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Do foreign MNEs alleviate multidimensional poverty in developing countries?

Julien Hanoteau

KEDGE Business School, Marseille, FRANCE

<https://orcid.org/0000-0003-2951-9466>

Contact author: Julien Hanoteau, julien.hanoteau@kedgebs.com

Abstract

This study investigates the effects of the investment-based presence of multinational enterprises (MNEs) on poverty in developing countries. The relationship is decomposed into different pathways corresponding to various facets of firms' presence and activities, and monetary and multidimensional poverty. We hypothesize that depending on the pathways, the effects can be positive or negative in terms of poverty alleviation, and an overall conclusion has to be nuanced. The hypotheses are tested across 431 Indonesian administrative districts, observed in 2008, 2014 and 2018. Pooled instrumental variable regressions show that a higher presence of foreign MNEs does not reduce the number of people below the poverty line. It raises the depth and severity of poverty, and the population is also more exposed to pollutions. These results inform the ongoing debate, and offer important implications for policy makers eager to attract foreign direct investments, as well as for MNEs' managers concerned with social responsibility and achieving sustainable development goals in host developing countries.

Keywords Multinational enterprises – FDI – Poverty – CSR – Developing country –

Indonesia

JEL classification D22 · F23 · I32 · M14

1 Introduction

Whether investments of foreign Multinational Enterprises (MNEs), i.e., Foreign Direct Investments (FDIs), can eradicate poverty remains debated. The economics literature, generally concerned with FDIs' effects on growth rather than on poverty, concludes that FDIs foster economic activity, and raise inequalities both within developed and developing countries (Doh 2019). Some studies observe that foreign MNEs' investments reduce poverty across African countries (Gouhou and Soumaré 2012), or Vietnamese provinces (Jaax 2020), whereas others claim that such investments are unlikely to alleviate poverty (Jenkins 2005). Other scholars support the more nuanced conclusion that foreign corporate presence alleviates poverty as the aggregated outcome of positive as well as negative complex mechanisms. These mechanisms remain ill-understood as they have been overlooked in the economics and International Business (IB) literatures, which neglect the multidimensionality of poverty and of foreign firm presence (Kolk et al., 2018).

Studies focus, indeed, on a single poverty dimension such as income, education, or health (Kolk et al., 2018), and measure it with inappropriate indicator, such as the Gross Domestic Product (GDP) per capita which fails to reflect poverty and inequalities induced by FDIs (Doh 2019).

Poverty and its measurement remain complex and debated issues, and part of the complexity arises from perceptions and realities that vary across regions, communities, and between developing and developed countries. Its multidimensionality is nonetheless acknowledged, as in a broad definition, poverty is about individuals' or households' well-being (and lack of it) which covers a range of attributes (Ruggeri Laderchi et al., 2003; Banks et al., 2021). Its multidimensionality is nonetheless acknowledged, as in a broad

definition, poverty is about individuals' or households' well-being (and lack of it) which covers a range of attributes (ibid). Yet the monetary approach is the most commonly used measurement of poverty. It is based on the rationale that a certain purchasing power is necessary to fulfil basic needs, and then identifying poverty as a shortfall in consumption (or income) from a threshold (Thorbecke 2008). Despite the importance of income and financial resources as means for people to achieving desired functioning (Sen 1993), thus justifying monetary measurements, these latter are insufficient or inappropriate, suffering from several flaws. Money metrics are indirect indicators, and they require markets and transactions, which do not exist for all well-being attributes, such as for instance freedom, security, or exclusion. And when markets exist, they may be imperfect and ill-functioning, especially in developing countries (Ruggeri Laderchi et al. 2003).

As an alternative to monetary measurement, and in the wake of Amartya Sen's work, multidimensional poverty approaches have been developed to observe and measure directly a range of attributes of well-being or capabilities (Alkire et al. 2015). Multidimensional poverty is then defined as the failure to achieve certain minimal or basic capabilities (Ruggeri Laderchi et al. 2003), whereas its measurements are not more exempt from drawbacks and caveats. They often remain at best the proxy of complex and latent well-being attributes that are difficult to observe. Other difficulties are the selection of multiple attributes and the identification of minimum threshold levels, which may be impossible or relying on value judgments that are context specific (Thorbecke 2008).

Monetary and multidimensional measurement of poverty are distinct constructs that are necessary and cannot substitute, justifying to use them jointly, which is rarely done in empirical studies on poverty (Banks et al. 2021).

A foreign MNE is likely to impact differently monetary and multidimensional poverty, through the various facets of its presence and activities (Kolk et al. 2018). This aspect does not appear in empirical studies, as foreign firm presence is usually seen as a monolithic concept measured with a single indicator such as an ownership share, an investment, or the number of employees. Jenkins (2005) suggests that a firm impacts poverty through different pathways corresponding to the various facets of its presence, and she proposes three “employment”, “distribution”, and “government revenue” mechanisms. In a similar vein, Kolk et al. (2018) argue that a foreign firm’s influences depend on whether Corporate Social Responsibility (CSR) is a main objective of its core business, and whether it is undertaking peripheral CSR activities in host countries.

In this study, we analyze the relationship between the multi-faceted investment-based presence of foreign MNEs and monetary and multidimensional poverty in developing countries. This enables to disentangle the relationship into different pathways through which MNEs affect poverty positively, negatively, or both. Investment-based presence means running activities that include operating a production facility owned fully or partially through a joint venture. This ownership results from past or current FDIs.

We focus on monetary poverty and households’ vulnerability and exposure to risks, that are directly impacted by foreign corporate presence, as detailed in the next section. The effects on other poverty dimensions, e.g., education and health, are likely to be mediated through corporate support to and cooperation with dedicated public agencies and non-profit organizations (Waagstein 2011; Montiel et al. 2021).¹ For ease of the current analysis, mediation is left for future research.

¹ We thank a referee for pointing out that these effects are mainly mediated.

We hypothesize first that a higher presence of foreign MNEs, through its effects on jobs and salaries, reduces the number of poor, and second, that it also raises the depth and severity of poverty. This second hypothesis lays on a skill-bias in foreign MNEs' behavior and distributed benefits, and the crowding out of domestic firms, destroying unqualified jobs, a source of livelihood for the poor. We then hypothesize that foreign MNEs' presence raises the vulnerability of local populations through higher exposure to violence and pollution.

We test these hypotheses across 431 Indonesian administrative districts observed in 2008, 2014 and 2018. Pooled Instrumental Variable (IV) regressions show that a higher foreign MNEs' presence does not reduce the number of poor people, whereas it raises the depth and severity of poverty, and exposes local populations to further pollutions.

These effects, observed for various facets of corporate presence and for different poverty dimensions, justify decomposing the relationship between MNEs' presence and poverty, to reveal its complexity. This confirms that any overall conclusion on that relationship has to be nuanced, thus contributing to the ongoing debate.

The next section develops hypotheses based on the economics and IB literatures, whereas the third one exposes stylized facts about poverty and FDIs in Indonesia, the data and the methodology. The fourth section presents the results, and the last one discusses them, their implications, limits of this study, and avenues for future research.

2 Literature review and hypotheses

MNEs' core business activities affect poverty through two main employment and distribution pathways (Jenkins 2005). An employment mechanism intervenes through the

additional jobs and salaries that accompany the extension of a facility, or the settlement of a new one. In general, foreign MNEs operating in developing countries offer higher salaries compared to domestic firms (Wihardja and Cunningham 2021), as they are more productive due to larger economies of scale, a better access to resources such as financing, or better technologies (Kolk et al. 2018). The employment mechanism is further amplified by a local multiplier (Moretti 2010), as foreign MNEs' presence favors a business ecosystem, with opportunities for domestic suppliers and distributors (Kolk et al. 2018). The additional jobs and salaries are likely to benefit individuals and remove them from the poor fringe of the local population.

The distribution mechanism rests on the availability and cost of products necessary to satisfy basic needs. Foreign MNEs are better able than domestic firms to reduce the price of these goods, as they enjoy lower production costs and higher productivity, for instance due to superior manufacturing practice and technology (Belderbos et al. 2021). They may also benefit from larger economies of scale, as they operate in several countries and can thereby spread fixed costs on larger markets. This contributes to lower the poverty line, i.e., the income necessary to purchase these goods and satisfy basic needs. This, in turn, reduces the number of poor people, i.e., those who are below the poverty line, everything else being equal.

Offering products at a price affordable to the poor is the objective of a corporate Bottom-Of-the-Pyramid (BOP) strategy (Prahalad 2005). The firm designs new products, or adapt existing ones in order to satisfy the needs of the poor, at low prices. This strategy can be profitable, if market size—hundreds of millions of poor people—and economies of scale compensate higher risks and fixed costs, and lower margins. Nonetheless, BOP strategies' potential to alleviate poverty has been nuanced, as the dedicated products may

be ill-adapted to the poor, due to a misunderstanding of local needs and conditions (Jenkins 2005; Dembek et al. 2020).

Poor people may receive direct transfers, in cash or in kind, from charity programs operated directly by foreign MNEs or financed by them, as part of their peripheral CSR activities (Waagstein 2011; Kolk et al. 2018).

Foreign MNEs' investment-based presence in developing countries can alleviate poverty, through a reduction in the number of poor people, resulting from employment and distribution effects, or as the result of peripheral CSR activities. More individuals receive an income above the poverty line, due to jobs creation and higher wages, a direct transfer from a charity program, or a lowering of the poverty line following a drop in the price of basic and necessary goods. This leads us to hypothesize:

H1: A higher investment-based presence of foreign MNEs in developing countries reduces the number of poor people.

Foreign MNEs' presence brings more jobs and salaries, but these benefits are unequally distributed in developed as well as in developing countries (Nunnenkamp et al. 2007; Doh 2019; Wihardja and Cunningham 2021). The induced income and wealth inequalities proceed mainly from a skill-bias in MNEs' activities (Doh 2019), and exacerbated by technology transfers. In developing countries, foreign firms use higher technology and employ more skilled workers compared to indigenous enterprises (Haile et al. 2017). This pushes up the demand for skilled workers and their wages, widening inequalities with unskilled workers. This problem is acute in regions with a relative abundance in unskilled workforce (Doh 2019). If technology spills over from foreign to domestic firms, this pushes

up further the demand for high-skilled workers, and decreases the demand for unskilled. This results in a mismatch on the job market, with further scarcity rent for the skilled workers, unemployment for the unskilled, and further wage dispersion between the different categories of workers. These impacts of technology transfers induced by FDI have been observed in studies on developing countries, in South-East Asia in particular (Piva 2003).

MNEs' hiring, centered on skilled workers, does not benefit poor people, likely unskilled. These are actually worse-off, as domestic firms are crowded-out (Jenkins 2005; Kolk et al. 2018). Productive foreign MNEs replace indigenous enterprises manufacturing the same goods less efficiently with unskilled workers (Spencer 2008).²

The crowding-out of domestic firms is amplified and spread to other sectors as MNEs bring with them intermediary inputs instead of relying on local suppliers, and thus drying up their business opportunities (Spencer, 2008). In addition, foreign MNEs tend to grab local scarce resources, such as skilled workers and financings, crowding out further indigenous enterprises (Kolk et al. 2018). Poor people losing their jobs are pushed further into poverty. They find substitute employments in the informal sector, synonym of precarity and low wages, and which represents a large share of jobs in developing countries. Rodrick (2014) observes that FDIs in Mexico in the 2000s led to moderate growth of employment in the formal economy, and an explosion of precarious jobs in the informal sector. The higher presence of foreign MNEs, crowding out domestic activities, induces structural changes in the employment sector, with skilled jobs creation, and

² For instance, when British American Tobacco started the manufacturing and sale of incense sticks in India, this destroyed the jobs of many Indian women. They were homeworking, making these incense sticks by hand, and had this occupation as their main source of livelihood (Jenkins 2005).

unskilled jobs destruction (Jude and Silaghi 2016). Such structural changes reducing the demand for unskilled labor deepen the poverty for the poor (Martuscelli and Gaziorek 2019). We therefore hypothesize that:

H2: A higher investment-based presence of foreign MNEs in developing countries increases the depth and severity of poverty.

Business affects the risk of conflicts and violence (Ganson et al. 2022), and studies underline FDI's particular influence which depends on the sector of activity (Mihalache-O'Keef 2018; Pinto and Zhu 2018). The influence is negative for the tertiary sector, as foreign subsidiaries are relatively intensive in skilled and high-skilled labor, embedded in the local society, prone to quiet and peaceful context, and do not give rise to much greed or grievance. On the opposite, foreign subsidiaries of the primary sector may induce violence, as they are intensive in low-skilled workers and close in the value chain to the rent generated with primary resources, which exacerbates greed, grievance, and conflicts. Violence occurs also as these activities are often associated with negative externalities, non-compliance with environmental and social regulations, and violation of human and property rights, especially in countries suffering from institutional void. The theoretical predictions are undetermined in the case of industry as it is composed of subsectors that are close to the primary sector (e.g., heavy industries, food processing, tobacco) and others that are similar to the tertiary sector (e.g., car manufacturing, microelectronics, biotechnologies) in terms of primary resources, pollution, skilled and low-skilled labor, and technology intensities (Mihalache-O'Keef, 2018). The theoretical predictions are undetermined in the case of industry as it is composed of subsectors that are close to the primary sector (e.g.,

heavy industries, food processing, tobacco) and others that are similar to the tertiary sector (e.g., car manufacturing, microelectronics, biotechnologies) in terms of primary resources, pollution, skilled and low-skilled labor, and technology intensities (ibid). Mihalache-O'Keef (2018) confirms empirically the indeterminacy of the relationship between industrial FDI and local conflicts on a sample of developed and developing countries.

We nonetheless argue that in the context of developing countries, foreign subsidiaries in the manufacturing sector are close to primary resources in the value chain (e.g., transformation industries), and intensive in low-skilled workers (e.g., textile, food processing), making them comparable to the primary sector, and thus likely to exacerbate local conflict and violence.

The economics and IB literatures have addressed extensively FDI's impact on pollution in developing countries, underlining the role of technology brought and used by foreign subsidiaries. Firms are increasingly concerned with their Environmental, Social, and Governance (ESG) performances due to strengthening regulations, legitimacy with stakeholders, or competitiveness. Technology and innovation permit to raise simultaneously corporate ESG performances and competitiveness (Porter and Van der Linde 1995; Di Simone et al. 2022). MNEs may nonetheless adopt different ESG practices and production technologies across the areas in which they operate, depending on the nature and strength of formal and social institutional pressures in their home and host countries (Linnenluecke 2022). FDI may then induce more or less pollution depending on whether a "pollution haven" or a "pollution halo" effect dominates (Meyer 2004). The first effect assumes that host developing countries do not require companies to conform with high ESG performance standards, and foreign MNEs, attracted by lax environmental regulations, operate cheap and dirty production technologies. The second effect suggests

that MNEs adopt in both home and host countries the same and highest ESG standards and the most efficient and cleanest technologies. These technology effects are complemented in the economics literature by two composition and scale effects (Antweiler et al. 2001). The former is a structural change in the economy—a new combination between the primary, secondary, and tertiary sectors—induced by FDIs and impacting the country’s total pollution. The scale effect means that pollution is proportional to the level of activity, everything else being equal. Without loss of generality, we restrict our analysis to the scale effect, acknowledging that foreign MNEs in developing countries, like any other indigenous firms, generate waste and pollution, and exert pressures on natural resources in the normal course of their manufacturing activities (Meyer 2004; Montiel et al. 2021). More industrial activities, everything else being equal, induces more pollution and pressure on the ecosystem. These additional activities consume energy, water, land, and they produce liquid, solid and gaseous wastes. This leads us to hypothesize that:

H3: A higher investment-based presence of foreign MNEs in developing countries raises vulnerability and risks for the population through higher exposure to pollution and violent conflicts.

3 Data and method

3.1 Indonesian context

As the World’s fourth most populated country and largest archipelago, Indonesia has wide within variations in terms of institutions, culture, economic development, and openness to the World economy (Hanoteau and Vial 2020; Wihardja and Cunningham

2021). This justifies considering the effects of FDIs on poverty across Indonesian administrative districts.

FDIs have risen from about 6 billion of dollars per year in 2006, to 30 billion in 2018, but Indonesia underperforms in attracting them, compared to its Asian neighbors Cambodia, Malaysia, Philippines, Thailand, and Vietnam. Explanations are a poor investment climate, and that foreign investors have left efficient export-oriented sectors to invest in rent-seeking projects in natural resources and production for the domestic market (Wihardja & Cunningham, 2021). These last two factors contribute to explain that over the period 2006-2015, the average flows of FDI (Figure 1) are concentrated in provinces that are resource-rich (e.g., Kalimantan and Papua), or densely populated and industry and service oriented (e.g., Banten, Jakarta, East and West Java). On the opposite, rural and agricultural provinces of Gorontalo and West Sulawesi receive very low FDI inflows. In addition to resources endowment, market size, and the local economy structure, other FDI determinants justify the wide disparity between provinces exhibited in Figure 1. These include geography and the island structure of the country, or the nature and timing of institutional reforms and investment laws that have been implemented unevenly across regions since 1999 (Blalock and Gertler 2008). The Table 1 illustrates the wide geographic, demographic, and economic disparity across the 33 Indonesian provinces.

Although the percentage of the population under the poverty line (i.e., the *P0* poverty indicator) has been halved between 1999 and 2013, from about 23% to less than 12%, it remains substantial with large heterogeneity in levels across provinces in 2018 (Figure 1), and across districts within provinces, with rich provinces of Java hosting some of the poorest Indonesian districts (Hanandita and Tampubolon 2016).

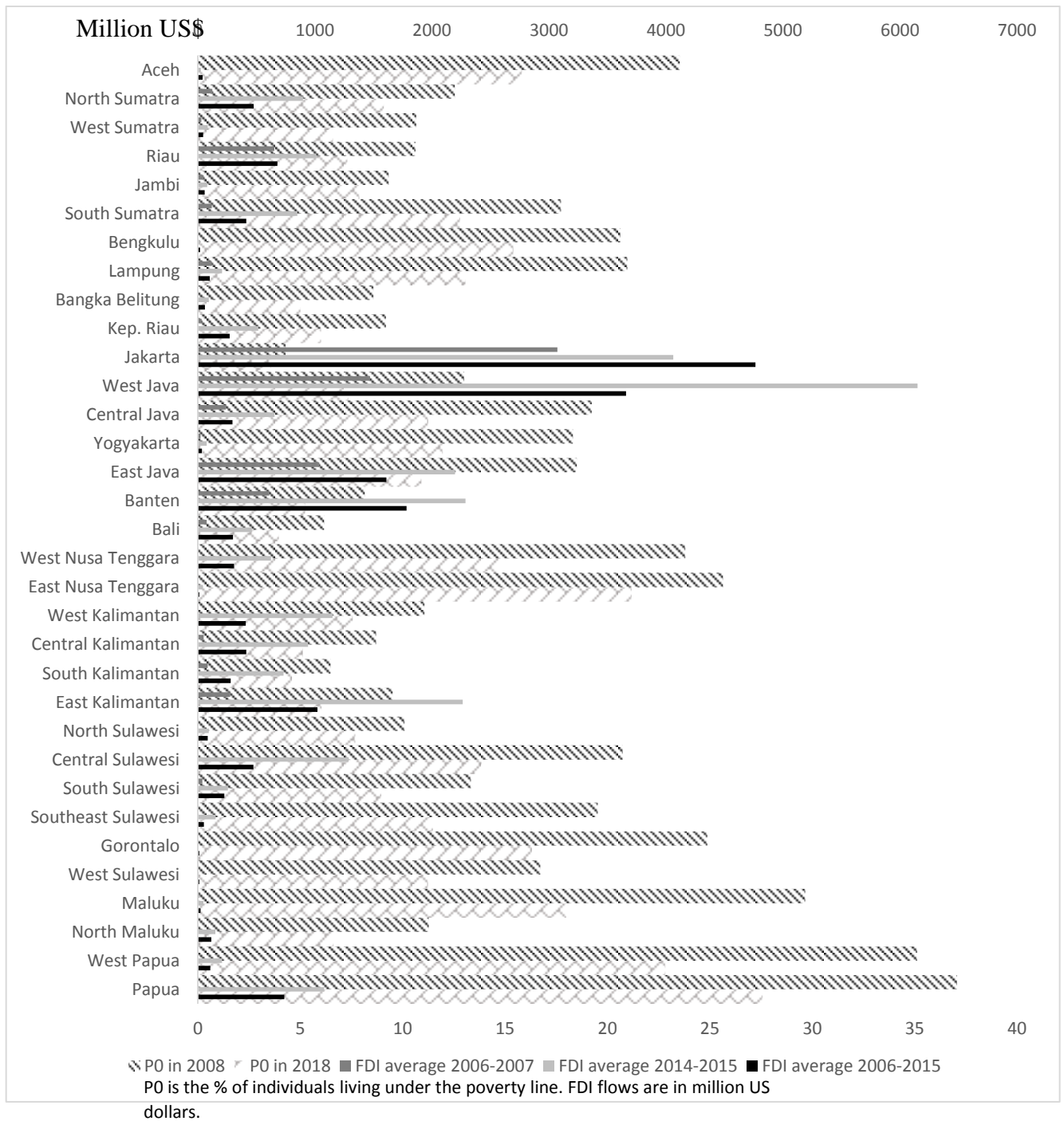


Fig. 1 FDIs and percentage of poor people by Indonesian provinces. Data are from BPS

Table 1 Geographic, demographic, and economic characteristics of Indonesian provinces

Province	Number of Islands	Population (million)	Pop. density (person/km ²)	Urban population (%)	GDP (1000 billions rupiah)	Agriculture, forestry & fishing (% GDP)	Manufacturing and mining (% GDP)
Aceh	663	5,0	86	30,5	112,7	27,7%	14,0%
North Sumatra	419	13,9	191	52,6	441,0	25,0%	20,9%
West Sumatra	391	5,2	124	44,2	140,7	23,8%	15,3%
Riau	139	6,3	73	39,6	449,0	24,3%	52,4%
Jambi	19	3,4	68	32	125,0	26,3%	35,9%
South Sumatra	53	8,1	88	36,5	254,0	19,0%	40,3%
Bengkulu	47	1,9	94	31,7	38,1	29,4%	10,1%
Lampung	188	8,1	234	28,3	199,5	31,9%	24,1%
Bangka Belitung	950	1,4	84	52,5	46,0	19,0%	36,7%
Kep. Riau	2 408	2,0	241	83	155,1	3,7%	54,7%
Jakarta	218	10,2	15 328	100	1 454,6	0,1%	13,0%
West Java	131	46,7	1 320	72,9	1 207,2	7,7%	45,7%
Central Java	296	33,8	1 030	48,4	806,8	14,1%	37,3%
Yogyakarta	23	3,7	1 174	70,5	83,5	9,2%	13,4%
East Java	287	38,8	813	51,1	1 331,4	12,1%	34,5%
Banten	131	12,0	1 237	67,7	368,4	5,6%	37,4%
Bali	85	4,2	718	65,5	129,1	14,4%	7,9%
West Nusa Tenggara	864	4,8	260	45,4	89,3	21,2%	30,2%
East Nusa Tenggara	1 192	5,1	105	21,6	56,8	28,4%	2,7%
West Kalimantan	339	4,8	33	33,1	112,3	22,8%	20,7%
Central Kalimantan	32	2,5	16	36,6	78,9	21,6%	31,2%
South Kalimantan	320	4,0	103	45,1	110,9	14,4%	40,1%
East Kalimantan	370	4,1	27	66	440,7	6,5%	70,2%
North Sulawesi	668	2,4	174	49,8	70,4	20,7%	15,4%
Central Sulawesi	750	2,9	47	27,2	82,8	31,8%	20,9%
South Sulawesi	295	8,5	182	40,6	250,8	21,6%	20,5%
Southeast Sulawesi	651	2,5	66	31,2	73,0	23,2%	27,2%
Gorontalo	136	1,1	101	39	22,1	36,4%	5,3%
West Sulawesi	0	1,3	76	22,9	26,0	39,7%	13,6%
Maluku	1 422	1,7	36	38	24,9	23,8%	8,6%
North Maluku	1 474	1,2	36	27,8	20,4	23,3%	15,5%
West Papua	1 945	0,9	9	32,3	52,3	10,5%	53,2%
Papua	598	3,1	10	28,4	130,3	11,7%	42,6%

Source: data are from BPS and for the year 2015

3.2 Sample and data

Data originate mainly from three datasets of Indonesia's Central Bureau of Statistics (BPS). First, the Annual Survey of Manufacturing Industry (SI) is a census of all industrial

facilities with 20 employees or more in Indonesia. The information collected includes output, expenditures, employment, finance, or ownership, and enables to identify foreign facilities in each district. Second, the National Socio-Economic Survey (SUSENAS) is a repeated cross-section survey of about 300,000 households that are representative of the Indonesian population as a whole and in each administrative district (*kabupaten* and *kota*).³ SUSENAS covers social, demographic, and economic households' characteristics, and uses a multistage stratified sampling method. It provides population weights for aggregating the data, and we use them for calculating district level variables (Kis-Katos and Sparrow 2015). The third dataset is the Village Potential Census (PODES), which provides detailed information on all Indonesian rural villages and urban townships, about 80,000. The characteristics covered are demographic, social, infrastructure, finance, or institutional, and the survey is conducted every 3 or 4 years. We can observe the investment-based presence of foreign MNEs with the SI dataset between 2005 and 2015, which is a period of structural reform in Indonesia, with further opening to and inflows of FDIs (Wihardja and Cunningham 2021). A 3-years lag on MNEs' presence, justified in the next subsection, leads us to consider the SUSENAS and PODES datasets during the period 2008-2018. As we have PODES data for the years 2008, 2014 and 2018, we use the same years for SUSENAS, and the years 2005, 2011, and 2015 for SI.

We aggregate the variables and merge these datasets at the districts level, accounting for the decentralization process that accelerated after 1999 and led to splitting of districts. Their number rose from 440 in 2005, to 514 in 2019. We aggregate the data to match the 2005

³ Below the 33 Indonesian provinces, the second-level administrative subdivision is composed of rural districts (*kabupaten*) and municipalities (*kota*). Administrative districts have their own local government, and are central in the provision of governmental services.

districts borders, and given missing observations, we end up with a sample of 431 districts, out of 440, pertaining to the 33 Indonesian provinces.

3.3 Variables

3.3.1 Dependent variables

The most common measure of monetary poverty uses households' consumption expenditures and the poverty line (Ravallion 2016). This latter is the estimated cost of a bundle of products that are deemed essential to cover basic needs. This bundle is defined depending on local conditions, and it usually comprehends food commodities, and non-food goods and services such as housing, clothing, footwear, health care, cost of education, or transportation. Someone is deemed poor if its average consumption expenditures fall below the poverty line, and the headcount ratio $P0$ is the share of poor people in a district population. Taken alone, this indicator is insufficient, as for instance, two districts may exhibit the same share of poor people, whereas these people experience very different poverty conditions. $P0$ is usually considered jointly with the indicators $P1$ and $P2$ measuring respectively the depth and severity of poverty. The poverty gap $P1$ is the mean shortfall in consumption from the poverty line. It is for a district's population of poor, the sum of deviations between consumption per capita and the poverty line, and normalized by the total income necessary to reach the poverty line. The severity index $P2$ is, for a district's population of poor, the sum of squared individual deviations from the poverty line, normalized by the squared poverty line. It reflects the extent of inequalities between the poor and the very poor (Ravallion 2016; Yoshino et al. 2018). These indicators permit

districts comparison, which would not be possible with quantile of the consumption distribution (Kis-Katos and Sparrow 2015).

We built the indicators $P0$, $P1$, and $P2$ using households' monthly expenditures per capita (SUSENAS), and the province-specific urban and rural poverty lines, retrieved from BPS. The Table 2 summarizes variables' definition and presents descriptive statistics. Over the period 2008-2018, and across Indonesian districts, the poor amount in average to 8.4% of the population, with a minimum close to zero in the city of Depok near Jakarta, and a maximum of 73.6% in a district of Papua. The poverty gap $P1$ is in average 13.6% of the poverty line, with a maximum of 44.1% in a district of West Sumatra, whereas the severity of poverty $P2$ is 0.032 in average, with a maximum of 0.194.

We employ two indicators of multidimensional poverty and that measure vulnerability. *Pollution* is the share of a district population living in villages or townships with significant air, water, or soil pollution (PODES). *Fights* is the share of a district population living in villages or townships in which mass fights—involving groups, other communities, security forces, government officials, or students—occurred during the year (PODES).

3.2.2 Independent variables

Following the International Monetary Fund's definition of FDI (Carson 2003), we consider a foreign investment-based presence as an industrial facility with a foreign ownership of at least 10%.

To reflect the different facets of a firm's presence and activities, we use alternative indicators on *employment*, *output*, *tax* payment, and *charity* giving. They are respectively the shares of foreign facilities in the total industrial employment, output, payments of taxes,

and charity giving in a district. All the data are from the SI dataset. For instance, in the SI annual survey rubric “other expenditures”, facilities report their “gifts, charities, and donations”. We use this item to build the indicator *charity*.

The investment-based presence of foreign firms is likely to affect poverty dimensions in the short and medium runs (Kolk et al. 2018), and to capture fully this effect, we observe the independent variables with a 3-years lag. This also permits to reduce potential endogeneity due either to reverse causality or an unobserved factor.

3.2.3 Control variables

Recent studies on the determinants of local poverty in developing countries (Kis-Katos and Sparrow 2015; Jaax 2020) lead us to select, as control variables, the share of *industrial employment* in district total employment, the share of *urbanization* of the population, the adults (20+) *literacy* rate, the share of the population settled on slopes or peaks instead of valleys (*topography*), the average *travel time* (in hours) necessary to reach the district capital, the share of the population living in villages or townships in which Islam is the majority *religion*, and *age* which is the share of population aged 16-60 years.

To build *industrial employment*, we use data on district total industrial employment from SI, and data on total employment from SUSENAS. The variables *urbanization*, *literacy*, and *age* are from SUSENAS, and *topography*, *travel time*, and *religion* are from PODES.

3.2.4 Instrumental variables

Despite the introduction of control variables and a lag on the independent ones, potential endogeneity, due to reverse causality or omitted variable, remains an issue. We address it with Instrumental Variable (IV) regressions.

A first excluded instrument for *Employment* is analogous to the shift-share instrument used in studies on immigration, inequalities, or poverty (McLaren and Yoo 2017; Jaax 2020). This instrument $IV_{k,t}$, for the years $t = \{2005, 2011, 2015\}$, relies on a district's k initial share θ_k —during the reference year 2003—of nationwide industrial employment, and the nationwide share—excluding the district k under observation—of foreign MNEs in nationwide total industrial employment—excluding the district k . With $tot_indus_emp_t$ the nationwide total industrial employment, $tot_for_emp_t$ the nationwide foreign MNEs industrial employment, $indus_emp_{k,t}$ the total industrial employment in district k , and $for_emp_{k,t}$ the foreign MNEs industrial employment in district k , the instrument is $IV_{k,t} = \theta_k \cdot [tot_for_emp_t - for_emp_{k,t}] / [tot_indus_emp_t - indus_emp_{k,t}]$. $IV_{k,t}$ reflects that in absence of district-specific shock, all districts should host a share in the nationwide foreign MNEs industrial employment in 2005, 2011, and 2015, in proportion of their initial share in 2003. We build similar instruments for the other independent variables *output*, *tax*, and *charity*, based on the SI dataset.

We add a second excluded instrument to satisfy the condition of $n+1$ excluded instruments for n endogenous predictors. For *employment* and *output*, we use KPPOD's index *land access* of the quality of access to land and security of tenure.⁴ This reflects a

⁴ The Indonesian Monitoring Committee for the Implementation of Regional Autonomy (KPPOD) builds periodically local (district, province) business and investment climate indexes, to monitor the consequences of

primary aspect of the investment climate in Indonesia. In some districts and major cities, ownership rights are poorly documented or enforced, rental contracts are unsecure, land laws are complex, and administrative procedures are difficult and costly (KPPOD 2012). The registration process may exceed 6 months, whereas nearly 80% of land parcels in Indonesia are not formally registered, raising risk of eviction and legal insecurity (KPPOD 2012). This discourages investment, especially for firms bearing a liability of foreignness (Zaheer 1995).

For *tax* and *charity*, we use, as excluded instrument, the KPPOD index on *security* and *conflict*. Insecurity is detrimental to investors and another critical element of the business climate (KPPOD 2012). It also influences firms' payment of taxes and charities in Indonesia. With the decentralization process, district governments have received a significant fiscal discretionary power, and they have used it to introduce and levy excessive taxes and fees, sometimes for personal purposes only (Henderson and Kuncoro 2011). In certain areas, such as Aceh and Papua, informal groups, activists or independentists, also levy local taxes and extort rents on businesses, in exchange for "protection". Foreign firms pay these taxes and charities, to avoid harassment and conflict with local stakeholders, including bureaucrats, and to obtain security and peace (Ross 2005).

The indexes *land access* and *security* range on a scale from 0 to 100, with 0 standing for the lowest quality, and we divide them by 100. The data are available at the district level, and missing observations are imputed using data of close rural or urban districts in the same

decentralization. To do so, KPPOD interviews representative samples of private firms with 10 employees or more, in the non-primary sectors. The surveys are complemented with secondary data such as the frequency of land eviction in a district, or the average length to obtain a registered land certificate. Data are retrieved from local economic governance reports for various years, available at: <https://www.kppod.org/penelitian/index> (accessed 19 March 2022).

province. Data missing for a province one year are imputed using data for the same province at a previous period, and applying the variation rate of a close province.

Table 2 Descriptive statistics and variable definitions

Variable	Mean	Min	Max	SD	N	Definition	Source
P0 (headcount ratio)	0.084	0.00	0.736	0.080	1291	Share of the district population below the poverty line.	SUSENAS
P1 (poverty gap)	0.136	0.00	0.441	0.056	1291	Sum of deviations between monthly expenditures per capita and the poverty line, normalized by the district total income necessary to reach the poverty line.	SUSENAS
P2 (poverty severity index)	0.032	0.00	0.194	0.022	1291	For a district's population of poor, it is the sum of squared individual deviations from the poverty line, normalized by the squared poverty line.	SUSENAS
Fights	0.051	0.00	0.596	0.073	1291	Share of the district's population living in villages or townships in which mass fights occurred during the year.	PODES
Pollution	0.279	0.00	1.00	0.203	1291	Share of the district's population living in villages or townships with significant air, water, or soil pollution.	PODES
Employment	0.111	0.00	1.00	0.216	1291	Share of foreign facilities in the total industrial employment in a district.	SI
Output	0.133	0.00	1.00	0.252	1291	Share of foreign facilities in the total industrial output in a district.	SI
Tax	0.130	0.00	1.00	0.283	1291	Share of foreign facilities in the industry's total tax payments in a district.	SI
Charity	0.119	0.00	1.00	0.265	1291	Share of foreign facilities in the industry's total charity giving in a district.	SI
Industrial employment	0.023	0.00	0.416	0.043	1291	Share of industrial employment in a district's total employment.	SI
Urbanization	0.401	0.00	1.00	0.322	1291	Share of the district's population living in urban area.	SUSENAS
Literacy	0.940	0.466	1.00	0.064	1291	Share of the district's adult (20+) population that can read or write.	SUSENAS
Topography	0.133	0.00	1.00	0.171	1291	Share of the district's population settled on slopes or peaks instead of valleys.	PODES
Travel time	1.67	0.00	28.25	1.993	1291	The average travel time (in hours) necessary for the district population in order to reach the district capital.	PODES
Age	0.610	0.392	0.728	0.042	1291	Share of the district's population aged 16-60 years.	SUSENAS
Religion	0.813	0.00	1.00	0.335	1291	Share of the district's population living in villages or townships in which Islam is the majority religion.	PODES
Land access	0.713	0.242	1.00	0.127	1291	Index of the quality of access to land and security of tenure. The interval data ranging from 0 to 100, with 0 standing for the lowest quality, is divided by 100, and missing observations are imputed.	KPPOD
Security	0.636	0.024	1.00	0.139	1291	Index of the level of insecurity and conflict in a district. The interval data ranging from 0 to 100, with 0 standing for the lowest level of security, is divided by 100, and missing observations are imputed.	KPPOD
IV_emp.	0.001	0.00	0.014	0.002	1291		SI
IV_output	0.001	0.00	0.029	0.003	1291	IV_X is the shift-share instrument of the variable X , with X either <i>Employment</i> , <i>Output</i> , <i>Charity</i> , or <i>Tax</i> . At a period $t \in [2005, 2011, 2015]$, it is a district k initial share, during the reference year 2003, of nationwide industry level of X , times the nationwide share, excluding district k , of foreign MNEs in nationwide industry level of X , excluding district k .	SI
IV_charity	0.001	0.00	0.346	0.012	1291		SI
IV_tax	0.001	0.00	0.355	0.016	1291		SI

After construction, all variables are continuous and at the district level.

3.3 Analytical method

We end up with a sample of 1,291 observations. This is a short pseudo-panel, with a large cross-section dimension—431 districts— and only 3 measurement points in time—2008, 2014, and 2018—with uneven gaps between these points. This justifies using pooled IV regressions with observations clustered at the province level. Indonesian province governments have budgets to finance programs for assistance, environmental protection, and social cohesion (Sumarto et al. 2014). Unobserved factors, likely to influence the dependent variables, justify introducing province dummies. In a short panel context, group dummies are a better empirical strategy compared to individual-level dummies which would capture the effect of the main explanatory variable (Cameron and Triverdi 2007; Bell and Jones 2015). Year dummies are not included as they would otherwise capture poverty variations and the effects of socio-economic conditions, integrated in the model, that contributed to Indonesia’s recent positive development (Sumarto et al. 2014). The correlation matrix (Table A1 in annex) reveals no important correlation between the explanatory or the control variables. The instrumented variables *Output* and *Charity* are correlated, or weakly correlated, with their instrumental variables that are respectively *Land access* and *IV_output*, and *Security* and *IV_charity*. *Employment* is correlated with *IV_emp.*, but not with *Land access*, and *Tax* is weakly correlated with *Security*, but not with *IV_tax*.

4 Results

The Table 3a (columns 1, 2, 3, and 4) exhibits the second stage results of pooled IV regressions of models in which the poverty headcount ratio *P0* is the dependent variable, and for alternative indicators of MNEs’ presence, *employment*, *output*, *tax*, or *charity*. For

these four indicators, the estimated coefficients are respectively 0.336, 0.013, 0.012, and 0.016, and non-significant, preventing us from supporting hypothesis H1. A relatively higher presence of MNEs does not reduce the number of poor people locally.

For models in which poverty depth *P1* is the dependent variable (columns 5, 6, 7, and 8, Table 3a), the estimates are always positive, and for *employment* and *output*, they are significant and respectively equal to 0.423 and 0.082. The results are similar with the severity of poverty *P2* (columns 9, 10, 11, and 12). The estimated coefficients for *employment* and *output* are positive and significant, respectively equal to 0.175 and 0.032. These results obtained for *P1* and *P2* bring support to the second hypothesis. A higher presence of industrial MNEs, measured as shares in total manufacturing employment and output, induces higher levels of depth and severity of poverty at the district level.

With the dependent variable *pollution*, the estimated coefficients are always positive (Table 3b, columns 1, 2, 3, and 4), but significant only for the variable *output* and equal to 0.242 (column 2). This supports the fourth hypothesis that a higher foreign firms' presence is associated with a higher exposure of local populations to pollution problems. The significance obtained only for *output* suggests an explanation based on a scale effect of production on pollution. The results are never significant with the dependent variable *fishes*.

Table 3a Pooled instrumental variable regressions, 2nd stage results

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	P0				P1				P2			
Employment	0.336 (0.240)				0.423* (0.246)				0.175* (0.100)			
Output		0.013 (0.054)				0.082* (0.046)				0.032* (0.017)		
Tax			0.012 (0.067)				0.007 (0.054)				0.007 (0.021)	
Charity				0.016 (0.046)				0.059 (0.038)				0.024 (0.014)
Indus. emp.	-0.519 (0.326)	-0.092 (0.085)	-0.100 (0.142)	-0.101 (0.087)	-0.592* (0.334)	-0.138* (0.072)	-0.047 (0.116)	-0.127* (0.072)	-0.251* (0.136)	-0.060** (0.027)	-0.034 (0.044)	-0.056** (0.027)
Urbanization	-0.018 (0.020)	-0.038*** (0.009)	-0.038*** (0.009)	-0.038*** (0.009)	0.008 (0.020)	-0.014* (0.007)	-0.018*** (0.007)	-0.015** (0.007)	0.006 (0.008)	-0.003 (0.003)	-0.004 (0.003)	-0.003 (0.003)
Literacy	-0.431*** (0.089)	-0.340*** (0.040)	-0.341*** (0.041)	-0.340*** (0.039)	-0.230** (0.091)	-0.127*** (0.034)	-0.115*** (0.034)	-0.123*** (0.033)	-0.094** (0.037)	-0.051*** (0.013)	-0.047*** (0.013)	-0.050*** (0.012)
Topography	0.005 (0.020)	0.014 (0.012)	0.014 (0.013)	0.013 (0.013)	-0.015 (0.021)	-0.003 (0.010)	-0.003 (0.010)	-0.009 (0.011)	-0.005 (0.008)	-0.0002 (0.004)	-0.001 (0.004)	-0.003 (0.004)
Travel time	-0.001 (0.002)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.004** (0.002)	-0.004*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)	-0.001 (0.001)	-0.001** (0.0004)	-0.001** (0.0003)	-0.001* (0.0004)
Age	-0.339*** (0.104)	-0.305*** (0.067)	-0.300*** (0.065)	-0.308*** (0.068)	-0.213** (0.106)	-0.188*** (0.057)	-0.164*** (0.053)	-0.192*** (0.057)	-0.087** (0.043)	-0.076*** (0.021)	-0.066*** (0.020)	-0.078*** (0.021)
Religion	0.006 (0.019)	-0.004 (0.012)	-0.005 (0.012)	-0.005 (0.011)	0.032 (0.020)	0.021** (0.010)	0.018* (0.010)	0.017* (0.010)	0.010 (0.008)	0.006 (0.004)	0.005 (0.004)	0.005 (0.004)
Provinces dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Constant	0.707*** (0.086)	0.652*** (0.050)	0.652*** (0.050)	0.655*** (0.051)	0.409*** (0.089)	0.349*** (0.043)	0.338*** (0.041)	0.356*** (0.043)	0.145*** (0.036)	0.119*** (0.016)	0.116*** (0.015)	0.122*** (0.016)
Observations	1,291	1,291	1,291	1,291	1,291	1,291	1,291	1,291	1,291	1,291	1,291	1,291
Sargan stat.	3.06	11.88	1.45	1.40	0.08	5.68	2.90	2.63	0.41	9.74	4.63	4.48
χ^2 p-val.	0.08	0.00	0.23	0.24	0.78	0.02	0.9	0.11	0.52	0.00	0.03	0.03

Standard errors in parentheses. ***, **, * mean significant at 1%, 5%, 10%. 431 districts observed in 2008, 2014, 2018. *Employment, output, tax, and charity* are observed with a 3-years lag. Foreign investment-based presence is foreign ownership \geq 10%.

Table 3b Pooled instrumental variable regressions, 2nd stage results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Pollution				Fights			
Employment	0.697 (0.535)				-0.002 (0.145)			
Output		0.242* (0.151)				0.014 (0.050)		
Tax			0.116 (0.180)				0.024 (0.062)	
Charity				0.181 (0.124)				-0.013 (0.043)
Indus. emp.	-0.384 (0.727)	0.226 (0.236)	0.306 (0.384)	0.253 (0.235)	-0.146 (0.197)	-0.167** (0.079)	-0.197 (0.133)	-0.129 (0.081)
Urbanization	0.091** (0.043)	0.061** (0.024)	0.054** (0.024)	0.059** (0.023)	0.042*** (0.012)	0.043*** (0.008)	0.043*** (0.008)	0.041*** (0.008)
Literacy	0.322 (0.198)	0.474*** (0.110)	0.488*** (0.112)	0.485*** (0.107)	-0.011 (0.054)	-0.014 (0.037)	-0.018 (0.039)	-0.010 (0.037)
Topography	-0.057 (0.045)	-0.036 (0.034)	-0.043 (0.034)	-0.055 (0.035)	0.015 (0.012)	0.015 (0.011)	0.0138 (0.012)	0.016 (0.012)
Travel time	-0.012*** (0.004)	-0.011*** (0.003)	-0.010*** (0.003)	-0.009*** (0.003)	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)
Age	0.311 (0.231)	0.323* (0.186)	0.401** (0.176)	0.308* (0.185)	0.233*** (0.063)	0.229*** (0.062)	0.234*** (0.061)	0.238*** (0.064)
Religion	-0.031 (0.042)	-0.044 (0.032)	-0.058* (0.032)	-0.056* (0.031)	-0.023** (0.011)	-0.022** (0.011)	-0.024** (0.011)	-0.022** (0.011)
Provinces dummies yes	yes	yes	yes	yes	yes	yes	yes	yes
Constant	-0.344* (0.193)	-0.427*** (0.140)	-0.451*** (0.135)	-0.407*** (0.140)	-0.095* (0.052)	-0.093** (0.047)	-0.093** (0.047)	-0.099** (0.048)
Observations	1,291	1,291	1,291	1,291	1,291	1,291	1,291	1,291
Sargan stat.	1.72	0.07	0.12	0.40	0.02	0.00	0.04	0.00
χ^2 p-val.	0.19	0.79	0.73	0.53	0.90	0.99	0.84	0.97

Standard errors in parentheses. ***, **, * mean significant at 1%, 5%, 10%. 431

districts observed in 2008, 2014, and 2018. Employment, output, tax, and charity are observed with a 3-years lag.

The identification tests reveal that the over-identification (Sargan statistics, Tables 3a & 3b), weak identification, and under-identification restrictions (Table 4) are satisfied, except for some of the regressions when *employment* is the main explanatory variable. For these latter cases, and following Nichols' (2007) approach, we replace the excluded instrument *land access* by another one which is the interaction between *land access* and one of the

control variables, *industrial employment*. The Sargan, Cragg-Donald Wald F, and Anderson canonical correlation LM statistics are improved such that the over-identification, weak identification, and under-identification restrictions are respectively met, whereas the main results—not reported here—remain similar, confirming the robustness of the results.

The orthogonality condition, with the joint significance of endogenous regressors (Anderson-Rubin Wald F-statistic) are always met, supporting the validity of the excluded instruments and the procedure.

Table 4 Pooled Instrumental variable regressions, 1st stage results

<i>Variables</i>	Employment	Output	Tax	Charity
IV_emp.	5.931 (4.691)			
IV_output		15.76*** (3.455)		
IV_tax			-1.556*** (0.497)	
IV_charity				3.274*** (0.605)
Land access	0.093 (0.061)	0.097 (0.071)		
Security			0.098 (0.064)	0.012 (0.060)
Indus. emp.	1.209*** (0.185)	0.790*** (0.218)	2.213*** (0.218)	1.343*** (0.200)
Urbanization	-0.049* (0.028)	-0.044 (0.033)	-0.040 (0.035)	-0.054 (0.033)
Literacy	0.267** (0.128)	0.175 (0.151)	0.213 (0.169)	0.160 (0.158)
Topography	0.024 (0.041)	-0.008 (0.048)	0.033 (0.053)	0.085 (0.050)
Travel time	0.002 (0.004)	0.0002 (0.004)	-0.003 (0.005)	-0.007 (0.004)
Age	0.083 (0.217)	0.185 (0.255)	-0.168 (0.283)	0.393 (0.263)
Religion	-0.038 (0.038)	-0.042 (0.045)	0.049 (0.049)	0.019 (0.046)
Province dummies	yes	yes	yes	yes
Constant	-0.192 (0.167)	-0.146 (0.196)	-0.097 (0.215)	-0.273 (0.200)
<i>Underidentification test</i>				
Anderson canon. corr. LM stat.	3.85	22.61	12.14	29.55
χ^2 p-value	0.155	0.000	0.000	0.000
<i>Weak identification test (of excluded instruments)</i>				
Cragg-Donald Wald F stat.	1.86	11.12	5.92	14.62
χ^2 p-value	0.155	0.000	0.002	0.000
<i>Orthogonality condition</i>				
Anderson-Rubin Wald test	5.88	5.89	5.92	2.60
p-value	0.003	0.003	0.003	0.074

Standard errors in parentheses. ***, **, * mean significant at 1%, 5%, 10%.

Robustness tests

Although the *P0* headcount ratio is the most common measure of monetary poverty, it relies on aggregated consumption expenditures per capita and on the poverty line. The former may hide the absence of certain essential goods, whereas the latter is a trade-off between goods and which may not fit in all contexts. For robustness check of the results and to reflect deprivation, we use alternatively disaggregated measures of the quality of housing, and of access to piped water or private sanitation, and whether a household is recipient of a food assistance program (Ravallion 2016). *Food program* is the proportion of households in the district that are recipient of the rice assistance program “raskin”. *Piped water* is the proportion of households that have access to piped water. *Toilet* is the proportion of households that have exclusive or shared access to private sanitation. *Floor* is the proportion of households whose house floor is mud. All data originate from SUSENAS. Part 1 of Table 5 exhibits the main results of these robustness tests. The estimated parameters for *Employment*, *Output*, *Tax*, and *Charity* remain non-significant with all alternative indicators *Food program*, *Piped water*, *Toilet*, and *Floor*, thus confirming results obtained with *P0*.

As a second robustness check, we consider an alternative definition of a foreign firm’s investment-based presence, with an equity ownership threshold of 33%. This is justified as the ownership share is likely to impact the foreign owners’ behavior. For instance, Takii and Ramstetter (2005) observe that the productivity of Indonesian manufacturing plants increased with the percentage of foreign ownership during the period 1975-2001. The results remain unchanged with the alternative threshold of 33% of foreign ownership as shown in part 2 of Table 5.

Third, to test the stability of the model, we run several regressions in which we exclude the main explanatory variables, or we remove the control variables one after the other. The

results and the estimated parameters remain stable across these different specifications, as exhibited in part 3 of Table 5.

Finally, we consider the dataset as a panel instead of a pooled sample. A series of Breusch–Pagan LM tests lead us to choose fixed-effect (FE) specification over random-effects. We run IV regressions with fixed effects panel. The estimated parameters for the main explanatory variables have the same signs as those obtained with the pooled IV regressions, but with levels of significance systematically lower, as shown in part 4 of Table 5. The reason is that with short panel, the individual intercepts of FE are absorbing the effects of the main explanatory variables (Cameron and Triverdi 2007; Bell and Jones 2015).

Table 5 Robustness tests

Part 1. Alternative indicators of material deprivation. IV pooled regressions, 2nd stage results for the main independent variables only													
Variables	Food program			Piped water			Toilet		Floor				
Employment	-0.367 (0.515)			-0.546 (0.555)			0.264 (0.327)		-0.199 (0.304)				
Output	-0.060 (0.171)			-0.254 (0.177)			0.095 (0.108)		-0.144 (0.104)				
Tax		-0.204 (0.218)			-0.104 (0.210)			0.052 (0.133)		-0.100 (0.126)			
Charity			-0.084 (0.145)			0.010 (0.143)		-0.069 (0.093)		0.085 (0.084)			
Part 2. Alternative definition of foreign investment-based presence: foreign ownership ≥ 33%. IV pooled regressions, 2nd stage results for the main independent variables only													
	P0	P1			P2		Pollution						
Employment	0.319 (0.239)			0.431* (0.256)		0.176* (0.103)			0.761 (0.571)				
Output		0.007 (0.056)			0.082* (0.048)		0.031* (0.018)			0.255* (0.157)			
Tax			0.012 (0.071)			0.006 (0.058)		0.007 (0.022)		0.123 (0.192)			
Charity				0.014 (0.045)		0.056 (0.037)			0.022 (0.014)	0.177 (0.122)			
Part 3. IV pooled regressions, 2nd stage results, model stability							Part 4. IV panel fixed effect regressions, 2nd stage results						
Employment	0.383* (0.225)	0.416* (0.251)	0.442* (0.267)	0.441* (0.265)	0.396* (0.231)	0.467** (0.209)	Employment	-0.130 (0.258)	0.840 (0.696)	0.247 (0.213)	1.407 (1.305)	0.696 (0.606)	
Indus. emp.	-0.550* (0.308)	-0.595* (0.342)	-0.639* (0.365)	-0.629* (0.358)	-0.585* (0.318)	-0.695*** (0.269)	-0.033 (0.040)	Indus. emp.	0.268 (0.330)	-1.029 (0.892)	-0.300 (0.273)	-1.978 (1.672)	-0.956 (0.776)
Urbanization	-0.005 (0.017)	-0.002 (0.019)	0.007 (0.020)	0.010 (0.021)	-0.010 (0.014)		-0.019*** (0.007)	Urbanization	0.041 (0.051)	-0.134 (0.137)	-0.041 (0.042)	0.064 (0.256)	-0.097 (0.119)
Literacy	-0.240*** (0.086)	-0.249*** (0.093)	-0.251** (0.098)	-0.251*** (0.098)			-0.113*** (0.032)	Literacy	-0.102 (0.065)	-0.129 (0.177)	-0.044 (0.054)	0.288 (0.331)	0.022 (0.154)
Topography	-0.010 (0.019)	-0.019 (0.020)	-0.017 (0.021)				-0.003 (0.010)	Topography	0.023 (0.021)	-0.024 (0.056)	-0.004 (0.017)	-0.063 (0.104)	0.061 (0.048)
Travel time	-0.004** (0.002)	-0.004** (0.002)					-0.003*** (0.001)	Travel time	0.001 (0.002)	-0.008 (0.005)	-0.002 (0.002)	-0.014 (0.009)	-0.003 (0.004)
Religion	0.026 (0.018)						0.019** (0.009)	Religion	-0.087 (0.164)	-0.495 (0.444)	-0.170 (0.136)	-0.539 (0.832)	-0.141 (0.387)
Age							-0.165*** (0.053)	Age	0.039 (0.149)	-0.357 (0.403)	-0.117 (0.123)	-0.256 (0.755)	0.003 (0.351)
Province dummies	yes	yes	yes	yes	yes	yes	Yes						

Standard errors in parentheses. ***, **, * mean significant at 1%, 5%, 10%. 431 districts observed in 2008, 2014, 2018. *Employment, output, tax, a*

5 Discussion and conclusion

The relationship between foreign MNEs' investment-based presence and monetary and multidimensional poverty is investigated in a developing country context. It is disentangled into different pathways through which different facets of a foreign firm presence impact households' monetary poverty, vulnerability and exposure to risks. The relationship is analysed empirically across 431 Indonesian administrative districts in 2008, 2014, and 2018, using pooled IV regressions, and the results confirm its complexity. Foreign firm presence has no or negative effects in terms of poverty alleviation, thus underlying the need of a nuanced conclusion. A higher presence of foreign MNEs is not reducing the number of poor people, thus invalidating hypothesis 1, whereas it raises the depth and severity of poverty, supporting the second hypothesis. This is consistent with earlier results on the inequalities induced by FDI (Doh 2019). There is a skill-bias in foreign MNEs' behaviour and the additional jobs and salaries they bring (Haile et al. 2017). They hire low- and medium-skilled workers, already outside poverty, whereas the poor, unskilled, are left behind (Jenkins 2005; Kolk et al. 2018) explaining that their number does not vary significantly, as revealed by the non-significant estimates obtained when $P0$ is the dependent variables (Table 3a, columns 1-4). They are actually worse-off, as shown by the increasing depth and severity of poverty. There is a structural change in the formal employment sector, as unskilled jobs are being destroyed, pushing the poor further into poverty and precarity (Jude and Silaghi 2016; Martuscelli and Gasiorek 2019). Domestic firms, intensive in unskilled workers, are crowded-out either by more productive foreign

competitors, or because they have no longer access to essential resources such as financings, skilled employees, and raw materials (Kolk et al. 2018).

This negative effect in terms of poverty materiality is revealed when measuring foreign MNEs' presence with industrial employment and output shares, reflecting firms' core business activities (Kolk et al., 2018).

Alongside this negative effect, the results indicate that a higher presence of foreign MNEs measured in terms of output shares is associated with local populations' higher exposure to pollution, thus supporting the third hypothesis of a higher vulnerability. More industrial activities, everything else being equal, release more pollution.

This study makes relevant contributions to the literature, first by decomposing the relationship between foreign MNEs' presence and poverty into its different pathways, which permits to reveal various effects, thus informing the debate. Second, contrary to some studies (Gouhou and Soumaré 2012; Jaax 2020), and consistent with earlier predictions (Jenkins 2005), it is shown that foreign firms' investment-based presence does not reduce the number of poor people, but worsens their conditions: the poor are getting poorer in average, with more inequalities between them. The foreign MNEs' presence raises local populations vulnerability through a higher exposure to pollutions. These effects observed on different poverty dimensions and channeled through different facets of firm presence call for a nuanced conclusion on the overall effect of foreign MNEs' presence (Kolk et al. 2018).

This has important implications for policy makers and managers of MNEs. This calls for more nuanced and balanced policies regarding internationalization, inward FDIs, and their alleged benefits for local economies, consistent with other studies. For instance, Belderbos et al. (2021) show that between 2000 and 2007, inward FDI in Belgium did not bring

additional spillover or productivity growth for local firms that were already exporting to or importing from abroad. Dosi et al. (2023) observe that following its accession to the World Trade Organization, China hosted a rising number of exporting firms, largely foreign owned, that did not have any productivity and wage premia in the long-run. Our results suggest that governments in developing countries willing to attract foreign investments as a strategy to foster growth, employment, and development in the long run must undertake accompanying measures mitigating the adverse effects, in the short run, of structural changes induced by FDIs. These measures must target the unskilled who risk losing their jobs and being pushed deeper into poverty and precarity. This could be achieved by limiting the crowding-out of domestic firms, while preserving their access to markets and resources needed to maintain their activity. One such resource is external financing, and government credit promotion programs have proven effective for supporting small domestic firms in Indonesia (Auwalin 2021). Another accompanying measure is to ease micro-entrepreneurship, which serves as a safety net and a source of livelihood. Poor households in developing countries start micro-businesses to complement and diversify their income, and to reduce vulnerability to economic risk such as losing one's job (Vial and Hanoteau 2015).

Host countries' authorities must implement environmental policies in order to cut and mitigate the pollutions of additional foreign industrial activities. Such policies must proceed from cost-benefit analyses, force polluters to internalize external costs, and compensate the victims of pollutions (Baumol and Oates 1988). Governments in developing countries may not have the sufficient resources and capabilities to enact, implement, and enforce environmental regulations (Montiel et al. 2021) and they should seek the involvement of MNEs. Multinationals cause inequalities and disorders in

developing countries, and they should take responsibility for their full value chain, go beyond their accountability to shareholders, and create value for stakeholders in society at large. For that matter, MNEs can play direct and indirect roles in pursuing the United Nations' Sustainable Development Goals (SDGs). For instance, MNEs can target SDGs in the domains of poverty, inequalities, clean energy, access to clean water, inclusive growth, or climate action, through their investments and activities in host countries (Ghauri, 2022). For that aim, our study has practical implications for MNEs, revealing their potential negative impacts on local communities. This justifies to rethink and adapt their investments policies in host developing countries, to better achieve SDGs. MNEs' subsidiaries can design their internal investments—those targeting primary stakeholders such as employees or suppliers—or their external investments—those targeting secondary stakeholders, such as local communities or interest groups (Montiel et al. 2021).

6 Limitations and future research

Our study is subject to several limitations that may confound the results and open up interesting avenues for future research. First, although Indonesia shares common features with other developing countries (Miguel et al. 2006), it has also economic, institutional, and cultural specificities, and this limits the generalizability of our findings obtained with a country-study. Their reliability could be increased through future research using data from different countries.

Second, we do not consider all dimensions of poverty. For instance, it would be relevant to focus on the effects of foreign MNEs' presence on education and health, through a mediation analysis. These effects are certainly channelled through the support to or

cooperation with local public agencies and non-profit organization in charge of providing health and educational services and assistance to local populations (Kolk et al. 2018).

Third, the non-significant results obtained with the explanatory variable *charity*, and with the dependent variable *fight*s, are intriguing. For *charity*, this may come from our inability to account for local non-profit actors, due to unavailable data. To implement impactful CSR activities in host countries, foreign MNEs must rely on and partner with local actors (Oetzel and Doh 2009). This would justify including in the analysis non-profit actors partnering locally with foreign MNEs, as a potential moderating factor of the relationship between MNEs' peripheral CSR activities and dimensions of local poverty (Kolk et al. 2018).

Mihalache-O'Keef (2018) observes a significant negative (positive) effect of primary (tertiary) sector FDI's on violent conflicts. However, the relationship appears non-significant for FDI's pertaining to the secondary sector, which is similar to our results obtained with the variable *fight*s. An explanation is that the industrial sector is made of subsectors varying in terms of their intensities in pollution, raw materials, low- and high-skilled labour, whereas these intensities matter on the relationship between FDI's and conflicts (Mihalache-O'Keef, 2018). In terms of these intensities, some manufacturing subsectors (e.g., heavy industries) are close to the primary sector, whereas others (e.g., micro-electronics) are closer to the tertiary sector. FDI's in these subsectors are therefore likely to induce opposed effects on conflicts, that may compensate or cancel each other if observed at the aggregated level of the whole secondary sector, thus explaining non-significant estimates. This would justify breaking down the manufacturing sector in the analysis, and considering foreign MNEs according to their subsectors. Such a decomposition would be further justified as some manufacturing subsectors (e.g., food and

dairy products, pharmaceuticals) are more prone than others to BOP strategies and to have poverty alleviation as an explicit goal of core business activities (Kolk et al. 2018).

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Table A2 Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	
(1) P0	1.00																					
(2) P1	0.55*	1.00																				
(3) P2	0.58*	0.94*	1.00																			
(4) Fights	0.04	0.06*	0.07*	1.00																		
(5) Pollution	-0.28*	-0.09*	-0.11*	0.05	1.00																	
(6) Employment	-0.12*	0.01	0.01	-0.03	0.13*	1.00																
(7) Output	-0.12*	0.04	0.04	-0.01	0.14*	0.88*	1.00															
(8) Tax	-0.12*	-0.03	-0.04	0.00	0.13*	0.64*	0.65*	1.00														
(9) Charity	-0.10*	0.02	0.02	0.03	0.15*	0.61*	0.65*	0.66*	1.00													
(10) Indus. Emp.	-0.18*	-0.08*	-0.10*	-0.05	0.22*	0.28*	0.24*	0.32*	0.29*	1.00												
(11) Urbanization	-0.36*	-0.18*	-0.18*	0.16*	0.29*	0.08*	0.09*	0.12*	0.12*	0.41*	1.00											
(12) Literacy	-0.38*	-0.23*	-0.23*	0.08*	0.28*	0.13*	0.11*	0.11*	0.09*	0.12*	0.33*	1.00										
(13) Topography	0.18*	0.05	0.06*	0.01	-0.16*	-0.04	-0.06*	-0.06*	-0.02	-0.18*	-0.28*	-0.16*	1.00									
(14) Travel time	0.22*	0.09*	0.15*	0.10*	-0.20*	-0.02	-0.03	-0.06*	-0.09*	-0.14*	-0.37*	-0.13*	0.03	1.00								
(15) Age	-0.33*	-0.15*	-0.15*	0.00	0.28*	0.10*	0.11*	0.12*	0.14*	0.33*	0.56*	0.27*	-0.37*	-0.27*	1.00							
(16) Religion	-0.18*	-0.10*	-0.14*	-0.18*	0.15*	0.05	0.06*	0.08*	0.08*	0.19*	0.21*	0.15*	-0.29*	-0.31*	0.32*	1.00						
(17) Land access	0.07*	0.03	0.01	-0.14*	-0.12*	-0.05	-0.06*	-0.09*	-0.09*	-0.16*	-0.35*	-0.04	0.16*	0.00	-0.20*	-0.10*	1.00					
(18) Security	-0.01	-0.01	-0.02	-0.04	-0.09*	-0.04	-0.06*	-0.06*	-0.09*	-0.17*	-0.16*	0.06*	0.14*	-0.03	-0.10*	-0.16*	0.50*	1.00				
(19) IV emp.	-0.17*	-0.05	-0.07*	0.02	0.20*	0.21*	0.21*	0.25*	0.25*	0.63*	0.35*	0.11*	-0.12*	-0.12*	0.29*	0.17*	-0.21*	-0.16*	1.00			
(20) IV_output	-0.17*	-0.05	-0.07*	0.03	0.19*	0.25*	0.26*	0.30*	0.28*	0.60*	0.32*	0.13*	-0.14*	-0.10*	0.27*	0.15*	-0.20*	-0.14*	0.91*	1.00		
(21) IV_charity	-0.04	0.02	0.01	-0.01	0.08*	0.07*	0.12*	0.14*	0.22*	0.26*	0.09*	0.01	-0.02	-0.05	0.11*	0.06*	-0.05	-0.08*	0.36*	0.34*	1.00	
(22) IV_tax	-0.04	-0.01	-0.01	-0.03	0.04	-0.01	-0.01	-0.00	-0.01	0.28*	0.12*	0.03	-0.05	-0.04	0.06*	0.04	0.02	0.01	0.12*	0.23*	0.05	1.00

* is significant at 5%