has a lower ratio of skilled to unskilled workers than $\bar{S}$, and so the skilled-to-unskilled wage ratio must rise to induce domestic employers to substitute toward unskilled workers and restore labor-market clearing. The result is a rise in wage inequality (which in this illustrative model is also a rise in overall inequality). In this case, FDI reduces the absolute wages of the unskilled workers as well, since in each domestic firm the ratio of skilled to unskilled workers, and hence the marginal product of unskilled labor, will fall. If $S^F < \bar{S}$, inequality is reduced, and real incomes of unskilled workers are increased, due to FDI, following the same logic.

The former case could be quite plausible in the case of extractive industries; perhaps a new oil well will require 1 engineer, 1 supervisor, and 20 manual workers; but if the typical domestic employer has 1 supervisor for 100 manual workers, the oil well removes from

the domestic economy skilled workers who would normally employ 200 manual workers, while providing new jobs in the foreign-capital-using sector for only 20 of them. The resulting net decrease in unskilled labor demand requires a drop in unskilled wages to restore equilibrium. The opposite outcome is more likely for an assembly operation, where the skilled-unskilled ratio might be comparable to or even below the domestic-sector average.

These three examples are by no means exhaustive. Indeed, there is now a rich theoretical literature on the relationship between trade and inequality (Harrison, McLaren and McMillan, 2011), and any one of those models would have its own implications for the effect of FDI on inequality. These examples merely illustrate the point that there can be no theoretical presumption regarding whether inward FDI will raise or lower income inequality, whether it will raise or lower the real incomes of low-skilled workers, or whether it will raise or lower poverty rates. Only empirical enquiry can answer these questions.

1.2 Literature review

There are several studies that have investigated the effects of FDI on income inequality. Since they differ greatly in the coverage of countries, measures and data sources for inequality, and methodology, comparing or summarizing their results is not straightforward. Nevertheless, most studies tend to suggest that FDI increases inequality.

Tsai (1995) finds that FDI increases inequality, measured by the

Gini coefficient, for developing countries during the 1970s, particularly so for Asian countries. Basu and Guariglia (2007) use a panel of 119 developing countries for 1970-1999 focusing on educational inequality and find that FDI raises human capital inequality. Jaumotte et al (2008) use panel data of the Gini index and the income shares of the population of 51 advanced and developing countries for 1981-2003. They find that technological progress has a greater positive effect on inequality than globalization and that whereas trade globalization is associated with a reduction in inequality, financial globalization, FDI in particular, is associated with an increase.

Raveh and Reshef (2014) examine the effects of capital imports on the skill premium in wage data for a wide panel of countries, using changes in unit prices of different types of capital as instruments. They find that the *composition* of capital imports is more important than the *quantity* of capital imports, with more R&D intensive capital imports promoting increased skilled-wage premia. Our question is different because capital imports are different from FDI, which often involves acquisition of existing capital assets or building new ones in addition to importing them (and of course capital imports may be on behalf of domestic firms as well as foreign-owned entities). It would be of great interest to investigate the differential effect of R&D intensive FDI in our study, but unfortunately we cannot do so with our data.

Franco and Gerussi (2013) use a sample of 17 European transitional countries for 1990-2006 and find that the effects of FDI on the Gini

coefficients in these countries are statistically insignificant. Herzer and Nunnenkamp (2013) use an estimated household income inequality Gini index for 8 European countries over the period from 1980 to 2000 and employ panel cointegration methodology. They find that both inward and outward FDI, on average, reduce inequality in the long run. However, they find that there are large cross-country differences in the long-run effects; for instance, in the case of inward FDI, FDI raises inequality for Spain, the poorest country in the sample, while FDI reduces it for Finland, the Netherlands, and Sweden.

Surprisingly, studies on the effects of FDI on poverty are very scarce. Klein et al (2001) argue that beyond leading to economic growth, FDI has positive effects on poverty reduction by reducing adverse financial shocks to the poor as during the Asian crisis, helping improve environmental and labor standards, and broadening tax bases that would increase a safety net for the poor. Although they find that there is no direct link between FDI and poverty alleviation for a sample of 26 developed and developing countries, Jalilian and Weiss (2002) find that FDI in five ASEAN countries is poverty reducing. They attribute this positive effect to labor training and direct employment of the poor offered by multinational enterprises (MNEs). Mold (2004), however, contends that FDI can influence poverty rate in either direction but that FDI is an unattractive instrument for poverty reduction per se. One reason that he proposes is that FDI may entail mergers and acquisitions and privatization in monopolistic markets such

as electricity, telecommunications, water, post, railways and energy, both of which would result in a more unequal income distribution.

A major problem with this line of research is the endogeneity of FDI. Any shock to an economy is likely to have an effect on FDI, and if the shock also has an effect on income inequality, then treating FDI as an exogenous variable will lead to biased estimates of its effects. For example, if a political party takes power that is committed to a 'pro-business' agenda that includes weaker environmental and labor regulation, restrictions on union formation and collective bargaining, as well as lower corporate income taxes, the result could be both a surge in inward FDI and a rise in inequality. This would result in a spurious positive correlation between FDI and inequality. On the other hand, a government revenue windfall that is partly spent on upgrading public schools and a boom in hiring teachers could, after several years, both lower inequality and result in a rise in inward FDI to take advantage of the better-educated workforce. This would result in a spurious negative correlation between FDI and inequality. This endogeneity issue has been ignored in most of the studies to date.[4]

The main contribution of this paper can be summarized as follows. First, we take endogeneity issue of FDI into account by introducing some novel instruments that have a strong claim to exogeneity. We show that these instruments have a powerful effect on the results,

[4]One exception is Jaumotte et al (2008). They also use instrumental variables, but their instruments, such as the lagged value of endogenous variables and a distance-weighted sum of industrial countries' FDI assets, are rather *ad hoc*.

revealing an apparent positive bias in the existing estimates of the relationship between FDI and inequality. Second, compared with the past studies, we employ the most comprehensive and reliable datasets on FDI and income distribution with the vast coverage of countries and time series under investigation.

2 Empirical Methodologies

2.1 Empirical Model

We propose the following country-fixed effects model:

$$y_{it} = \alpha + \beta_1 FDI_{it} + \mathbf{x}'_{it}\boldsymbol{\beta} + \mu_i + \xi_t + \varepsilon_{it}, \tag{1}$$

where i indicates a country and t time; y_{it} is an outcome variable that will take the form of either income inequality or the poverty rate; FDI_{it} is the ratio of the stock of FDI to GDP times 100; $\mathbf{x}'_{it}$ is the row vector of control variables; μ_i is a country fixed effect, ξ_t is a year effect, and ε_{it} a random variable.

One major concern with equation (1) is that our key variable, FDI, is likely to be endogenous in the following reasons. First, FDI can be considered to be an outcome variable rather than an exogenous variable. Second, the decision of a multinational firm to invest in a country is unlikely to be entirely random. To be concrete, suppose a hypothetical setting where political leaders in the host country, who

are more attentive to their own welfare and less care for welfare or income distribution of citizens, try to attract foreign investment to maintain and stabilize their privileged status.[5] Of course, the opposite scenario is also feasible that benevolent elites attract FDI to help create more jobs and improve welfare of workers. FDI in either case is likely to be endogenous.

To address the endogeneity issue, we use two-stage least squares (TSLS) with *time-varying* instruments for FDI. Valid instruments should be correlated with FDI and orthogonal to the error term in the main equation. We propose four such instruments.

The first instrument is the number of discoveries of giant oil or gas fields (in short giant oilfields hereafter) in the host country for a given year ($Giant_{it}$). An oilfield is categorized as giant if it contains estimated ultimate recoverable reserves of oil, including gas and condensate equivalent, of 500 million barrels of oil equivalent or more before extraction began (Lei and Michaels, 2011). It appears that there are many discoveries of giant oilfields and they are also spread widely across the globe. For the period of 1960 to 2010, there are in total 756 discoveries of giant oilfields in 65 countries.

A natural question is whether or not these giant oil discoveries can be thought of as plausibly exogenous. After all, discoveries follow from exploration, and exploration may itself respond to, for example,

[5]This hypothesis is not entirely unreal and is often proposed by political scientists. For instance, Blanton and Blanton (2007) state "Domestic elites reap a disproportionate benefit from foreign investment and are often willing to compromise the good of the whole in order to attract and keep foreign investment." See also some anecdotal evidence therein.

political trends that themselves have an effect on income distribution. However, exploration of course does not guarantee a discovery, let alone a giant one, and there is a plausible interpretation supported by data that the giant discoveries are an accident of geology that do not respond in an obvious way to the economic environment. Lei and Michaels (2011) exhaustively explore the exogeneity of this variable, showing that the presence of a discovery in one year of the data is not correlated with any movements in any of their political or economic variables in preceding years. It is correlated, however, with large increases in oil production and exports in subsequent years. The discoveries are also not correlated with inflation-corrected world oil prices. Overall, the evidence suggests that for all intents and purposes we can treat the giant oil discovery as an exogenous event. This interpretation stands up in our results to tests of over-identifying restrictions.

Lei and Michaels (2011) find that oil production increases by about 25-30 percent within two years of a giant discovery, rises by about 35-45 percent within four years, and remains stable until 10 years after discovery. Having noted this, we use a two-year lagged value for the number of giant discoveries in estimation. We also make the identifying assumption that the only way the discoveries affect income distribution is through its effect on FDI, essentially that the mere presence of the oil in the ground does not affect income distribution but rather the economic consequences of extracting it.

Other instruments are provided by shocks to neighboring countries that may affect the relative attractiveness of different locations for investment by multinationals. Specifically, we use the sum of the numbers of natural disasters ($NDisaster_{it}$) and the sum of the number of internal armed conflicts ($NConflict_{it}$) in neighboring countries of the host country for a given year. To the extent that neighboring countries tend to be similar along many dimensions and compete with each other for FDI, we conjecture that natural disasters and armed conflict in countries neighboring country i could lead potential multinational enterprises to shift some of their investment that would have gone to those neighboring countries to i instead.[6] It is therefore reasonable to assume that these occurrences in neighboring countries are not only independent of income distribution and poverty in the host country but also correlated with FDI into the host country.

It is also possible that FDI into one country affects FDI in other countries nearby. If i and j are neighboring countries, a large stock of FDI in j could make j a more appealing place to locate a new plant due to agglomeration effects, thus drawing new FDI away from i; or it drive up the prices of productive factors in j, making j a *less* appealing place to locate a new plant and driving new FDI to i. In addition, more FDI in j could raise the demand for inputs produced by firms in

[6]This is similar to an approach found in the recent immigration literature. Pugatch and Yang (2011) use rainfall shocks in Mexico to construct an instrument for Mexican immigrants to the US, and Hong and McLaren (2014), use natural disasters, civil conflicts, and negative economic growth in source countries as instruments for immigrant flows to the US.

i or raise the supply of inputs used by firms in i, thus making i a more attractive place to locate a new plant and raising FDI in i. Either way, a rise in FDI into j could affect flows of FDI into i. Therefore, we include the sum of the ratio of FDI to GDP in neighboring countries of the host country ($NFDI_{it}$) as another possible instrument, but since the *a priori* case for exogeneity of this variable is less clear-cut, we do the estimation both with and without it. Once again, we make the identifying assumption that FDI in a neighboring country does not affect income inequality except through its effect on FDI into the host country.

The result is a set of four instruments: $Giant_{it}$, $NDisaster_{it}$, $NConflict_{it}$, and $NFDI_{it}$.

We use two-stage least squares to estimate equation (1), where the first stage equation is:

$$FDI_{it} = \gamma_0 + \gamma_1 FDI_{io} Giant_{it-2} + \sum_{c=2}^{C} \sum_{n_i}^{N_i} \gamma_c FDI_{io} Z_{cn,it} + \mathbf{x}'_{it}\boldsymbol{\gamma} + \delta_i + \varphi_t + \omega_{it}, \tag{2}$$

where $Z_{cn,it} \in \{NDisaster_{it}, NConflict_{it}, NFDI_{it}\}$.

We interact each instrument with initial value of the ratio of FDI to GDP in the host country (FDI_{io}) because a country that has scarcely any FDI to begin with probably has barriers to FDI that will prevent its FDI stock from responding to neighboring countries' shocks or its own shocks. Of course, if shocks are serially correlated, initial FDI may fail the exogeneity requirement, so we perform exogeneity tests

of these interacted instruments post-estimation; in general, we cannot reject the null hypothesis of their exogeneity. Throughout, we do all estimations with two sets of instruments: The first set, denoted IV 1, includes all but the neighboring FDI ratio, while the second, denoted as IV 2, includes all four.

It is worthwhile describing our identification strategy in instrument estimation. First, we check the rank condition for identification of equation (2) using the Kleibergen-Paap test of the null hypothesis that the rank is deficient or the equation is underidentified. Second, we test the validity of instruments, which requires that they are both orthogonal to the error term in the main equation (exogeneity) and correlated with the endogenous variable (relevance). As for orthogonality, we use the Hansen's J test of the null hypothesis that instruments are exogenous. As for relevance, the usual criterion suggested by Stock and Yogo (2002) is that under homoskedasticity, the first-stage F statistic should be above 10 to avoid a weak instrument problem, a criterion that our own instruments generally do not satisfy. However, we see no justification for imposing an assumption of homoskedasticity, and there are no tables available for the heteroskedasticity-robust F statistic (Baum et al, 2007; Atkin, 2009).[7] Due to this issue, for hypothesis testing, we use the Anderson-Rubin test, which is robust to weak instruments, with the null that the coefficient of the endogenous variable in the structural equation equals zero (Baum et al, 2007).[8]

[7]For the reference, we still report heteroskedasticity-robust F statistics in result tables.
[8]Equivalently, the null is that the coefficients of the excluded instruments in the reduced

Finally, we also estimate the system of equations (1) and (2) using the limited information maximum likelihood estimator (LIML), which is more robust to weak instruments than standard two stage procedures, as a robustness check (Staiger and Stock, 1997).

We include several control variables which are likely to influence inequality and poverty (as do Tsai, 1995; Jaumotte et al, 2008). A wide range of theoretical models suggest that increased access to international trade can have an effect on a country's inequality (see the survey by Harrison, McLaren and McMillan (2011)). Hence, we include the share of merchandise exports and imports in GDP, respectively. Other control variables are real GDP per capita (in log), the annual growth rate of GDP, the share of gross capital formation over GDP, and total population (in log). As a robustness check, we later show that the results hold up with these controls replaced by country-specific time trends.

2.2 Data

For the data on income inequality and poverty rate, we use the Povcal database of the World Bank originally constructed by S. Chen and M. Ravallion. The Povcal contains the panel data covering for 127 developing countries for 1977-2012, although time series for each country vary. This database has income or consumption distributional data

form equation for the outcome variable (y_{it}) are jointly equal to zero. As instruments become weak, either null is less likely to be rejected, which is why this test is robust to weak instruments.

based on randomly sampled household surveys in developing countries and uses a substantially more rigorous and consistent method to filtering the individual income or consumption data for differences in quality (Jaumotte et al, 2008).

When two series based on either income or consumption survey are available for a country, we take a consumption based one. Since consumers can intertemporally shift resources through lending and borrowing, current consumption better measures lifetime well-being. Also, high income respondents tend to underreport their income.[9] Therefore, the literature suggests that compared with income, consumption captures lifetime well-being more appropriately (Deaton, 1997; Goldberg and Pavcnik, 2007).

Among many variables in the Povcal, we use the Gini index and the income shares of the quintiles of the population as a measure for inequality. The Gini index, defined as the area between the 45° line and the Lorenz curve as a fraction of the area below the 45° line, is the most commonly used summary of inequality in a distribution. It ranges from 0 to 100 with 0 representing perfect equality. Inequality can be further dissected by looking at the income shares by quintile.[10] Table A.1 in the Appendix shows the list of countries and years for which income distribution and poverty rate data are available in the sample.

[9] When urban, rural, and weighted average data are available for a country, we use weighted average.

[10] Although income shares are originally given by decile, we aggregate them into quintiles for the sake of easy exposition.

We use two measures for the poverty rate that are standard in the literature (Chen and Ravallion, 2010). The headcount index is the percentage of population living in households with consumption or income per person below the poverty line ($1.25 per day or $38 per month). The poverty gap index is a mean distance below the poverty line as a percentage of the poverty line, counting the nonpoor as having zero poverty gaps. In other words, the headcount index simply counts all the people below the poverty line while considering them equally poor, while the poverty gap index measures the depth of poverty by considering how far, on average, the poor are from the poverty line. Both poverty indexes are also drawn from the Povcal.

We use FDI stock data from the comprehensive database of the external wealth of nations mark II compiled by Lane and Milesi-Ferretti (2007).[11] They extensively use cumulative flow data with valuation adjustments designed to capture shifts in relative prices across countries and construct estimates of foreign asset and liability positions for a large sample of countries for 1970-2011. FDI data includes controlling stakes in acquired foreign entities (at least 10% of an entity's equity) as well as greenfield investments. In estimation, we use the ratio of FDI liabilities to GDP.

Turning to the construction of the instruments, first, the number of findings of giant oilfields in a given country in a given year is obtained from the Giant Oil and Gas Fields of the World, compiled by M.K.

[11]The most up-to-date data can be found in http://www.philiplane.org/EWN.html.

Horn.[12] This dataset contains, among others, the date of discovery, the discovering country, the coordinates of oilfields, field type, geologic age, and reservoir lithology. It covers the findings of all giant oilfields in the world for the period of 1868-2010.

We extract data on natural disasters from EM-DAT: the International Disaster Database.[13] It contains essential core data on the occurrence and estimated effects of over 18,000 mass disasters in the world from 1900 to present. We count the total number of natural disasters in a given country in a given year which affected more than 1,000 people. UCDP/PRIO Armed Conflict Database reports the incidence of armed conflicts in the world.[14] Specifically, we use the onset dataset that contains annual observations of all countries on all internal and internationalized internal armed conflicts and consider the total number of active armed conflicts in a given country in a given year that claimed the death of 25 people or more.

Since what we ultimately need for the instruments except the discovery of giant oilfields is the sums of natural disasters, armed conflicts, and FDI ratio of neighboring countries for a given country, we need information on which countries are neighboring or sharing a border. For this, we use CEPII geography database, which incorporates several geographical variables for 225 countries. Among them, we use information on whether pairs of countries share a border to construct

[12] One can get this data from http://www.datapages.com/AssociatedWebsites/GISOpenFiles/HornGiantFields

[13] This database is accessible at http://www.emdat.be.

[14] This database is available at http://www.pcr.uu.se/research/ucdp/datasets/ucdp_prio_armed_conflict_da

data on neighboring countries for a given country. Finally, we merge this data with data on natural disasters, armed conflicts, and FDI ratio of a country to construct the instruments.[15]

Data for all control variables are obtained from the World Bank's World Development Indicator (WDI) database. Summary of data descriptions and sources is provided in Table A.2 in the Appendix. Table 1 presents the summary statistics for the sample used in estimations. The overall mean of the Gini coefficient is 42.98. The mean headcount index is 16.73, while the mean poverty gap index is 6.52. The ratio of FDI stock to GDP is on average 25.3 percent. Regarding the instruments, the average number of giant discoveries in the sample is 0.09.[16] On average, the sum of natural disasters of neighboring countries is 11.66, while that of armed conflicts is 1.25.[17] The average of the sum of the ratio of FDI stock of neighboring countries is 125.2 percent.

<Table 1. Summary Statistics>

Figure 1 illustrates the relationship between inequality, poverty, and FDI for some selected countries. Latin American countries are known to have high inequality compared with other developing countries. For instance, the Gini index in Brazil hovers between the mid

[15]By construction, island countries such as Madagascar and Sri Lanka are to be dropped, as they are not contiguous with any other countries.

[16]Some countries have more than two giant discoveries for a given year. If we simply count the number of at least one giant discovery per year, it is 0.07, suggesting that giant discovery occurs in about 7% of our country-year observations.

[17]There are on average about 3.9 neighboring countries for a given country.

50s and 60 during the sample period. Both the Gini and headcount index in Brazil decrease slightly as the FDI ratio increases since 2000. India observes a dramatic drop in poverty rate throughout the sample period, while her inequality is more or less stable for the same period and her FDI ratio increases only slightly recently. The poverty rate in Bangladesh, one of the poorest countries in the world, continues to drop since 2000. However, both inequality and FDI ratio in this country change little during the same period. Lastly, Ethiopia, another poorest country, observes a decrease in both poverty rate and inequality, when her FDI ratio begins to increase around the mid 1990s. In summary, these casual observations do not provide a concrete picture on the relationship, not to mention causality, which we now turn to.

3 Results

3.1 Income Inequality: the Gini Index

We begin with the Gini index. Table 2 shows the results of OLS and TSLS estimations. In the OLS estimation the coefficient of the FDI ratio is positive but insignificant (column 1 in Table 2) and only the growth rate of GDP is significant, with a negative coefficient. To address the endogeneity of FDI, columns 2 and 3 show the results of TSLS with the first set of instruments (IV 1) including the discovery of giant oilfields in the host country and neighbors' natural disasters and armed conflicts. According to the results in the first stage (column 2),

both the discovery of giant oilfields and armed conflicts of neighboring countries are significant and positive, while their natural disasters are negative but insignificant. In the second stage (column 3), we find that the effect of the FDI ratio switches its sign to a negative one but still insignificant.

<Table 2. Income Inequality: the Gini Index>

Next, we consider another model specification (IV 2) with the addition of the sum of FDI ratios of neighboring countries to the first set of instruments. In the first stage, we find that all instruments are significant except the sum of neighbors' FDI ratios (column 4 in Table 2). As predicted, findings of giant oilfields in the host country and neighbors' armed conflict increase FDI in the host country. On the other hand, neighbors' natural disasters decrease FDI. In retrospect, however, the negative association can be possible if natural disasters are regional phenomena involving several countries rather than merely local events.

The estimated effect of FDI at the second stage is now significantly negative, implying that FDI decreases income inequality in the host country (column 5 in Table 2). As noted above, this is the opposite of the findings in several previous studies. In terms of the magnitude of the effects of FDI on the Gini coefficient, one standard deviation increase in the FDI ratio in the host country, on average, would decrease the Gini coefficient by 3.68. Given that the standard deviation

of the Gini coefficient within a country is just 2.98, this effect is quite sizable. As for control variables, exports share and the growth rate of GDP are found to reduce inequality.

As set forth previously, in order to see if the instruments in the estimations are legitimate, we check various test statistics (see the lower panel of columns 2-5 in Table 2). First, according to the Kleibergen-Paap test, we are able to reject the null hypothesis of underidentification. Next, the Hansen's J test cannot reject the null of exogeneity of the instruments. Note that the F statistic from the first stage takes a value of 3.464 for IV 1 and 3.977 for IV 2, which are well below conventional criteria for strong instruments. However, this criteria is only valid under homoskedasticity, we are assuming heteroskedasticity, and so we use hypothesis testing that is robust to weak instruments. The Anderson-Rubin test reported in the last line is the weak-instrument-robust test of the hypothesis that the coefficient of FDI ratio is zero, and it fails to reject for IV 1 but rejects at a significance level of 5% for IV 2. Therefore, the instruments in IV 2 are legitimate in the sense that they would influence income distribution only via their effects on FDI ratio.

In summary, OLS indicates no relationship between inward FDI and the Gini coefficient, but correcting for the endogeneity of FDI produces results of a negative relationship that is significant both statistically and economically.

3.2 Income Inequality: Income Shares by Quintile

The Gini coefficient provides a useful summary of trends in inequality, but in order to have a more detailed picture of the change in income distribution in response to economic change we study in Table 3 the income shares of population quintiles. In the OLS estimation, we find that the effect of a rise in the FDI ratio is negative for the first four quintiles but positive for the highest income group (Panel A in Table 3).[18] However, they are all insignificant.

<Table 3. Income Inequality: Income Shares by Quintile>

In the TSLS estimation with the first set of instruments, we find that the pattern of signs for the FDI ratio completely reverses, so that the first four quintiles are now positive, while the highest quintile is negative (IV 1: Panel B in Table 3). However, the coefficient of the FDI ratio is significant only for the third quintile, suggesting that as more FDI flows inward, only the middle class income grows any faster than aggregate income, contributing to the decrease in inequality overall. On the other hand, in the estimation of the third quintile, while the Kleibergen-Paap test rejects the null of underidentification and the Hansen's J test cannot reject the null of exogeneity,

[18]Note that since the dependent variable is one of five income shares of population, the sum of estimates for any four quintiles for a given independent variable should equal the estimate of the remaining quintile.

the Anderson-Rubin tests cannot reject the null of zero coefficient of the FDI ratio.

Next, the results from TSLS with the second set of instruments show that while preserving the same sign pattern over income groups as in the IV 1 specification, all coefficients of the FDI ratio are now significant (IV 2: Panel C in Table 3). The coefficient on the FDI ratio is the largest in absolute terms for the highest quintile (-0.145), followed by the third (0.049) and the second (0.041) quintile. The results are well in line with our previous finding of the negative coefficient in the estimation of the Gini index. However, what is new here is that we have a better insight on where the change of inequality suggested by the Gini index comes from. Namely, as FDI rises, while the second and the third income group, in particular, gain their income shares, the highest one loses its share.

With respect to the instruments in the specification of IV 2, the Kleibergen-Paap test rejects the null of underidentification and Hansen's J tests cannot reject the null of the exogeneity of the instruments across all quintiles (see Panel C in Table 3). The Anderson-Rubin tests rejects the null that the coefficient of the FDI ratio equals zero for the second, the third, and the fifth quintile, but not for the other quintiles. Overall, the above post-estimation test results suggest that the instruments satisfy our identifying assumption that they are not only independent of income shares of population in the host country but also correlated with its FDI ratio.

3.3 Poverty

In Table 4, we report results on the role of FDI in the change in poverty in developing countries. In the OLS estimation, an increase in the FDI ratio raises both poverty measures, although it is significant only with the headcount index (column 1 in both Panels in Table 4). However, in the TSLS estimation with the first set of instruments, FDI alleviates poverty regardless of which poverty measures are used (IV 1: columns 2 & 3 in both Panels in Table 4). Therefore, the increase in FDI is likely to reduce not only the number of people living under the poverty line but also the depth of poverty for the poor. This result makes sense given our previous finding that the income share of the lowest income group rises with the increase in FDI.

In terms of the magnitudes of the estimates, an increase in the FDI ratio in the host country by one standard deviation reduces the headcount index by 9.42 and the poverty gap index by 4.93 on average, which are large effects considering that the standard deviations of those variables within a country are just 6.63 and 3.38, respectively. As for control variables, in the estimations of both poverty measures, real GDP per capita, total population, and the imports share are associated with lower poverty, and the exports share with higher poverty.

<Table 4. Poverty>

We reject the null of underidentification in the Kleibergen-Paap test. According to Hansen's J test, we cannot reject the null that

the instruments are exogenous. We are able to reject the null of zero coefficient of the FDI ratio in the Anderson-Rubin test. Therefore, it can be concluded that the instruments in IV 1 are appropriate to identify the causal effects of FDI on poverty reduction in developing countries.

In the TSLS with the second set of instruments, the negative effect of FDI is significant only for the poverty gap index (IV 2: columns 4 & 5 in both Panels in Table 4). However, in this case, Hansen's J test rejects the null of exogeneity of the instruments, while the Kleibergen-Paap test rejects the null of underidentification and the Anderson-Rubin test rejects the null of zero coefficient of the FDI ratio .

3.4 Robustness Checks

In this section, we check robustness of the results in several ways. First, to see if there is heterogeneity among countries in the effects of FDI on income distribution, we divide developing countries into two income groups. Following the World Bank's categorization, countries in the lower income group have gross national incomes per capita in 2012 less than or equal to $4,085, while those in the higher income group earn more than $4,085. Table 5 shows the results from the TSLS estimations with the Gini and the headcount index as a dependent variable, respectively.

FDI is found to reduce inequality only in the lower income group

(Columns 1 & 2 in Panel A in Table 5). This suggests that the finding that FDI decreases the Gini index in the whole sample is driven predominantly by the effect in poorer countries. Similar results are also found when estimating poverty (Panel B in Table 5): Only the lower income group has a significantly negative coefficient for the FDI ratio. Furthermore, observe that the various post-estimation test results suggest the legitimacy of the instruments only for the lower income group.

<Table 5. Income Inequality by Income Group>

We are parsimonious with the number of control variables included in order to have as many observations as possible, but as a robustness check, we add some more control variables that may be also important in the degree of inequality and poverty of a country. Technological progress is likely to make automated machines replace workers, resulting in the increase in the demand for skilled labor as opposed to unskilled labor. Hence, we add a measure for technology change as an additional control variable, for which we use the growth rate of total factor productivity (TFP).[19] In the TSLS estimation on the Gini index, we find that TFP itself is negative but insignificant but that this addition does not change qualitatively the previous results (see columns 1 & 2 in Panel A in Table 6). However, after controlling for technological change, the negative effect of FDI on inequality is found

[19]The growth rate of TFP is obtained from the Conference Board.

to be larger than before (-0.240 in Table 6 vs. -0.159 from the last column of Table 2).

Social welfare policy can also influence income distribution. Having noted this, we add expenditures on public social protection and health as a percentage of general government expenditures as an additional control variable.[20] However, including this variable substantially reduces the sample size and thus interpretation of the results warrants caution. We find that the effect of FDI on inequality is still negative, but that social expenditure itself is insignificantly positive (see columns 3 & 4 in Panel A in Table 6). Similarly, the results on poverty do not change qualitatively either when adding TFP and social expenditures (see Panel B in Table 6). In a nutshell, our main results are robust to the inclusion of these control variables.

<Table 6. Technology Change and Social Expenditures>

When the number of the included endogenous variable is just one, which is our case, LIML is known to be more robust to the weak instrument problems than standard TSLS (Staiger and Stock, 1997). Table 7 presents the results of the LIML estimates on the Gini index, income shares by quintile, and poverty (the headcount and the poverty gap index). Overall, we find that the results stay qualitatively the same as before and that, in particular, the estimates of the FDI ratio and their standard errors are only slightly different from their

[20]The source of the data is the IMF Government Finance Statistics.

previous counterparts. Therefore, it can be concluded that our results are robust in the potential presence of weak instruments.

<Table 7. LIML Estimation>

Although we have addressed the issue of the potential endogeneity of our key variable, the FDI ratio, by introducing instruments, there is still a concern that the control variables might be endogenous as well. However, it is difficult to find valid instruments for each of them. As an alternative to deal with this problem, we replace control variables with interaction terms between each country-fixed effect and a time trend. The rationale for this exercise, though ad hoc, is that control variables such as exports share, real GDP per capita, and total population tend to increase with a trend over time. Therefore, the resulting regression can be summarized as follows:

$$y_{it} = \alpha + \beta_1 FDI_{it} + \beta_2 t + \sum_{i=1}^{N} \theta_i \mu_i t + \mu_i + \xi_t + \varepsilon_{it}$$

where t is a time trend and $\mu_i t$ is the interaction between country-fixed effects and a time trend for country i. Table 8 reports the results. Note that including the interaction term instead of control variables substantially increases the value of R^2 in the OLS estimation (Columns 1 & 4 in Table 8). Overall, we find that the results in both the OLS and TSLS estimations are qualitatively the same as before, though the coefficient on the FDI ratio in the TSLS estimation on headcount decreases sharply (Column 6 in Table 8).

<Table 8. Addressing Endogeneity of Control Variables>

4 Concluding Remarks

We investigate the effects of inward FDI on income distribution and the poverty rate in developing countries using panel data. In so doing, we address the problem of endogenous FDI through new instruments, which are time-varying, based on shocks to the attractiveness of investment in neighboring countries as well as giant oil discoveries in the host country. Without instruments, FDI appears to have no effect on income inequality and a small positive effect on poverty, but with the instruments, FDI helps decrease both inequality and the poverty rate. Looking closely at the change in income distribution in response to FDI inflows, we find that the lower second and the third population quintiles enjoy the largest gain in their income shares, while the highest quintile suffers a reduction in its share. Furthermore, the negative relationship between FDI and inequality and poverty is found only among lower-income developing countries.

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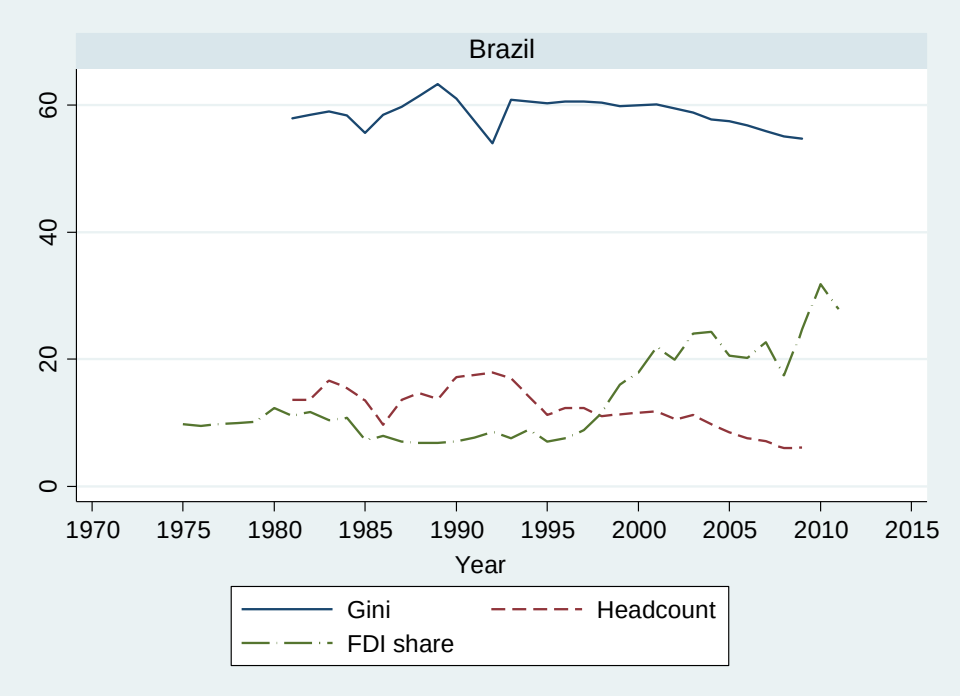
Figure 1. Inequality, Poverty, and FDI for Selected Countries



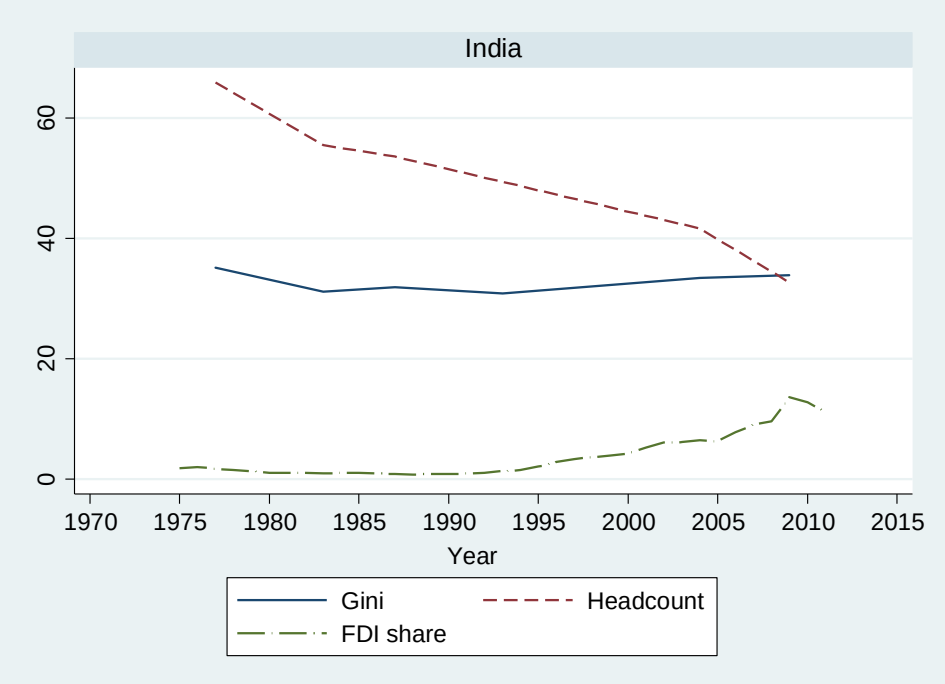
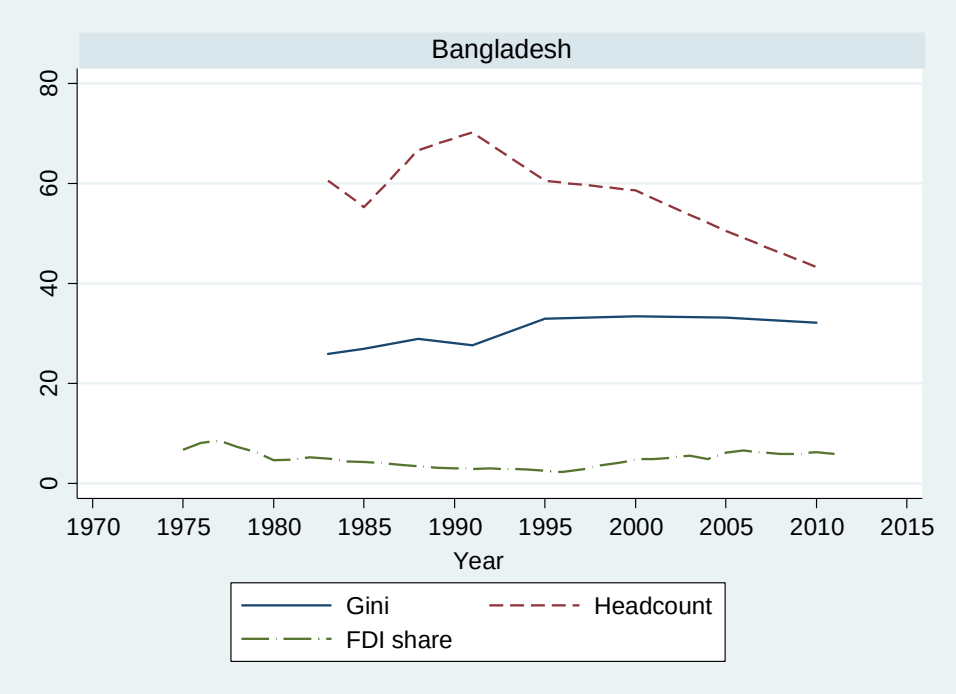


Figure 1. Inequality, Poverty, and FDI for Selected Countries (Continued)



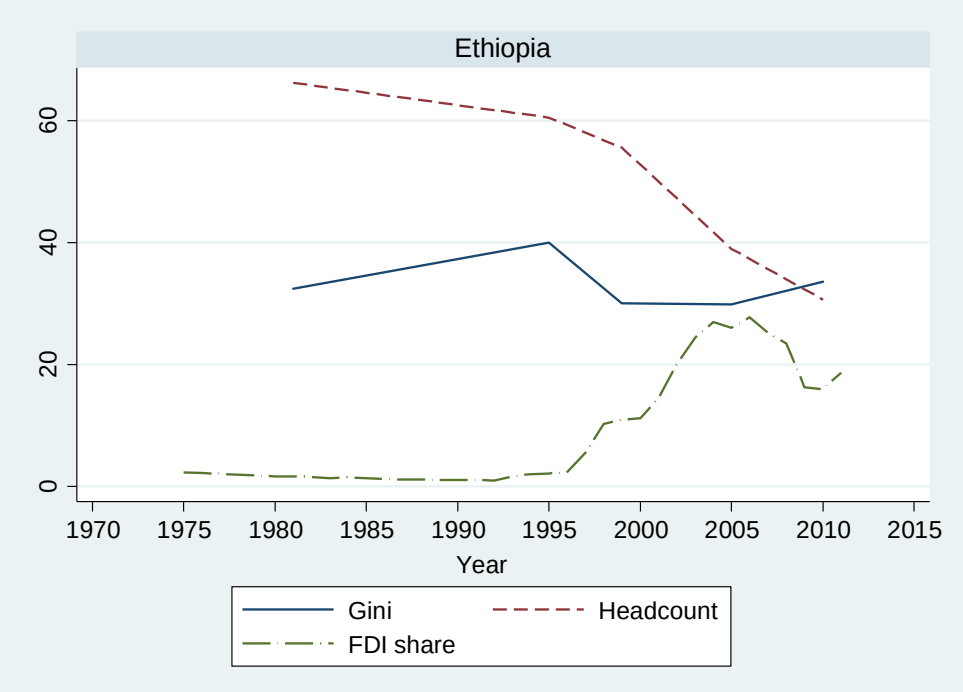


Table 1. Summary Statistics

Variable	Obs	Mean	S. D.	Within S. D.	Min	Max
Gini	674	42.984	9.855	2.980	24.240	67.400
Headcount	670	16.729	20.973	6.629	0.000	87.720
Poverty gap	670	6.524	9.336	3.380	0.000	53.090
FDI ratio	674	25.311	23.153	11.607	0.849	352.874
Exports share	674	25.482	18.470	6.767	2.673	274.298
ln GDPPC	674	7.598	1.038	0.199	4.830	9.752
GDP Growth	674	4.489	4.496	3.931	-17.955	37.485
Capital share	674	22.548	7.706	4.763	4.652	84.338
ln Population	674	16.607	1.456	0.115	12.198	21.009
Import share	674	35.613	48.808	9.444	4.258	1189.263
Initial FDI ratio	674	12.350	20.745	0.000	0.491	352.874
Giant discovery	666	0.090	0.389	0.326	0.000	5.000
Neighbors disasters	651	11.664	11.616	5.662	0.000	85.000
Neighbors conflicts	651	1.247	1.935	0.671	0.000	14.000
Neighbors FDI ratio	651	125.172	136.175	85.080	0.885	1522.778
TFP	511	1.284	3.832	3.316	-18.570	19.457
Social expenditure	209	3075.512	1570.980	429.400	1.000	5502.000

Notes: Summary statistics reported correspond to the sample used in OLS estimations. Within S. D. indicates a standard deviation within a country. The average number of neighboring countries for a typical country is about 3.9.

Table 2. Income Inequality: the Gini Index

	OLS	IV 1		IV 2	
Dependent: Gini		1st stage	2nd stage	1st stage	2nd stage
FDI ratio	0.015		-0.103		-0.159**
	(0.027)		(0.076)		(0.072)
Exports share	-0.037	-0.063	-0.052**	-0.072	-0.057**
	(0.028)	(0.083)	(0.022)	(0.080)	(0.025)
ln GDPPC	1.560	-4.029	1.227	-4.030	1.066
	(2.176)	(3.593)	(1.523)	(3.642)	(1.560)
GDP growth	-0.104*	-0.323***	-0.141**	-0.310***	-0.158***
	(0.058)	(0.105)	(0.056)	(0.103)	(0.056)
Capital share	0.043	0.053	0.038	0.054	0.038
	(0.036)	(0.111)	(0.032)	(0.112)	(0.035)
ln Population	0.616	-27.649**	-3.177	-26.100**	-4.998
	(5.079)	(11.030)	(4.340)	(10.663)	(4.244)
Imports share	0.006	0.020	0.007	0.023	0.008
	(0.015)	(0.052)	(0.019)	(0.051)	(0.020)
Initial FDI ratio X Lagged giant discovery		0.315**		0.312*	
		(0.157)		(0.164)	
Initial FDI ratio X Neighbors disasters		-0.007		-0.011**	
		(0.006)		(0.005)	
Initial FDI ratio X Neighbors conflicts		0.132**		0.136**	
		(0.057)		(0.056)	
Initial FDI ratio X Neighbors FDI ratio				0.001	
				(0.001)	
Observations	674	637	637	637	637
Number of countries	101	83	83	83	83
R squared	0.120				
1st stage robust *F* stat.		3.464		3.977	
Kleibergen-Paap *p* value		0.039		0.040	
Hansen's *J p* value			0.926		0.808
Anderson-Rubin *p* value			0.632		0.026

Notes: Numbers in parentheses are heteroskedasticity-robust standard errors. The number in 1st stage robust *F* stat. indicates the heteroskedasticity-robust *F* statistic on the excluded instruments at the first stage. * significant at 10% level, ** at 5%, and *** at 1%.

Table 3. Income Inequality: Income Shares by Quintile

Panel A: OLS Estimation

Dependent: Income share	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
FDI ratio	-0.005	-0.003	-0.002	-0.000	0.010
	(0.006)	(0.006)	(0.006)	(0.005)	(0.022)
Exports share	0.008	0.008	0.010	0.006	-0.032
	(0.006)	(0.007)	(0.007)	(0.006)	(0.024)
ln GDPPC	-0.334	-0.461	-0.542	-0.084	1.422
	(0.609)	(0.538)	(0.504)	(0.403)	(1.729)
GDP growth	0.027*	0.025*	0.019	0.010	-0.081*
	(0.015)	(0.014)	(0.012)	(0.010)	(0.046)
Capital share	-0.007	-0.007	-0.009	-0.015*	0.038
	(0.008)	(0.009)	(0.009)	(0.008)	(0.030)
ln Population	0.068	0.018	-0.358	-0.469	0.742
	(1.159)	(1.267)	(1.256)	(0.977)	(4.148)
Imports share	-0.004	-0.000	-0.000	0.001	0.003
	(0.003)	(0.004)	(0.004)	(0.003)	(0.013)
Observations	675	675	675	675	675
Number of countries	101	101	101	101	101
R squared	0.110	0.113	0.113	0.091	0.119

Notes: Quintile 1 is the group of the lowest incomes. Numbers in parentheses are heteroskedasticity-robust standard errors. The number in 1st stage robust *F* stat. indicates the heteroskedasticity-robust *F* statistic on the excluded instruments at the first stage. * significant at 10% level, ** at 5%, and *** at 1%.

Panel B: TSLS Estimation with the First Set of Instruments (IV 1)

	1st stage	2nd stage				
Dependent: Income share		Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
FDI ratio		0.013	0.026	0.040**	0.026	-0.104
		(0.015)	(0.018)	(0.020)	(0.020)	(0.066)
Exports share	-0.062	0.010**	0.012**	0.015**	0.009*	-0.046**
	(0.083)	(0.005)	(0.006)	(0.006)	(0.005)	(0.019)
ln GDPPC	-4.104	-0.264	-0.363	-0.423	-0.052	1.101
	(3.601)	(0.380)	(0.372)	(0.368)	(0.312)	(1.252)
GDP growth	-0.324***	0.033**	0.035***	0.032**	0.016	-0.116**
	(0.106)	(0.013)	(0.013)	(0.013)	(0.011)	(0.047)
Capital share	0.057	-0.006	-0.006	-0.008	-0.013*	0.034
	(0.111)	(0.007)	(0.008)	(0.008)	(0.007)	(0.027)
ln Population	-26.596**	0.563	0.911	0.965	0.416	-2.854
	(10.975)	(0.919)	(1.018)	(1.095)	(0.928)	(3.609)
Imports share	0.021	-0.004	-0.001	-0.000	0.002	0.004
	(0.052)	(0.005)	(0.005)	(0.004)	(0.003)	(0.015)
Initial FDI ratio X Lagged giant discovery	0.316**					
	(0.156)					
Initial FDI ratio X Neighbors disasters	-0.007					
	(0.006)					
Initial FDI ratio X Neighbors conflicts	0.133**					
	(0.058)					
Observations	638	638	638	638	638	638
Number of countries	83	83	83	83	83	83
1st stage robust *F* stat.	3.495					
Kleibergen-Paap *p* value	0.038					
Hansen's *J p* value		0.736	0.875	0.9	0.889	0.961
Anderson-Rubin *p* value		0.768	0.569	0.172	0.481	0.441

Notes: Quintile 1 is the group of the lowest incomes. Numbers in parentheses are heteroskedasticity-robust standard errors. The number in 1st stage robust *F* stat. indicates the heteroskedasticity-robust *F* statistic on the excluded instruments at the first stage. * significant at 10% level, ** at 5%, and *** at 1%.

Panel C: TSLS Estimation with the Second Set of Instruments (IV 2)

	1st stage	2nd stage				
Dependent: Income share		Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
FDI ratio		0.027*	0.041**	0.049***	0.028*	-0.145**
		(0.016)	(0.017)	(0.018)	(0.016)	(0.061)
Exports share	-0.072	0.011**	0.014**	0.015**	0.010*	-0.050**
	(0.080)	(0.005)	(0.006)	(0.007)	(0.005)	(0.022)
ln GDPPC	-4.102	-0.220	-0.321	-0.395	-0.044	0.980
	(3.649)	(0.388)	(0.383)	(0.377)	(0.310)	(1.282)
GDP growth	-0.310***	0.038***	0.039***	0.035***	0.016	-0.128***
	(0.103)	(0.013)	(0.013)	(0.013)	(0.011)	(0.046)
Capital share	0.059	-0.007	-0.007	-0.008	-0.013*	0.034
	(0.113)	(0.008)	(0.008)	(0.009)	(0.007)	(0.029)
ln Population	-25.076**	1.029	1.357	1.262	0.494	-4.142
	(10.618)	(0.930)	(1.005)	(1.028)	(0.830)	(3.475)
Imports share	0.023	-0.005	-0.001	-0.001	0.002	0.005
	(0.051)	(0.005)	(0.005)	(0.005)	(0.003)	(0.016)
Initial FDI ratio X Lagged giant discovery	0.313*					
	(0.163)					
Initial FDI ratio X Neighbors disasters	-0.011**					
	(0.005)					
Initial FDI ratio X Neighbors conflicts	0.137**					
	(0.056)					
Initial FDI ratio X Neighbors FDI ratio	0.001					
	(0.001)					
Observations	638	638	638	638	638	638
Number of countries	83	83	83	83	83	83
1st stage robust *F* stat.	4.007					
Kleibergen-Paap *p* value	0.039					
Hansen's *J p* value		0.631	0.788	0.937	0.966	0.886
Anderson-Rubin *p* value		0.131	0.020	0.002	0.205	0.011

Notes: Quintile 1 is the group of the lowest incomes. Numbers in parentheses are heteroskedasticity-robust standard errors. The number in 1st stage robust *F* stat. indicates the heteroskedasticity-robust *F* statistic on the excluded instruments at the first stage. * significant at 10% level, ** at 5%, and *** at 1%.

Table 4. Poverty

Panel A: the Headcount Index

	OLS	IV 1		IV 2	
Dependent: Headcount		1st stage	2nd stage	1st stage	2nd stage
FDI ratio	0.086*		-0.407***		-0.098
	(0.049)		(0.142)		(0.103)
Exports share	0.167**	-0.066	0.139***	-0.075	0.165***
	(0.065)	(0.083)	(0.053)	(0.079)	(0.044)
ln GDPPC	-24.873***	-4.234	-26.422***	-4.216	-25.525***
	(3.922)	(3.564)	(2.873)	(3.615)	(2.410)
GDP growth	-0.001	-0.312***	-0.138	-0.300***	-0.043
	(0.061)	(0.107)	(0.090)	(0.105)	(0.066)
Capital share	0.143	0.057	0.149**	0.058	0.148**
	(0.101)	(0.111)	(0.076)	(0.112)	(0.063)
ln Population	-29.316***	-27.590**	-44.833***	-25.908**	-35.143***
	(7.945)	(10.890)	(8.418)	(10.564)	(5.662)
Imports share	-0.123***	0.018	-0.110***	0.021	-0.115***
	(0.045)	(0.052)	(0.035)	(0.051)	(0.032)
Initial FDI ratio X Lagged giant discovery		0.316**		0.313*	
		(0.156)		(0.163)	
Initial FDI ratio X Neighbors disasters		-0.004		-0.008	
		(0.007)		(0.006)	
Initial FDI ratio X Neighbors conflicts		0.103*		0.110*	
		(0.061)		(0.060)	
Initial FDI ratio X Neighbors FDI ratio				0.001	
				(0.001)	
Observations	672	636	636	636	636
Number of countries	99	82	82	82	82
R squared	0.494				
1st stage robust *F* stat.		2.583		2.867	
Kleibergen-Paap *p* value		0.045		0.045	
Hansen's *J p* value			0.824		0.000
Anderson-Rubin *p* value			0.006		0.000

Notes: Numbers in parentheses are heteroskedasticity-robust standard errors. The number in 1st stage robust *F* stat. indicates the heteroskedasticity-robust *F* statistic on the excluded instruments at the first stage. * significant at 10% level, ** at 5%, and *** at 1%.

Panel B: the Poverty Gap Index

	OLS	IV 1		IV 2	
Dependent: Poverty gap		1st stage	2nd stage	1st stage	2nd stage
FDI ratio	0.025		-0.213***		-0.116*
	(0.034)		(0.081)		(0.065)
Exports share	0.072**	-0.066	0.057**	-0.075	0.065***
	(0.032)	(0.083)	(0.025)	(0.079)	(0.021)
ln GDPPC	-10.104***	-4.234	-10.976***	-4.216	-10.695***
	(1.950)	(3.564)	(1.524)	(3.615)	(1.368)
GDP growth	-0.013	-0.312***	-0.086*	-0.300***	-0.056
	(0.037)	(0.107)	(0.051)	(0.105)	(0.041)
Capital share	0.044	0.057	0.048	0.058	0.048
	(0.046)	(0.111)	(0.038)	(0.112)	(0.034)
ln Population	-18.094***	-27.590**	-25.529***	-25.908**	-22.489***
	(4.487)	(10.890)	(4.997)	(10.564)	(3.906)
Imports share	-0.047**	0.018	-0.036**	0.021	-0.038***
	(0.023)	(0.052)	(0.015)	(0.051)	(0.014)
Initial FDI ratio X Lagged giant discovery		0.316**		0.313*	
		(0.156)		(0.163)	
Initial FDI ratio X Neighbors disasters		-0.004		-0.008	
		(0.007)		(0.006)	
Initial FDI ratio X Neighbors conflicts		0.103*		0.110*	
		(0.061)		(0.060)	
Initial FDI ratio X Neighbors FDI ratio				0.001	
				(0.001)	
Observations	672	636	636	636	636
Number of countries	99	82	82	82	82
R squared	0.390				
1st stage robust *F* stat.		2.583		2.867	
Kleibergen-Paap *p* value		0.045		0.045	
Hansen's *J p* value			0.361		0.048
Anderson-Rubin *p* value			0.019		0.034

Notes: Numbers in parentheses are heteroskedasticity-robust standard errors. The number in 1st stage robust *F* stat. indicates the heteroskedasticity-robust *F* statistic on the excluded instruments at the first stage. * significant at 10% level, ** at 5%, and *** at 1%.

Table 5. Income Inequality and Poverty by Income Group

Panel A: Income Inequality (Gini)

	Lower income		Higher income	
Dependent: Gini	1st stage	2nd stage	1st stage	2nd stage
FDI ratio		-0.129***		-0.078
		(0.047)		(0.100)
Exports share	-0.178**	-0.035	-0.164	-0.100**
	(0.088)	(0.033)	(0.132)	(0.042)
ln GDPPC	0.087	4.425*	-8.523	1.180
	(5.569)	(2.684)	(5.249)	(1.778)
GDP growth	-0.391***	-0.206**	-0.365**	-0.101*
	(0.137)	(0.090)	(0.152)	(0.060)
Capital share	0.174	-0.036	0.111	0.037
	(0.188)	(0.050)	(0.141)	(0.045)
ln Population	-27.150**	15.531***	-14.539	-12.198***
	(12.541)	(5.176)	(16.202)	(3.798)
Imports share	-0.068*	0.018	0.389**	0.089
	(0.037)	(0.019)	(0.158)	(0.054)
Initial FDI ratio X Lagged giant discovery	1.074**		0.199	
	(0.509)		(0.157)	
Initial FDI ratio X Neighbors disasters	-0.017***		0.009	
	(0.004)		(0.008)	
Initial FDI ratio X Neighbors conflicts	0.195***		-0.110	
	(0.035)		(0.077)	
Initial FDI ratio X Neighbors FDI ratio	0.001*		0.002	
	(0.000)		(0.001)	
Observations	258	258	379	379
Number of countries	42	42	41	41
1st stage robust *F* stat.	14.900		1.309	
Kleibergen-Paap *p* value	0.036		0.261	
Hansen's *J p* value		0.237		0.841
Anderson-Rubin *p* value		0.002		0.742

Notes: Countries in lower income group have gross national incomes per capita in 2012 less than or equal to $4,085, while those in higher income group more than $4,085. Numbers in parentheses are heteroskedasticity-robust standard errors. The number in 1st stage robust *F* stat. indicates the heteroskedasticity-robust *F* statistic on the excluded instruments at the first stage. * significant at 10% level, ** at 5%, and *** at 1%.

Panel B: Poverty (Headcount)

	Lower income		Higher income	
Dependent: Headcount	1st stage	2nd stage	1st stage	2nd stage
FDI ratio		-0.306**		-0.245
		(0.122)		(0.159)
Exports share	-0.216**	0.043	-0.135	0.041
	(0.094)	(0.084)	(0.146)	(0.056)
ln GDPPC	-1.241	-28.005***	-7.159	-21.635***
	(5.564)	(4.785)	(4.854)	(3.516)
GDP growth	-0.352**	0.111	-0.398**	-0.194**
	(0.145)	(0.143)	(0.169)	(0.085)
Capital share	0.177	0.106	0.087	0.124**
	(0.183)	(0.116)	(0.137)	(0.061)
ln Population	-26.671**	-27.573***	-15.607	-26.165***
	(13.026)	(9.857)	(16.413)	(6.214)
Imports share	-0.062	-0.120***	0.385**	0.088
	(0.039)	(0.038)	(0.157)	(0.082)
Initial FDI ratio X Lagged giant discovery	1.105**		0.219	
	(0.494)		(0.152)	
Initial FDI ratio X Neighbors disasters	-0.009		0.013	
	(0.007)		(0.010)	
Initial FDI ratio X Neighbors conflicts	0.135**		-0.142	
	(0.062)		(0.091)	
Observations	257	257	379	379
Number of countries	41	41	41	41
1st stage robust *F* stat.	4.329		1.526	
Kleibergen-Paap *p* value	0.024		0.157	
Hansen's *J p* value		0.310		0.276
Anderson-Rubin *p* value		0.018		0.012

Notes: Countries in lower income group have gross national incomes per capita in 2012 less than or equal to $4,085, while those in higher income group more than $4,085. Numbers in parentheses are heteroskedasticity-robust standard errors. The number in 1st stage robust *F* stat. indicates the heteroskedasticity-robust *F* statistic on the excluded instruments at the first stage. * significant at 10% level, ** at 5%, and *** at 1%.

Table 6: Technology Change and Social Expenditures

Panel A: Income Inequality (Gini)

	Model with TFP		Model with TFP & social expenditure	
Dependent: Gini	1st stage	2nd stage	1st stage	2nd stage
FDI ratio		-0.240**		-0.227***
		(0.103)		(0.072)
Exports share	-0.116	-0.060	-0.174	-0.053
	(0.105)	(0.040)	(0.173)	(0.071)
ln GDPPC	-9.877**	-1.085	-43.759***	-8.711
	(5.004)	(2.321)	(13.214)	(6.124)
GDP growth	-0.158	-0.142**	0.050	0.093
	(0.152)	(0.067)	(0.282)	(0.126)
Capital share	-0.104	0.015	0.166	0.009
	(0.113)	(0.047)	(0.301)	(0.091)
ln Population	-52.162***	-17.036**	-102.503***	-27.179**
	(13.391)	(8.026)	(34.868)	(13.429)
Imports share	0.025	0.030	0.329	0.088
	(0.059)	(0.019)	(0.231)	(0.077)
TFP	-0.216	-0.103	-0.404	-0.200
	(0.173)	(0.076)	(0.290)	(0.130)
Social expenditure			0.192	0.009
			(0.173)	(0.065)
Initial FDI ratio X Lagged giant discovery	0.256*		0.371	
	(0.148)		(0.265)	
Initial FDI ratio X Neighbors disasters	-0.009		0.004	
	(0.006)		(0.007)	
Initial FDI ratio X Neighbors conflicts	0.143***		0.188**	
	(0.047)		(0.082)	
Initial FDI ratio X Neighbors FDI ratio	0.001		0.002**	
	(0.001)		(0.001)	
Observations	487	487	186	186
Number of countries	67	67	36	36
1st stage robust *F* stat.	4.321		2.962	
Kleibergen-Paap *p* value	0.049		0.158	
Hansen's *J p* value		0.920		0.185
Anderson-Rubin *p* value		0.013		0.000

Notes: Numbers in parentheses are heteroskedasticity-robust standard errors. The number in 1st stage robust *F* stat. indicates the heteroskedasticity-robust *F* statistic on the excluded instruments at the first stage. * significant at 10% level, ** at 5%, and *** at 1%.

Panel B: Poverty (Headcount)

	Model with TFP		Model with TFP & social expenditure	
Dependent: Headcount	1st stage	2nd stage	1st stage	2nd stage
FDI ratio		-0.502***		-0.097
		(0.161)		(0.123)
Exports share	-0.111	0.120*	-0.132	0.367***
	(0.108)	(0.068)	(0.169)	(0.109)
ln GDPPC	-9.272*	-30.301***	-39.763***	-23.254***
	(4.738)	(3.691)	(13.249)	(8.377)
GDP growth	-0.186	0.013	0.010	0.223
	(0.151)	(0.131)	(0.287)	(0.148)
Capital share	-0.107	0.084	0.081	0.277**
	(0.111)	(0.089)	(0.301)	(0.121)
ln Population	-57.666***	-70.389***	-115.145***	-38.728*
	(13.960)	(14.131)	(33.549)	(20.058)
Imports share	0.021	-0.101**	0.373	-0.376***
	(0.059)	(0.043)	(0.237)	(0.135)
TFP	-0.206	-0.352***	-0.342	-0.432**
	(-0.16)	(-0.13)	(-0.303)	(0.172)
Social expenditure			0.002	0.001
			(-0.002)	(0.001)
Initial FDI ratio X Lagged giant discovery	0.268*		0.349	
	(-0.14)		(-0.293)	
Initial FDI ratio X Neighbors disasters	-0.002		-0.004	
	(-0.007)		(-0.01)	
Initial FDI ratio X Neighbors conflicts	0.106**		0.208*	
	(0.053)		(0.115)	
Observations	485	485	186	186
Number of countries	66	66	36	36
1st stage robust *F* stat.	2.804		1.634	
Kleibergen-Paap *p* value	0.052		0.231	
Hansen's *J p* value		0.991		0.853
Anderson-Rubin *p* value		0.004		0.831

Notes: Numbers in parentheses are heteroskedasticity-robust standard errors. The number in 1st stage robust *F* stat. indicates the heteroskedasticity-robust *F* statistic on the excluded instruments at the first stage. * significant at 10% level, ** at 5%, and *** at 1%.

Table 7: LIML Estimation

Panel A: the GINI Index

Dependent: Gini	1st stage	2nd stage
FDI ratio		-0.170**
		(0.078)
Exports share	-0.072	-0.058**
	(0.080)	(0.026)
ln GDPPC	-4.030	1.034
	(3.642)	(1.574)
GDP growth	-0.310***	-0.161***
	(0.103)	(0.057)
Capital share	0.054	0.038
	(0.112)	(0.035)
ln Population	-26.100**	-5.348
	(10.663)	(4.380)
Imports share	0.023	0.008
	(0.051)	(0.020)
Initial FDI ratio X Lagged giant discovery	0.312*	
	(0.164)	
Initial FDI ratio X Neighbors disasters	-0.011**	
	(0.005)	
Initial FDI ratio X Neighbors conflicts	0.136**	
	(0.056)	
Initial FDI ratio X Neighbors FDI ratio	0.001	
	(0.001)	
Observations	637	637
Number of countries	83	83
1st stage robust *F* stat.	3.977	
Kleibergen-Paap *p* value	0.040	
Hansen's *J p* value		0.820
Anderson-Rubin *p* value		0.026

Notes: Numbers in parentheses are heteroskedasticity-robust standard errors. The number in 1st stage robust *F* stat. indicates the heteroskedasticity-robust *F* statistic on the excluded instruments at the first stage. * significant at 10% level, ** at 5%, and *** at 1%.

Panel B: Income Shares by Quintile

	1st stage	2nd stage				
Dependent: Income shares		Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
FDI ratio		0.031*	0.044**	0.051***	0.028*	-0.152**
		(0.018)	(0.019)	(0.019)	(0.016)	(0.065)
Exports share	-0.072	0.011**	0.014**	0.016**	0.010*	-0.050**
	(0.080)	(0.005)	(0.007)	(0.007)	(0.005)	(0.022)
ln GDPPC	-4.102	-0.209	-0.312	-0.391	-0.043	0.960
	(3.649)	(0.391)	(0.387)	(0.379)	(0.310)	(1.291)
GDP growth	-0.310***	0.039***	0.040***	0.035***	0.017	-0.130***
	(0.103)	(0.014)	(0.014)	(0.013)	(0.011)	(0.046)
Capital share	0.059	-0.007	-0.007	-0.008	-0.013*	0.034
	(0.113)	(0.008)	(0.009)	(0.009)	(0.007)	(0.030)
ln Population	-25.076**	1.139	1.453	1.308	0.504	-4.352
	(10.618)	(0.975)	(1.039)	(1.045)	(0.835)	(3.555)
Imports share	0.023	-0.005	-0.001	-0.001	0.002	0.005
	(0.051)	(0.005)	(0.005)	(0.005)	(0.003)	(0.016)
Initial FDI ratio X Lagged giant discovery	0.313*					
	(0.163)					
Initial FDI ratio X Neighbors disasters	-0.011**					
	(0.005)					
Initial FDI ratio X Neighbors conflicts	0.137**					
	(0.056)					
Initial FDI ratio X Neighbors FDI ratio	0.001					
	(0.001)					
Observations	638	638	638	638	638	638
Number of countries	83	83	83	83	83	83
1st stage robust *F* stat.	4.007					
Kleibergen-Paap *p* value	0.039					
Hansen's *J p* value		0.656	0.803	0.940	0.966	0.892
Anderson-Rubin *p* value		0.131	0.020	0.002	0.205	0.011

Notes: Quintile 1 is the group of the lowest incomes. Numbers in parentheses are heteroskedasticity-robust standard errors. The number in 1st stage robust *F* stat. indicates the heteroskedasticity-robust *F* statistic on the excluded instruments at the first stage. * significant at 10% level, ** at 5%, and *** at 1%.

Panel C: Poverty

	Dependent: Headcount		Dependent: Poverty gap	
	1st stage	2nd stage	1st stage	2nd stage
FDI ratio		-0.417***		-0.236***
		(0.147)		(0.090)
Exports share	-0.066	0.139**	-0.066	0.055**
	(0.083)	(0.054)	(0.083)	(0.027)
ln GDPPC	-4.234	-26.449***	-4.234	-11.045***
	(3.564)	(2.897)	(3.564)	(1.576)
GDP growth	-0.312***	-0.141	-0.312***	-0.093*
	(0.107)	(0.091)	(0.107)	(0.054)
Capital share	0.057	0.149*	0.057	0.049
	(0.111)	(0.076)	(0.111)	(0.040)
ln Population	-27.590**	-45.133***	-27.590**	-26.274***
	(10.890)	(8.585)	(10.890)	(5.364)
Imports share	0.018	-0.109***	0.018	-0.036**
	(0.052)	(0.035)	(0.052)	(0.015)
Initial FDI ratio X Lagged giant discovery	0.316**		0.316**	
	(0.156)		(0.156)	
Initial FDI ratio X Neighbors disasters	-0.004		-0.004	
	(0.007)		(0.007)	
Initial FDI ratio X Neighbors conflicts	0.103*		0.103*	
	(0.061)		(0.061)	
Observations	636	636	636	636
Number of countries	82	82	82	82
1st stage robust *F* stat.	2.583		2.583	
Kleibergen-Paap *p* value	0.045		0.045	
Hansen's *J p* value		0.830		0.401
Anderson-Rubin *p* value		0.006		0.019

Notes: Numbers in parentheses are heteroskedasticity-robust standard errors. The number in 1st stage robust *F* stat. indicates the heteroskedasticity-robust *F* statistic on the excluded instruments at the first stage. * significant at 10% level, ** at 5%, and *** at 1%.

Table 8. Addressing Endogeneity of Control Variables

	Dependent: Gini			Dependent: Headcount		
	OLS	IV		OLS	IV	
		1st stage	2nd stage		1st stage	2nd stage
FDI ratio	0.017		-0.188**	0.080		-0.244**
	(0.031)		(0.088)	(0.048)		(0.105)
Trend	-0.041	-0.961	-0.137	0.423	-0.352	0.254
	(0.432)	(1.213)	(0.388)	(0.621)	(1.124)	(0.547)
Initial FDI ratio X Lagged giant discovery		0.306**			0.343**	
		(0.135)			(0.135)	
Initial FDI ratio X Neighbors disasters		0.001			0.005	
		(0.005)			(0.008)	
Initial FDI ratio X Neighbors conflicts		0.094**			0.077	
		(0.038)			(0.061)	
Initial FDI ratio X Neighbors FDI ratio		0.002**				
		(0.001)				
Observations	777	714	714	773	711	711
R squared	0.543			0.814		
Number of countries	127	98	98	124	96	96
1st stage robust *F* stat.			8.861			3.531
Kleibergen-Paap *p* value			0.003			0.011
Hansen's *J p* value			0.125			0.788
Anderson-Rubin *p* value			0.001			0.049

Notes: Numbers in parentheses are heteroskedasticity-robust standard errors. The number in 1st stage robust *F* stat. indicates the heteroskedasticity-robust *F* statistic on the excluded instruments at the first stage. The interaction terms between country-fixed effects and a time trend are included in estimation but not reported here. * significant at 10% level, ** at 5%, and *** at 1%.

The Appendix

Table A.1 Country List with Years of Income Distribution and Poverty Data Available in the Sample

Country	Year									
Albania	1996	2002	2004	2005	2008					
Algeria	1988	1995								
Argentina	1986	1987	1991	1992	1993	1994	1995	1996	1997	1998
	1999	2000	2001	2002	2003	2004	2005	2006		
Armenia	1998	2001	2002	2003	2004	2005	2006	2007	2008	2010
Azerbaijan	1995	2001	2008							
Bangladesh	1983	1985	1988	1991	1995	2000	2005	2010		
Belarus	2000	2001	2002	2004	2005	2006	2007	2008	2009	2010
	2011									
Belize	1993	1994	1996	1997	1998	1999				
Bolivia	1990	1993	1997	1999	2000	2001	2002	2005	2006	2007
	2008									
Bosnia & Herzegovina	2001	2004								
Brazil	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
	1992	1993	1995	1996	1997	1998	1999	2001	2002	2003
	2004	2005	2006	2007	2008	2009				
Bulgaria	1994	1997	2001	2003	2007					
Burkina Faso	1994	1998	2003	2009						
Burundi	1998	2006								
Cambodia	1994	2004	2007	2008	2009					
Cameroon	1996	2001	2007							
Central African Rep.	2003	2008								
Chile	1987	1990	1992	1994	1996	1998	2000	2003	2006	2009
China	1990	1993	1996	1999	2002	2005	2008	2009		
Columbia	1992	1996	1999	2000	2001	2002	2003	2004	2005	2006
	2007	2008	2009	2010						
Congo, Dem. Rep.	2005									
Congo, Rep.	2005									
Costa Rica	1981	1986	1989	1990	1991	1992	1993	1994	1995	1996
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	2007	2008	2009							
Cote d'Ivoire	1985	1986	1987	1988	1993	1995	1998	2002	2008	
Croatia	1998	1999	2000	2001	2004	2008				
Czech Republic	1993	1996								
Dominican Republic	1986	1989	1992	1996	1997	2000	2001	2002	2003	2004
	2005	2006	2007	2008	2009	2010				
Ecuador	1987	1994	1998	1999	2000	2003	2005	2006	2007	2008
	2009	2010								
Egypt, Arab Rep.	1990	1995	1999	2004	2008					
El Salvador	1991	1995	1996	1998	1999	2001	2002	2003	2004	2005
	2006	2007	2008	2009						

Estonia	1998	2000	2001	2002	2003	2004				
Ethiopia	1995	1999	2005	2010						
Guatemala	1987	1989	1998	2000	2002	2003	2004	2006		
Honduras	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
	1999	2001	2002	2003	2004	2005	2006	2007	2008	2009
Hungary	1998	1999	2000	2001	2002	2004	2007			
India	1977	1983	1987	1993	2004	2009				
Indonesia	1984	1987	1990	1993	1996	1999	2002	2005	2008	2010
Iran, Islamic Rep.	1986	1990	1994	1998	2005					
Jordan	1986	1992	1997	2002	2006	2008	2010			
Kazakhstan	1996	2001	2002	2003	2004	2006	2007	2008	2009	
Kenya	1992	1994	1997	2005						
Kyrgyz Republic	1993	1998	2002	2004	2005	2006	2007	2008	2009	2010
	2011									
Lao PDR	2002	2008								
Latvia	1998	2002	2003	2004	2007	2008	2009			
Lithuania	1996	1998	2000	2001	2002	2004	2008			
Macedonia, FYR	1998	2000	2002	2003	2004	2005	2006	2008		
Madagascar	1980	1993	1997	1999	2001	2005				
Malawi	2004	2010								
Malaysia	1984	1987	1989	1992	1995	1997	2004	2007	2009	
Mali	1994	2001	2006	2010						
Mauritania	2000	2004	2008							
Mexico	1984	1992	1994	1996	1998	2000	2002	2004	2006	2008
	2010									
Moldova	1997	1998	1999	2001	2002	2003	2004	2005	2006	2007
	2008	2009	2010							
Morocco	1984	1990	1998	2000	2007					
Mozambique	1996	2002	2007							
Nepal	2003	2010								
Nicaragua	1993	1998	2001	2005						
Nigeria	1985	1992	1996	2003	2009	2011				
Pakistan	1987	1990	1996	1998	2001	2004	2005	2007		
Panama	1989	1991	1995	1997	2001	2002	2003	2004	2005	2006
	2009	2010								
Paraguay	1995	1997	1999	2001	2002	2003	2004	2005	2006	2007
	2008	2009	2010							
Peru	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	2007	2008	2009	2010						
Philippines	1985	1988	1991	1994	1997	2000	2003	2006	2009	
Poland	1992	1996	1998	1999	2000	2001	2002	2004	2005	2006
	2007	2008	2009	2010	2011					
Romania	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008
	2010	2011								
Russian Federation	1993	1996	1999	2001	2002	2003	2004	2005	2006	2007
	2008	2009								
Rwanda	1984	2000	2005	2010						
Senegal	1991	1994	2001	2005	2011					
Serbia	2005	2006	2007	2008	2009	2010				
Sierra Leone	2003	2011								
Slovak Republic	2004	2005	2006	2007	2008	2009				

Slovenia	1998	2002	2003	2004						
South Africa	2000	2005	2008							
Sri Lanka	1985	1990	1995	2002	2006	2009				
Tajikistan	1999	2003	2004	2007	2009					
Tanzania	1991	2000	2007							
Thailand	1981	1988	1990	1992	1994	1996	1998	1999	2000	2002
	2006	2008	2010							
Togo	2006	2011								
Trinidad & Tobago	1988	1992								
Tunisia	1985	1990	1995	2000	2005	2010				
Turkey	1987	1994	2002	2003	2004	2005	2006	2007	2008	2009
	2010									
Uganda	1989	1992	1996	1999	2002	2005	2009			
Ukraine	1995	1996	2002	2003	2004	2005	2006	2007	2008	2009
	2010									
Uruguay	1981	1989	2006	2007	2008	2009	2010			
Uzbekistan	1998	2002	2003							
Venezuela, RB	1981	1987	1989	1992	1995	1998	1999	2001	2002	2003
	2004	2005	2006							
Vietnam	1992	1998	2002	2004	2006	2008				
Yemen, Rep.	1998	2005								
Zambia	1993	1996	1998	2002	2004	2006	2010			

Notes: Island countries are to be dropped in TSLS or LIML estimation.

Table A.2 Description of Variables and Data Sources

Variable	Description	Source
Gini	It ranges from 0 to 100 with 0 representing perfect equality.	World Bank Povcal
Headcount	The percentage of population living in households with consumption or income per person below the poverty line ($1.25 per day or $38 per month).	World Bank Povcal
Poverty gap	A mean distance below the poverty line as a percentage of the poverty line, counting the nonpoor as having zero poverty gaps.	World Bank Povcal
FDI ratio	The ratio of FDI liabilities in GDP (%)	Lane & Milesi-Ferretti (2007)
Giant oilfields	The number of discoveries of giant oil or gas fields in the host country	Giant Oil and Gas Fields of the World, compiled by M.K. Horn
Disasters	The sum of the number of natural disasters in neighboring countries, which affected more than 1,000 people	EM-DAT: the International Disaster Database
Conflicts	The sum of the number of active armed conflicts in neighboring countries, which claimed the death of 25 people or more	UCDP/PRIO Armed Conflict Database; the onset dataset
Export shares	The share of merchandise exports in GDP (%)	WDI
Import shares	The share of merchandise imports in GDP (%)	WDI
ln GDPPC	Real GDP per capita in log	WDI
GDP growth	The annual growth rate of GDP (%)	WDI
Capital share	The share of gross capital formation in GDP (%)	WDI
ln Population	The total population in log	WDI
TFP	The growth rate of total factor productivity (%)	Conference Board
Social expenditure	Expenditures on public social protection and health as a percentage of general government expenditures (%)	IMF Government Finance Statistics

Notes: We obtain information on neighboring countries for a given country from CEPII geography database.