Dynamics of Income Inequality, Investment, and Unemployment in Indonesia

Muryani[1*], Miguel Angel Esquivias[1], Narayan Sethi[2], and Henny Iswanti[1]

[1] Department of Economics, Faculty of Economics and Business, Universitas Airlangga, Indonesia
[2] Department of Humanities and Social Sciences, National Institute of Technology Rourkela, India
* Muryani, corresponding author. Email: muryani@feb.unair.ac.id
Submitted: 27 April 2021, Accepted: 30 July 2021, Published: 26 August 2021
Volume 29, 2021. pp. 660-678. http://doi.org/10.25133/JPSSv292021.040

Abstract

This paper examines the effect of per capita income, investment, and unemployment on income inequality in Indonesia from 2011 to 2019. We use both static and dynamic panel data approaches covering 34 provinces in Indonesia. The results support the Kuznets hypothesis, whereby a more significant per capita income growth is associated with more substantial income inequality in a short period; however, this decreases over time (sign change). Furthermore, a larger real per capita income is associated with lower inequality when accompanied by progress in human capital. Alternatively, foreign direct investment (FDI) and infrastructure expenditure positively relate to income inequality, although FDI eventually helps lower inequality. Similarly, increases in domestic private investment can help to reduce income disparity. Meanwhile, unemployment is negatively associated with income inequality, suggesting that better jobs (rather than more jobs per se) are needed to improve income distribution in the country. Although per capita income, investment, and employment have improved substantially and helped Indonesia raise overall income, economic progress does not seem to have been inclusive. We argue that the panel dynamic model helps to capture the persistence effect of income distribution, suggesting a more precise estimation of income inequality issues than static models.

Keywords

Income inequality; Indonesia; investment; per capita income; unemployment; welfare

Introduction

Based on neoclassical and endogenous economic growth models, it is generally believed that more significant inflows of foreign direct investment (FDI) support economic growth. However, the relationship between economic growth, investment, and income inequality often come as a trade-off. Kuznets (1955) opened the empirical debate, arguing that income distribution tends to be unequal in the early stages of economic development, but ultimately, income becomes more evenly distributed (i.e., 'U-inverted' Kuznets hypothesis). Several empirical studies followed, looking into empirical evidence for links between economic growth, investment, and income inequality (Bhandari, 2007; Kuncoro, 2013; Melikhova & Čížek, 2014).

Earlier literature on income inequality identified that uneven income distribution could arise due to differences in access to resources (Kataoka, 2012), different sectoral activities (Bogliaccini & Egan, 2017), and different levels of access to services like education (Tomul, 2009), finance, technology, and health (Esquivias et al., 2021). As a result of uneven distribution in resources, more significant economic development rates often occur in more endowed and better-connected regions than those in less wealthy and more remote areas.

As a developing country, Indonesia faces income inequality, with large imbalances occurring between and within regions, especially between Java Island and other provinces outside of Java (Kataoka, 2018; van Leeuwen & Földvári, 2016). Income inequality is observed between more and less sophisticated economic sectors (Lee & Wie, 2015). In Indonesia, provinces differ in geography, natural wealth, infrastructure, and human capital, which likely lead to uneven distribution of input factors resulting in overconcentration of resources, labor surpluses, and different patterns of income growth (Kataoka, 2012).

According to De Silva and Sumarto (2015), inequality in Indonesia is high due to economic and social policies that chiefly support more efficient economic activities and benefit higher-income earners, leaving the less privileged behind. Industrial policies often help more prominent entrepreneurs to a more considerable extent than small entrepreneurs, and the more skilled over the less-skilled workers (Lee & Wie, 2015). Indonesia is led mainly by small enterprises and informal workers, suggesting that the lack of support of smaller firms may create significant gaps between highly competitive and smaller firms and individuals (Esquivias & Harianto, 2020).

Although substantial reductions in poverty have taken place in Indonesia (Muryani & Esquivias, 2021; Purwono et al., 2021; Yusuf & Sumner, 2015), the Gini ratio (a measure of income or wealth inequality within a nation) has deteriorated over the past two decades (van Leeuwen & Földvári, 2016). Inequality in the country remains substantially significant (Erlando et al., 2020). Government efforts to promote more rapid economic growth, attract more FDI, and create more sophisticated jobs have been more active than ever (Das & Sethi, 2020; Esquivias & Harianto, 2020). Meanwhile, it is believed that investment plays an essential role in economic growth (Mehic et al., 2013).

The literature on FDI and income inequality can be presented into three streams. First, some researchers claim that FDI leads to a deterioration in income distribution (Bogliaccini & Egan, 2017; McLaren & Yoo, 2017). Others suggest that FDI supports equal income distribution as FDI promotes revenue, higher technological capability, and greater productivity (Mushtaq et

al., 2014; Ucal et al., 2016). A third stream of literature argues that FDI has only an indirect impact on income inequality or finds no evidence for the effect on uneven distribution (Bhandari, 2007; Fazaalloh, 2019; Rao et al., 2020; Sylwester, 2005). Empirical cases in Indonesia mainly support the case for the indirect effects of FDI on income inequality. Still, the question—of whether or not government efforts to attract more FDI and policies that mainly target high GDP growth aggravate Indonesia's income inequality—remains unsettled. Income inequality has been increasing in Indonesia, and the debate surrounding it remain inconclusive (De Silva & Sumarto, 2015; Taresh et al., 2021). A rise in unequal income distribution is often associated with the uneven allocation of development funds across provinces, high levels of population growth, the concentration of regional economic activity in Java, differences in demographic conditions, differences in resource endowments, inequality of infrastructure investment, and uneven per capita *Produk Domestik Regional Bruto* [gross regional domestic product] (PDRB) across provinces. The above problems open an empirical gap for this study.

In this study, we examine four specific links between income inequality and economic variables. First, we explore the effects of investment (foreign and domestic) on income - inequality in Indonesia. Second, we test the impact of per capita PDRB on income inequality to find new evidence of the 'U-inverted' Kuznets hypothesis in Indonesia. Third, we test whether unemployment is related to income inequality, aiming to determine whether creating more jobs may be enough to lower inequality; or, instead, whether new policies for labor promotion are needed. Fourth, we test whether the recent focus of national policies on increasing investment in infrastructure and human capital (Human Development Index [HDI]) has contributed to better income distribution. We look into data at a regional level, covering Indonesia's 34 provinces from 2011 to 2019.

We contribute to the literature by employing disaggregated data at the province level (34 provinces), adding a time trend variable (per capita square PDRB and square FDI), and incorporating unemployment and per capita income. As argued in Kuznets (1955), initial differences in income level across and within provinces are sources of unequal effects from investment. While FDI impacts have attracted more attention than domestic investment, we compare the effects that could help address the need for a more diverse investment policy. Similarly, we test whether effects from FDI may persist over a long period or whether the impact on income distribution changes direction over a more extended period.

Additionally, we contribute to the literature by comparing static panel data models (fixed and random effects) often employed in previous studies, with a dynamic model (Generalized Method of Moments [GMM]). Dynamic effects are essential when looking into income inequality, as permanence effects suggest that inequality is related to structural factors. Finally, we provide evidence that creating more jobs is insufficient to lower-income disparities, which requires policies to empower workers and increase their skill levels to benefit from large FDI inflows and Indonesia's rapid income growth. Finally, we compare models using the rate of growth in per capita PDRB and the per capita PDRB itself to examine whether the rate and the amount of per capita PDRB help improve income distribution.

Four arguments justify the decision to look at the Indonesian case. First, few studies have been carried out in Indonesian settings, with findings somewhat unsettled. Second, Indonesia has made substantial investments, undergone industrial policy changes, and attracted investment flows in the last decade (Esquivias & Harianto, 2020; Fernandez et al., 2020). The recently approved Omnibus law introduces essential reforms to foster job creation and simplify Indonesia's investment framework, likely to attract significant FDI inflows. However, the new

policies may exacerbate income inequality, suggesting that more active social and economic policies are needed to help less empowered people. Third, while most studies examine FDI, few empirical studies observe domestic investment, which remains crucial for Indonesia's new economic growth model. Initial levels of income and the unemployment rate could also be found to support the Kuznets hypothesis. Fourth, economic and social policies—aimed at improving welfare—focus on job creation (employment). Still, it is not clear whether or not lower levels of unemployment support more even income distribution.

Literature review

Two strands of literature on income inequality serve as a background for this study. The first strand relates to the extent of income inequality (decomposition approach), assessing the density of income distribution using functional methods. The second strand relates to factors influencing changes in income distribution. The first strand allows the identification of gaps in income distribution across individuals and factors of production. The second helps in the understanding of what drives such changes. Specifically, we look into the effect of changes in income growth, investment, and unemployment on income inequality.

Concept of distribution and income inequality

There are two primary measures of income distribution. The first is the size distribution of income, and the second, the functional or factor share distribution of income (Garvy, 1954). The size distribution of income indicates the amount of total income received by different groups and ponders inequality among different recipients, regardless of the income source. Under the size distribution of income, an individual could be considered a low earner and still own a piece of land. Previous studies in Indonesia identified more educated individuals, higher-skilled workers, and capital owners experiencing more extensive income growth than less privileged people (De Silva & Sumarto, 2015; Miranti et al., 2013; Wicaksono et al., 2017). Most studies in Indonesia agree that there is a deterioration in income equality across groups. On the other hand, factor share distribution of income focuses on the total national income received by each production input, such as land, labor, and capital. Factor share questions the percentage of total income going to each of the main production factors. Functional distribution compares the share of total national income for primary resources to the percentage of total revenue distributed in rent, interest, and profit. In Indonesia, studies have measured inequality decomposition on production factors, testing whether convergence in returns occurs across factors and regions (Kataoka, 2012, 2018; Lee & Wie, 2015). Differences in labor productivity across regions are generally identified as sources of income inequality in the country, strongly influenced by capital (investments) and technological capabilities (e.g., education and skills) (Chongvilaivan & Kim, 2016).

Income growth, investment, and unemployment links to income inequality

The literature on factors driving income inequality is abundant. This paper focuses on three potential drivers of change in income inequality: regional per capita income growth, investment (foreign and domestic), and unemployment.

Particular interest focuses on the links between income growth and inequality (Melikhova & Čížek, 2014). The Kuznets hypothesis postulates that the difference in economic growth rates between regions in the early stages of development often results in uneven income distribution. Still, once production factors are optimized long-term, output growth tends to equalize across areas (Akita et al., 2011). The hypothesis has been tested in many countries, finding mixed results. Indonesia has made meaningful progress in lowering regional disparities (convergence) in efficiency and resource relocation across provinces (Kataoka, 2018). Still, Indonesia displays similar trends to other developing countries where more considerable GDP growth is associated with increasing income inequality (Bogliaccini & Egan, 2017; Rubin & Segal, 2015), similar to South Asian countries (Mushtaq et al., 2014) and to some extent, to those in Africa (Adams & Klobodu, 2017; Kaulihowa & Adjasi, 2018).

In Indonesia, previous studies generally agree that the rise of incomes is positively related to higher income inequality (Fazaalloh, 2019; Kuncoro & Murbarani, 2016). Nevertheless, earlier studies mainly employ static models and fail to capture possible dynamic effects that are likely present in the income distribution. We test whether using static or dynamic models could offer additional evidence on the Indonesian case's Kuznets hypothesis. We argue that static models applied in Indonesia tend to overestimate the effect of per capita income on inequality. The second aspect of considerable interest is the link between investment and income inequality (Bhandari, 2007; Bogliaccini & Egan, 2017; Sylwester, 2005). Investment is generally believed to support national economic growth by functioning as a complement to its domestic savings. Foreign investment can support more rapid economic development processes, such as infrastructure development and factor production purchases. Foreign direct investment (FDI), mainly driven by multinational corporations, directs the construction of factories, the procurement of capital goods, purchasing land for production, and spending on equipment. Esquivias and Harianto (2020) stated that FDI could translate into technological transfers, knowledge sharing, and improvements in managerial practices (positive externalities). As such, foreign agents can be vehicles for encouraging sustainable practices and more efficient use of resources, leading to higher income for the individuals in the host country (Ucal et al., 2016).

More significant investments can lower income inequality for three reasons (Mushtaq et al., 2014). Firstly, investment encourages economic growth and creates additional revenue sources. Secondly, investments support the transfer of modern technology to host countries, thereby positively impacting efficiency and technological capability. Thirdly, investments could increase productivity, leading to higher income for workers. Some of those links between investment and productivity have been empirically tested in Indonesia via efficiency channels (Esquivias & Harianto, 2020), labor productivity, and technological change (Lee & Wie, 2015).

Nevertheless, the literature often finds evidence that FDI supports income equality. Bhandari (2007) examined the impact of FDI on income inequality in transition countries in 1990-2002 using panel data, finding a negative effect on income inequality. Other studies in Africa (Kaulihowa & Adjasi, 2018) show a nonlinear relation between FDI and income inequality, with a positive impact in the short run but a decreasing trend in the effects overall. The study highlights that FDI may support growth but not necessarily an equal distribution of income. For the Indonesian case, Fazaalloh (2019) found indirect adverse effects of FDI on income inequality via economic growth, while no significant direct impacts were identified. Kuncoro and Murbarani (2016) found that economic openness (FDI inflows and trade) in Indonesia supported more considerable income inequality across regions.

Another strand in the income inequality literature looks into the links between inequality and employment or the effects of income inequality via the labor market. It may be expected that increases in unemployment will drive income inequality. Lee et al. (2013) investigated income inequality in Korea from 1980 to 2012, finding that investment and unemployment significantly affect income inequality. For the Indonesian case, the impact of employment on inequality has increased (2002-2012), leading to the deterioration of income distribution (De Silva & Sumarto, 2015). Lee and Wie (2015) identified that technological progress (often driven by FDI) had supported a vast wage inequality in Indonesia, mainly benefiting skilled workers. Strong evidence suggests that indirect effects of FDI on income inequality are derived from the wage premium mechanism, as skilled workers or workers in specific sectors (e.g., services) are more likely to gain from FDI (Bogliaccini & Egan, 2017).

Table 1: Description of Variables

Variables	Description
Gini Ratio (Gini)	Index Gini Ratio. Zero (perfect equality) to One (perfect inequality)
Per capita Gross Regional Domestic Product (GRDP)	Annual per capita Gross Regional Domestic Product (GRDP) (constant at 2010 price level)
Per capita Growth of Gross Regional Domestic Product (GGRDP)	Annual per capita Growth of Gross Regional Domestic Product.
Per capita PDRB Square ($GRDP^{2)}$	GRDP Square
Foreign Direct Investment (FDI)	Annual FDI inflow in billions of Indonesian Rupiah
Foreign Direct Investment Square (FDI^2)	Foreign Direct Investment (FDI) Square
Domestic Investment (PMDN)	Annual domestic direct investment in billions of Indonesian Rupiah
Unemployment Rate (UN)	Percentage of the unemployed (job seekers) to the total workforce
Human Development Index (HDI	HDI has a range of 0 to 100. Zero HDI (lowest human capital index) to 100 HDI (highest level of human capital).
Infrastructure Spending (INFS)	Regional public infrastructure spending (in IDR billion).

Note: All data were collected from the National Statistical Agency of Indonesia for 34 provinces (All) from 2011-2019 (Badan Pusat Statistik, 2020).

Data and methodology

This study uses balanced panel data covering the 34 provinces of Indonesia from 2011 to 2019. The data were obtained from the Statistical Yearbook of Indonesia 2020 of the Central Bureau of Statistics in Indonesia (Badan Pusat Statistik, 2020). To proxy income inequality, we employ the Gini ratio. At the same time, exogenous variables are foreign direct investment (FDI), *Penanaman Modal Dalam Negeri* [domestic investment] (PMDN), unemployment rate (UN), growth of per capita Gross Regional Domestic Product (GRDP), and square per capita gross regional domestic product (PDRB). Table 1 provides details on the variables employed.

The empirical study applies both a static and dynamic model under a panel structure. Static models allow observation of contemporary and non-contemporary relations individually. The dynamic panel allows simultaneous observation of such contemporary and non-contemporary interactions. Dynamic relationships are characterized by their inclusion of lags

of independent or dependent variables as regressors in the equation. Income inequality is likely linked to structural factors that undermine individuals' ability to adjust income levels. Under the strong persistence effect, derived from unequal income structures, which tend to change only over more extended periods, a dynamic model appears to be more suitable for measuring income inequality changes. If the model is estimated with a fixed-effect or random-effect approach, it may produce biased and inconsistent predictors, opening itself to the possibility of endogeneity problems. By contrast, the dynamic Generalized Method of Moments [GMM] is known to control potential endogeneity and model the short and long-run impact.

We compare static and dynamic models to illustrate how the structural socio-economic conditions may change how variables like investment, income level, or unemployment affect income inequality. The GMM approach is preferred for empirical analysis, as supported by Wang and Lee (2018). The GMM is often employed for empirical studies testing the Kuznets effects in varied fields, offering more robust results than static panels.

The static model examines the empirical relation between income inequality (proxied by the Gini index) with FDI, domestic investment, per capita income, and unemployment. To capture the non-linearity nexus between per capita income (GRDP) and inequality (Gini index), we introduce the square of GRDP as follows:

$$Gini_{it} = \alpha + \beta_1 lnGRDP_{it} + \beta_2 (lnGRDP)^2{}_{it} + \beta_3 lnFDI_{it} + \beta_4 lnPMDN_{it} + \beta_5 UN_{it} + \varepsilon_{it} \quad \text{(Equation 1)}$$

where the dependent variable is the Gini Ratio ($Gini_{it}$) in province *i* at time *t*. Meanwhile, the independent variables are vector x_{it} including foreign direct investment (FDI), Domestic Investment (PMDN), Growth of per capita GRDP, Growth of per capita PDRB Square (GRDP2), and Unemployment Rate (UN).

This study uses data covering Indonesia's 34 provinces (*i*) from 2011 to 2019 (*t*). The error term (unobserved white disturbance) is captured by $\varepsilon_{it.}$ assumed to be identically and independently distributed with zero mean and variance $\sigma^2_{\varepsilon.}$

Equation (1) is estimated employing Partial least squares regression (PLS), Fixed Effects (FEM), and Random Effects (REM). PLS is likely to develop into unbiased estimators (Serrasqueiro & Nunes, 2008). Besides, the FEM and REM are more suitable models for heterogeneous characteristics across provinces; a fact often pointed out in Indonesia's empirical studies (Kataoka, 2018). We estimate Equation 1 with PLS, FEM, and REM and then test for the most appropriate model. The redundant test is used to choose between PLS and FEM, and the Hausman test is employed for choosing between REM and FEM.

Estimating the parameters of a dynamic model using FEM and REM models may lead to a biased estimate as some explanatory variables may be endogenous. Besides, the static effects missed capturing the persistence effect and correlation between previous inequality levels (relation with a lag on the dependent variable). We implement instrumental variables to reduce these problems and control for possible endogeneity, which uses instruments not correlated with the dependent variable but highly correlated with the endogenous variables. This study estimates dynamic panel data using the GMM method proposed by Blundell and Bond (1998) to address that shortcoming.

To observe the dynamic relation between income inequality and the set of proposed variables (investment, per capita income, infrastructure and unemployment), the following dynamic regression is proposed:

$$Gini_{it} = \alpha + \gamma Gini_{it-1} + \beta_1 lnGRDP_{it} + \beta_2 (lnGRDP)^2{}_{it} + \beta_3 lnFDI_{it} + \beta_4 lnFDI^2{}_{it} +$$

$$\beta_5 lnPMDN_{it} + \beta_6 UN_{it} + \beta_7 HDI_{it} + \beta_8 INFS_{it} + \varepsilon_{it} \quad \text{(Equation 2)}$$

where the dependent variable is the Gini Ratio ($Gini_{it}$) in province i at time t. The other regressors follow those specified in Equation 1, and γ is the adjusting parameter (lag variable). Additionally, for the regressors in Equation 2, we incorporate HDI variables in province i at time t; and infrastructure expenditure (INFS) in each province i at year t. Both human development and infrastructure (INFS) are the main focus of the national administration (2014-2019). To eliminate specific effects in panel data, we follow Arellano and Bond's (1991) estimation procedures requiring taking the first difference of Equation 2. The specification test in the generalized method of the moment required the Arellano Bond test (consistency of estimation) and the Hansen test (instrument validation or over-identification restriction). For consistency in results using the GMM model, the data are tested for stationarity (see Table 3).

Table 2: Descriptive Statistics

Variable	Mean	Median	Maximum	Minimum	Std. Dev.
Gini Ratio	0.38	0.38	0.48	0.27	0.04
GGRDP	3.83	4.11	20.20	-17.13	2.65
GRDP	38,032.18	28,577.89	174,136.60	9,675.89	29,569.70
FDI	847.36	382.80	7124.90	0.20	1255.27
PMDN	6,211.00	2,616.50	62,094.80	1.00	9,967.84
UN	5.29	4.82	13.74	1.40	2.05
HDI	68.66	68.81	80.76	55.01	4.43
INFS	1,410.55	832.06	29,036.30	135.30	2,545.89

Note: Data were collected from the National Statistical Agency of Indonesia for 34 provinces (All) from 2011 to 2019 (Badan Pusat Statistik, 2020). Abbreviations: Per capita Growth of Gross Domestic Product (GGRDP), Gross Regional Domestic Product (GRDP), Foreign Direct Investment (FDI), Domestic Investment (PMDN), Unemployment Rate (UN), Human Development Index (HDI), and Infrastructure Expenditure (INFS).

Empirical Results and Discussion

The descriptive statistics provided in Table 2 offer an initial understanding of the data employed in this study. For all the provinces, the Gini index is shown to be in the moderate range (between 0.48 and 0.27). Four provinces have relatively low inequality levels (below 0.35), whereas none show excessive levels of inequality (beyond 0.5). However, at the national level, the Gini index has increased from 0.382 in 2010 to 0.419 in 2015, indicating that inequality levels are rising. However, from 2015 to 2019, the Gini index has decreased from 0.419 to 0.389, indicating an improvement in the last years.

As a capital city and the center of Indonesia's national economy, Jakarta had the highest per capita GDP, equivalent to IDR174.1 million in 2019. By contrast, the lowest per capita GRDP was in East Nusa Tenggara, equal to IDR12.7 million. The average GRDP at a national level

in 2015 was IDR43 million. The compound annual growth rate (CAGR) for 2010 to 2019 was 3.7%, with most provinces growing at least 3% a year.

As for FDI, on average, 57% of total foreign and domestic investment is directed to Java Island, with Jakarta, West Java, and East Java as the most significant investment recipients. At the national level, total FDI inflows increased from US$15.292 billion in 2010 to US$28.208 in 2019 (maximum level of US$32.240 billion in 2017).

The unemployment rate is felt from 6.5% in 2010 to 4.7% in 2019, with an average of 5.4%. On average, the unemployment rate fell by nearly 3% during the period across provinces. Table 4 provides the results of both static and dynamic panels. At first glance, the results of the static and dynamic panels differ. We first examined the static models. The redundant test was used to choose between PLS and FEM, and the Hausman test was run to choose between REM and FEM. The redundant test (Chow test) shows that the FEM model is preferred over the PLS based on the probability test, at a 5% significance level. Comparing the FEM and the REM, the Hausman test shows that the REM model is the best, indicating a probability of (0.0848) > 5%. Based on the results, the preferred method is the REM model. The likelihood of F statistics demonstrates that the H_0 null hypothesis of all coefficients simultaneously influencing income inequality should be rejected, suggesting that the independent variables (per capita GRDP, per capita GRDP square, unemployment, foreign investment, domestic investment capital) combinedly affect income inequality in Indonesia.

For the dynamic model, the GMM models require stationarity assumptions to be met for consistency in results. We employed panel unit root tests to the data (see Table 3) using the Levin-Lin-Chu test (LLC), Harris-Tzavalis, Im-Pesaran-Shin, and Hadri test, to confirm that the data meet stationarity. Im-Pesaran-Shin test indicates that the data is free from cross-sectional dependence and that it is fit for panel analysis. As the Gini lagged variable is positive and statistically significant, it suggests that income inequality has a persistence effect, supporting the use of a GMM model.

Table 3: Panel Unit Root Test

Variables	Level I(0)				First Difference I(I)			
	LLC	**IPS**	**ADF**	**PP**	**LLC**	**IPS**	**ADF**	**PP**
Gini	-5.99***	-1.08	78.1	145.9***	-21.1***	-5.59***	152.4***	268.6***
GGRDP	-19.8***	-3.95***	119.2***	116.9***	-8.60***	-1.75**	86.9**	190.2***
GGRDP2	-30.6***	-6.19***	131.3***	156.2***	-11.6***	-3.02***	108.6***	233.1***
FDI	-4.96***	-1.31*	97.5***	156.1***	-21.5***	-6.19***	161.7***	260.9***
PMDN	0.59	3.42	39.9	78.1	-11.7***	-2.02**	96.9***	258.2***
UN	-8.00***	-1.45*	85.1**	200.6***	-11.9***	-4.06***	127.5***	384.2***
HDI	1.86	6.77	11.2	36.3	-19.0***	-4.73***	137.2***	222.7***
INFS	-4.66***	1.02	56.5	75.6	-19.6***	-5.77***	148.8***	244.9***

*Note: Authors' calculation using LLC (Levin-Lin-Chu), HT (Harris-Tzavalis), IPS (Im-Pesaran-Shin), Hadri (Hadri LM Test). ***, **, * significant with alpha 1%, 5%, 10%.*

For the GMM estimation results, we examined the model specification test. The Hansen test value of 0.035 accepts the null hypothesis of overidentifying restrictions, suggesting that the instruments employed are valid. The Arellano-Bond AR (2) test was employed (Arellano & Bond, 1991) to test for autocorrelation, using z-statistics distribution. An AR (2) value above

the significance level of 5% indicated no autocorrelation in the model, suggesting the validity of the data and model (Hayakawa, 2019). The moment conditions are formed by assuming that particular lagged levels of the dependent variable are orthogonal to the differenced disturbances, known as GMM-type moment conditions. The AR (2) indicated the value of 0.494 is lower than < 1 (H_1), so H_0 could not be rejected, meaning there was no autocorrelation between variables.

Additionally, the partial test was used to see the effect of variables on income inequality. The statistical significance from the lag of the dependent variable showed that income inequality still correlated with time, suggesting the dynamic effects in the model. Column (4) in Table 4 shows the regression results using the dynamic panel GMM.

The preferred static model (REM) indicates that two of the employed independent variables to test the investments (FDI and PMDN) are statistically significant. FDI has a positive and significant effect on Indonesia's income inequality, and domestic investment (PMDN) has a significant negative impact on income inequality. The per capita Gross Regional Domestic Product (GRDP) growth positively impacts Indonesia's income inequality, although it is not significant. Additionally, the per capita GRDP square has a negative effect on income inequality in Indonesia, although it is not considered significant in the static model (REM). Generally, the signs of the coefficient's variables when employing growth of per capita GRDP are consistent (columns 1-4), suggesting an appropriate estimation. Still, the results for the GRDP and GRDP square are not significant for the REM model. Similarly, the sign in the coefficients when employing GRDP (column 5-7) are consistent.

Influence of growth in per capita GRDP on income inequality

In both the static and dynamic model, the per capita GRDP relationship with income inequality is positive (columns 1-4), suggesting that increase in the growth rate of regional per capita income in the short term will lead to a rise in income inequality. These findings are in line with Neo-Classical theory, where it is hypothesized that at early stages of growth, the levels of income inequality tend to increase. The GMM model suggests that a 1% growth in per capita GRDP leads to an increase in income inequality of 0.27, a result in line with prior studies (Kaulihowa & Adjasi, 2018; Mehic et al., 2013; Mushtaq et al., 2014).

The GMM (4) predicts a lower effect on income inequality from a rise in per capita GRDP than the REM (or PLS) model. The lagged Gini variable introduced in the GMM model plays the role of capturing the permanence effect in the structure of inequality and moderating the impact of income growth on inequality, often attributed to a rise in per capita income level.

The dynamic model (GMM, column 4) indicating a negative coefficient in the GRDP square variable (column 4) was employed to test the Kuznets hypothesis. The results indicate that GRDP follows a nonlinear relation with income inequality. In other words, GRDP increases inequality of distribution of income in the short run. However, this effect changes signal with further increases of GRDP. The results indicate a flip in the sign of the GRDP coefficient, with an initial positive relation followed by a change in the effect (negative) in the longer term.

Table 4: Result of Panel Regression

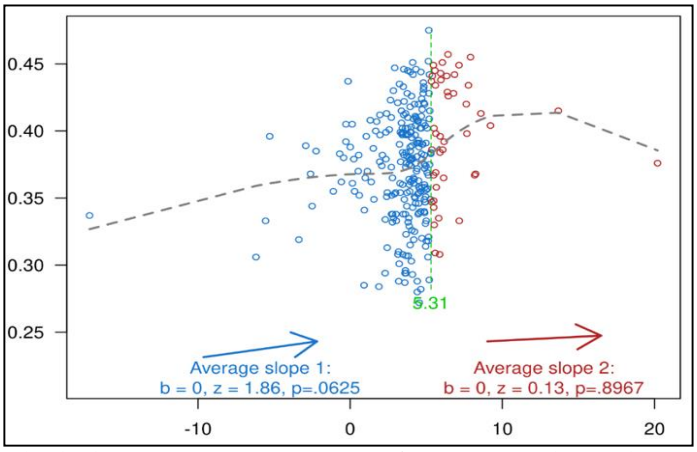
Variable	Coefficient Growth						
	PLS (1)	**REM (2)**	**FEM (3)**	**GMM (4)**	**GMM (5)**	**GMM (6)**	**GMM (7)**
Gini (-1)				0.2873***	0.414***	0.296***	0.326***
GGRDP	0.0028***	0.0015	0.0007	0.0027**	-0.804	0.266	-0.189***
GGRDP2	-1.89E-06	-0.00003	-4.20E-05	-8.77E-05*	0.032	-0.022	
FDI	7.24E-06***	7.84E-06**	3.06E-06	1.57E-05*	0.005**	0.012***	0.054***
FDI2							-0.006***
PMDN	-7.86E-07**	-1.20E-06***	-1.58E-06***	-3.05E-06***	-0.002*	-0.0002	-0.002*
UN	-0.0011	-0.0010	-0.0021	-0.0035*	-0.010***	-0.016***	-0.019***
HDI						-0.007*	-0.008*
INFS						0.034***	0.023**
C	0.3691***	0.3759***	0.3914***				
Breusch and Pagan LM Test	0.0000						
Hausman Test		0.0848					
Chow Test			0.0000				
Jarque-Berra					0.539	0.409	0.303
AR (1)				0.0006	0.012	0.684	0.147
AR(2)				0.4537	0.650	0.656	

*Note: ***, **, and * indicate 10%, 5% and 1% level of significance. Authors' calculation using Partial least squares (PLS), Fixed Effects (FEM), and Random Effects (REM), Generalized Method of Moments (GMM). Columns 1-4 employ GRDP Growth. Columns 5-7 use GRDP.*

To test whether the curve follows an inverted-U shape will require additional tests (Simonsohn, 2018). This study uses the Two-Lines Test to analyze whether the relationship between GRDP growth and the Gini Ratio has an inverted-U shape. The Two-Lines test has a breakpoint set algorithmically by the Robin Hood algorithm which 'takes away observations from the more powerful line and assigns them to the less powerful line' (Simonsohn, 2018). The results of the Two-Lines test indicated that the two slopes have unidirectional or non-opposite signs, and only the first slope is statistically significant (p = 0.0625). This means that GRDP Growth will mainly positively impact the Gini ratio. This result is in accordance with our estimation results using the GMM model (column 4 in Table 4). The coefficient for the quadratic term for GRDP Growth (GGRDP square) has a negative sign, but the coefficient value is relatively small. As such, GRDP growth has a negative effect on income inequality in the long run, but the effect is relatively small. While we can conclude that in the longer term, GRDP may help lowering income inequality, the effect does not follow an inverted-U curve.

The results of the Two-Lines test indicate that the two slopes have unidirectional or non-opposite signs (Figure 1), and only the first slope is statistically significant (p = 0.0625).

Figure 1: Two-Lines Test



Note: Authors' calculation using Two-Lines test for GRDP, and Gini data specified in Table 1

We incorporate estimations by employing per capita GRDP (columns 5-7) to compare the results with the GRDP growth rate (columns 1-4). Additionally, the variables of HDI and infrastructure expenditure (INFS) were included. Both human development and infrastructure are the main focus of the national administration (2014-2019). The results for HDI indicate that improvements in human development help to lower income inequality. Similarly, if improvements in HDI accompany FDI, it leads to a more equal income distribution in the long run (FDI2). The relationship between infrastructure and inequality is positive, suggesting that infrastructure expansion has a negative impact on income distribution. A positive result will likely be observable in a more extended period.

Our results highlight four critical aspects. First, there is evidence of the Kuznets hypothesis in Indonesia in which the sign of the relation between GRDP (income) and income inequality changes in the short-run (positive) and in the long run (negative). Second, FDI has a positive relationship with income inequality (deterioration of income distribution) in the short run. However, the impact of FDI on inequality turns positive in the long run (FDI2), suggesting that FDI effects take time to deliver positive outcomes on welfare distribution. Third, we argue that accounting for permanence (dynamic) effects is essential, as previous studies in Indonesia tended to overestimate the impact of per capita income on inequality (Fazaalloh, 2019;

Kuncoro & Murbarani, 2016). Fourth, we argue that economic growth positively affects income distribution when income growth is accompanied by improvements in human development (HDI).

Structural factors in the uneven income distribution are often related to non-economic aspects like education, institutions, access to health, and other programs. Access to education, financial services, and job opportunities can lower inequality in Indonesia (Esquivias et al., 2020; Wicaksono et al., 2017). De Silva and Sumarto (2015) estimated that 37% of income inequality derives from differences in educational achievements. While gaps due to regional geographical differences have decreased, those related to education have remained high. Closing gaps in education is vital to improving equality of opportunities (Tomul, 2009). Our results support Aginta et al. (2021), who found some convergence in income within districts and within provinces in Indonesia, although noting persistency in income inequality across regions. Inequality primarily results from imbalances in economic and development issues that remain unresolved in Indonesia (Siburian, 2020).

Previous studies in Indonesia have found that after 2000, economic growth increased, resulting in a worsening of wealth distribution (van Leeuwen & Földvári, 2016). Individuals in the tenth percentile increased their expenditure level at a 1% rate a year from 2002 to 2012, while those in the ninetieth percentile increased by 5% (De Silva & Sumarto, 2015). For instance, policies to support structural change should remain at the center of the development agenda. Efforts to improve income equality need to be accompanied by closing gaps in access to education, services, and infrastructure in under-developed areas. Expanding education opportunities (e.g., vocational training) can support human resource quality improvements, minimizing gaps in expertise and labor wages (Chongvilaivan & Kim, 2016).

More significant fiscal stimulus and government investment, including development in border areas, peripheries, and remote islands, could also support income redistribution. The massive government infrastructure projects of the last years aim to absorb large numbers of workers and create positive income spillovers for lower-skilled workers (Yusuf & Sumner, 2015). Accelerating infrastructure provision in each province is likely to minimize the income gap. More intensive efforts to decentralize fiscal activities can help lower income inequality across provinces (Siburian, 2020), as it enables local governments to allocate resources for development more efficiently by tailoring them to local needs.

The influence of FDI and PMDN on income inequality

Empirical results on the REM and GMM models show that FDI has a significant positive effect on income inequality. A common concern of development programs is related to the unequal distribution of investment across regions, noted in studies on Indonesia and other developing countries (Bogliaccini & Egan, 2017). Previous studies have often shown that investments positively affect the income gap, which is in line with our results (Kaulihowa & Adjasi, 2018; Lee et al., 2013; Mushtaq et al., 2014). Employing provincial data for China, Sueyoshi et al. (2021) found that technological disparity has increased across the provinces. Technology is mainly driven by investment, suggesting that the uneven growth in investment across provinces—similar to Indonesia —impacts inequality as proxied by the Gini Index.

Lee and Wie (2015) endorsed the notion that FDI has mainly supported skilled workers in Indonesia, leading to a widening of the gap in wages and unequal income distribution. Similarly, Kataoka (2018) found that labor productivity—primarily supported via investment,

skills, and technology—has become a substantial source of income inequality in Indonesia. Mushtaq et al. (2014) noted that FDI is a common vehicle used to introduce modern technology, skills, and knowledge to support labor productivity. While well-developed investment policies may support reductions in income inequality, policies must be formulated so that FDI improves non-skilled and skilled labor in urban and rural areas and across sectors. Our results suggest that policies to attract FDI should be accompanied by capacity-building programs whereby lower-skill workers, less competitive firms, and less endowed areas may increase their capabilities to absorb knowledge and techniques.

Bogliaccini and Egan (2017) proposed that the link between FDI and wages is weaker in low-skilled sectors within manufacturing and primary activities, dominant in Indonesia. For instance, FDI does not reduce lower income inequality; instead, it may increase income gaps. Previous studies in Indonesia generally find indirect effects of FDI on income inequality (Fazaalloh, 2019), primarily via the labor market or wage premiums (Lee & Wie, 2015).

Rather than suppressing FDI, policies to attract more significant inflows of investment should continue. Their positive effects on inequality indicate that FDI is a channel for increasing workers' wage premiums and create a positive income effect. Policies to close income gaps should accompany investment liberalization and promotion efforts. In contrast to foreign direct investment, both the static and dynamic models indicate that domestic private investment (PMDN) has a negative and significant effect on inequality, suggesting that more considerable domestic investment can contribute to welfare in Indonesia. Policies should support more considerable investment at home as a more effective mechanism to improve income distribution while supporting human development programs.

Some policies to encourage investment and allow a more efficient relocation of factors are: 1) creating stability of political, social, and economic conditions; 2) building a government free from corruption, one with consistency, clarity, and certainty of long-term policy, and with an efficient bureaucracy; 3) support practical financing sector functions and a conducive labor system; 4) creation of straightforward domestic and export-import tax and export procedures; 5) revision of the investment list to allow broader collaboration between foreign and domestic investors; 6) cancellation of overlapping regulations that hamper investment and business activities; and 7) increasing government investment as a complement to private investment. Appropriate investment policies may reduce income inequality in the long run.

The effect of unemployment rate on income inequality

The statistical results showed that unemployment has a significant and negative effect on income inequality. Our results align with previous studies in Indonesia, finding that lowering unemployment does not guarantee better income distribution (Chongvilaivan & Kim, 2016; Lee & Wie, 2015; Wicaksono et al., 2017). We argue that rather than promoting job creation alone (lowering unemployment), improvements in labor productivity are needed as a more appropriate mechanism to create positive effects on income distribution. Previous studies have found that inequality has increased as the higher income earners (De Silva & Sumarto, 2015), more educated (Wicaksono et al., 2017), and more skilled workers (Lee & Wie, 2015) have increased income at a faster speed than those on the bottom of the economic ladder.

The findings suggest that not only are more jobs needed but so are the skill improvements and higher technological absorption capability. Our notion is in line with Ridhwan (2021), who found that improving skills could help to increase local productivity and lower income

inequality. Our findings support recent shifts in policies in Indonesia which have redirected efforts towards upskilling and enhancing labor capabilities.

Moeis et al. (2020) found that as the Indonesian economy transforms into a more modern system, simply moving out of primary to secondary activities (e.g., non-agriculture) no longer ensured that individuals in rural areas would be better off. Similarly, having a job does not guarantee that workers would become better off. As formal jobs require higher skills and education, a substantial share of workers may escape poverty but will not significantly increase per capita income.

While today there is lower poverty in Indonesia than two decades ago (Dartanto et al., 2020), the absolute income inequality has improved only slightly, mainly in line with evidence that rapid growth in emerging countries lowers poverty and widens inequality complete terms. De Silva and Sumarto (2015) stated that Indonesia's rapid economic growth had benefited relatively affluent individuals, while low-income earners have gained little. Government policies have not been able to promote more even growth. It is necessary to create better opportunities for investors and favor universal access to capital, education, and skills development.

Although high and sustained unemployment presents a significant challenge for a country to improve prosperity, Indonesia's unemployment rate does not seem to be the primary income inequality source. Based on previous empirical studies, factors affecting inequality between regions in Indonesia are more often related to 1) natural resource and sectoral differences (Bogliaccini & Egan, 2017), 2) demographic factors, including labor conditions (De Silva & Sumarto, 2015), 3) allocation of development funds between regions, both government and private investment (Kataoka, 2012), 4) concentration of regional economic activity (Kataoka, 2018), and 5) mobility of goods and services.

Since the last decade, structural changes have occurred, with Indonesia shifting from efficiency allocation to equity allocation (Kataoka, 2012, 2018). Increasing human, technological, and physical capital development in less developed provinces (Yusuf & Sumner, 2015) may support a faster convergence and a more efficient relocation of factors to support income equality.

Conclusion and policy implications

This study estimates the effects of per capita income, investment (foreign and domestic), and unemployment rates on the level of income inequality (proxied by the Gini index) in 34 Indonesian provinces in 2011-2019. Additionally, we test whether the increasing focus of public policy in infrastructure and human development has supported income equality. Intrinsically, we seek new evidence for the plausible Kuznets hypothesis—whether or not it applies to Indonesia. Additionally, we test whether more considerable investment and more job creation can support lower income inequality across provinces in Indonesia.

This study compares static and dynamic panel data to determine whether accounting for persistence (lagged) effects matters when estimating income inequality. We provide evidence for the relevance of the Kuznets hypothesis for Indonesia, as increasing regional per capita income levels lead to more considerable income inequality in the short run, with an improvement in income distribution over more prolonged periods (although small, overall). Further, we find that more significant foreign direct investment inflows lead to higher

inequality in the short run. However, the impact of FDI on income equality is favorable for income distribution in the long run. Our results highlight that improvements in human capital (Human Development Index) can help to create inclusive effects (welfare gains) from the liberalization of investment (FDI) in Indonesia. By contrast, increases in domestic private investment support equal income distribution.

Finally, unemployment is negative and statistically significant and suggests that lack of jobs may not be Indonesia's primary income inequality source. Policies to support a higher quality of employment may be needed to lower inequality in the country. As supported in previous studies, more skilled workers, more efficient businesses, and more endowed regions may benefit more from Indonesia's economic growth (investment, infrastructure, and jobs) than their less privileged equivalents. Our findings indicate that infrastructure expenditure positively relates to income inequality, suggesting that while building infrastructure may support economic growth, it does not seem to support equal income distribution. Supporting infrastructure development with more extensive programs related to human capital may be needed to be capitalized from the large expending in infrastructure in the last decade.

Further, we find that accounting for dynamic effects is essential when looking into income inequality. Structural factors may create persistence effects that may lead to overestimating the impact of per capita income. Further efforts in attracting more FDI investment and creating more jobs need to be made, accompanied by policies that allow less privileged people to benefit from the economic progress taking place in Indonesia. For the longest time, the economic and social policies have been unable to promote equal growth.

References

Adams, S., & Klobodu, E. K. M. (2017). Capital flows and the distribution of income in sub-Saharan Africa. *Economic Analysis and Policy*, *55*, 169–178. https://doi.org/10.1016/j.eap.2017.05.006

Aginta, H., Gunawan, A. B., & Mendez. C. (2021). Regional income disparities and convergence clubs in Indonesia: New district-level evidence. *Journal of the Asia Pacific Economy*, 1–33. https://doi.org/10.1080/13547860.2020.1868107

Akita, T., Kurniawan, P. A., & Miyata, S. (2011). Structural changes and regional income inequality in Indonesia: A bidimensional decomposition analysis. *Asian Economic Journal*, *25*(1), 55–77. https://doi.org/10.1111/j.1467-8381.2011.02053.x

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, *58*(2), 277-297. https://doi.org/10.2307/2297968

Badan Pusat Statistik. (2020). *Statistik Indonesia 2020* [Statistical Yearbook of Indonesia 2020]. https://www.bps.go.id/publication/2020/04/29/e9011b3155d45d70823c141f/statistik-indonesia-2020.html

Bhandari, B. (2007). Effect of inward foreign direct investment on income inequality in transition countries. *Journal of Economic Integration*, *22*(4), 888–928. https://doi.org/10.11130/jei.2007.22.4.888

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115-143. https://doi.org/10.1016/S0304-4076(98)00009-8

Bogliaccini, J. A., & Egan, P. J. W. (2017). Foreign direct investment and inequality in developing countries: Does sector matter? *Economics & Politics*, *29*(3), 209–236. https://doi.org/10.1111/ecpo.12098

Chongvilaivan, A., & Kim, J. (2016). Individual income inequality and its drivers in Indonesia: A Theil decomposition reassessment. *Social Indicators Research*, *126*, 79–98. https://doi.org/10.1007/s11205-015-0890-0

Das, A., & Sethi, N. (2020). Effect of foreign direct investment, remittances, and foreign aid on economic growth: Evidence from two emerging South Asian economies. *Journal of Public Affairs*, *20*(3), e2043. https://doi.org/10.1002/pa.2043

Dartanto, T., Moeis, F. R., & Otsubo, S. (2020). Intragenerational economic mobility in Indonesia: A transition from poverty to the middle class in 1993–2014. *Bulletin of Indonesian Economic Studies*, *56*(2), 193–224. https://doi.org/10.1080/00074918.2019.1657795

De Silva, I., & Sumarto, S. (2015). Dynamics of growth, poverty and human capital: Evidence from Indonesian sub-national data. *Journal of Economic Development*, *40*(2), 1-33. http://www.jed.or.kr/full-text/40-2/1.pdf

Erlando, A., Riyanto, F. D., & Masakazu, S. (2020). Financial inclusion, economic growth, and poverty alleviation: Evidence from eastern Indonesia. *Heliyon*, *6*(10), e05235. https://doi.org/10.1016/j.heliyon.2020.e05235

Esquivias, M. A & Harianto, S. K. (2020). Does competition and foreign investment spur industrial efficiency? Firm-level evidence from Indonesia. *Heliyon*, *6*(8), e04494. https://doi.org/10.1016/j.heliyon.2020.e04494

Esquivias, M. A., Sethi, N., Ramandha, M. D., & Jayanti, A. D. (2021). Financial inclusion dynamics in Southeast Asia: An empirical investigation on three countries. *Business Strategy & Development*, *4*(2), 203–215. https://doi.org/10.1002/bsd2.139

Esquivias, M. A., Sugiharti, L., Jayanti, A. D., Purwono, R., & Sethi, N. (2020). Mobile technologies, financial inclusion, and inclusive growth in East Indonesia. *Journal of Telecommunications and the Digital Economy*, *8*(2), 123–145. https://doi.org/10.18080/jtde.v8n2.253

Fazaalloh, A. M. (2019). Is foreign direct investment helpful to reduce income inequality in Indonesia? *Economics & Sociology*, *12*(3), 25-36. https://doi.org/10.14254/2071-789X.2019/12-3/2

Fernandez, M., Almaazmi, M. M., & Joseph, R. (2020). Foreign direct investment in Indonesia: An analysis from investors perspective. *International Journal of Economics and Financial Issues*, *10*(5), 102–112. https://doi.org/10.32479/ijefi.10330

Garvy, G. (1954). Functional and size distributions of income and their meaning. *The American Economic Review*, *44*(2), 236–253. https://www.jstor.org/stable/pdf/1818339.pdf

Hayakawa, K. (2019). Alternative over-identifying restriction test in the GMM estimation of panel data models. *Econometrics and Statistics*, *10*, 71–95. https://doi.org/10.1016/j.ecosta.2018.06.002

Kataoka, M. (2012). Economic growth and interregional resource allocation in Indonesia. *Studies in Regional Science*, *42*(4), 911–920. https://doi.org/10.2457/srs.42.911

Kataoka, M. (2018). Inequality convergence in inefficiency and interprovincial income inequality in Indonesia for 1990–2010. *Asia-Pacific Journal of Regional Science*, *2*, 297–313. https://doi.org/10.1007/s41685-017-0051-3

Kaulihowa, T., & Adjasi, C. (2018). FDI and income inequality in Africa. *Oxford Development Studies*, *46*(2), 250–265. https://doi.org/10.1080/13600818.2017.1381233

Kuncoro, M. (2013). Economic geography of Indonesia: Can MP3EI reduce inter-regional inequality. *South East Asia Journal of Contemporary Business, Economics, and Law*, *2*(2), 17–33. http://seajbel.com/wp-content/uploads/2014/07/Economic-Geography-Of-Indonesia---Can-Mp3ei-Reduce-Inter-Regional-Inequality-Mudrajad-Kuncoro.pdf

Kuncoro, M., & Murbarani, N. (2016). Regional inequality in Indonesia, 1994-2012. *The Business & Management Review*, *8*(1), 38-52. https://cberuk.com/cdn/conference_proceedings/conference_68895.pdf

Kuznets, S. (1955). Economic growth and income inequality. *The American Economic Review*, *45*(1), 1–28. https://www.jstor.org/stable/1811581

Lee, H. Y., Kim, J., & Cin, B. C. (2013). Empirical analysis on the determinants of income inequality in Korea. *International Journal of Advanced Science and Technology*, *53*, 95–110. https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.637.8836&rep=rep1&type=pdf

Lee, J. W., & Wie, D. (2015). Technological change, skill demand, and wage inequality: Evidence from Indonesia. *World Development*, *67*, 238–250. https://doi.org/10.1016/j.worlddev.2014.10.020

McLaren, J., & Yoo, M. (2017). FDI and inequality in Vietnam: An approach with census data. *Journal of Asian Economics*, *48*, 134–147. https://doi.org/10.1016/j.asieco.2016.11.002

Mehic, E., Silajdzic, S., & Babic-Hodovic, V. (2013). The impact of FDI on economic growth: Some evidence from Southeast Europe. *Emerging Markets Finance and Trade*, *49*(sup1), 5–20. https://doi.org/10.2753/REE1540-496X4901S101

Melikhova, O., & Čížek, J. (2014). Kuznets inverted U-curve hypothesis examined on up-to date observations for 145 countries. *Prague Economic Papers*, *23*(3), 388–410. https://doi.org/10.18267/j.pep.490

Miranti, R., Vidyattama, Y., Hansnata, E., Cassells, R., & Duncan, A. (2013). *Trends in poverty and inequality in decentralising Indonesia* (No. 148, OECD Social, Employment and Migration Working Papers). OECD Publishing. https://doi.org/10.1787/5k43bvt2dwjk-en

Moeis, F. R., Dartanto, T., Moeis, J. P., & Ikhsan, M. (2020). A longitudinal study of agriculture households in Indonesia: The effect of land and labor mobility on welfare and poverty dynamics. *World Development Perspectives*, *20*, 100261. https://doi.org/10.1016/j.wdp.2020.100261

Muryani, N. A., & Esquivias, M. A. (2021). Factors influencing the gender gap in poverty: The Indonesian case. *World Review of Entrepreneurship, Management and Sustainable Development*, *17*(1), 103–119. https://doi.org/10.1504/WREMSD.2021.10034255

Mushtaq, M., Ahmad, K., Ahmed, S., & Nadeem, M. (2014). Impact of FDI on income distribution in selected SAARC countries. *Journal of Applied Environmental and Biological Sciences*, *4*(7S), 1–10. http://www.textroad.com/pdf/JAEBS/J.%20Appl.%20Environ.%20Biol.%20Sci.,%204(7S)1-10,%202014.pdf

Purwono, R., Wardana, W. W., Haryanto, T., & Mubin, M. K. (2021). Poverty dynamics in Indonesia: Empirical evidence from three main approaches. *World Development Perspectives*, *2*, 100346. https://doi.org/10.1016/j.wdp.2021.100346

Rao, D. T., Sethi, N., Dash, D. P., & Bhujabal, P. (2020). Foreign aid, FDI and economic growth in South-East Asia and South Asia. *Global Business Review*. https://doi.org/10.1177/0972150919890957

Ridhwan, M. M. (2021). Spatial wage differentials and agglomeration externalities: Evidence from Indonesian microdata. *Economic Analysis and Policy*, *71*, 573–91. https://doi.org/10.1016/j.eap.2021.06.013

Rubin, A., & Segal, D. (2015). The effects of economic growth on income inequality in the US. *Journal of Macroeconomics*, *45*, 258–273. https://doi.org/10.1016/j.jmacro.2015.05.007

Serrasqueiro, Z., & Nunes, P. M. (2008). Determinants of capital structure: Comparison of empirical evidence from the use of different estimators. *International Journal of Applied Economics*, *5*(1), 14–29. https://www2.southeastern.edu/orgs/ijae/index_files/IJAE%20MARCH%202008%20NUNES%20IJAE_ARTICLE_FINAL%20VERSION%206-1-08.pdf

Siburian, M. E. (2020). Fiscal decentralization and regional income inequality: Evidence from Indonesia. *Applied Economics Letters, 27*(17), 1383–1386. https://doi.org/10.1080/13504851.2019.1683139

Simonsohn, U. (2018). Two lines: A valid alternative to the invalid testing of U-shaped relationships with quadratic regressions. *Advances in Methods and Practices in Psychological Science*, *1*, 538-555. https://doi.org/10.1177/2515245918805755

Sueyoshi, T., Qu, J., Li, A., & Liu, X. (2021). A new approach for evaluating technology inequality and diffusion barriers: the concept of efficiency Gini coefficient and its application in Chinese provinces. *Energy,* 235, 121256. https://doi.org/10.1016/j.energy.2021.121256

Sylwester, K. (2005). Foreign direct investment, growth and income inequality in less developed countries. *International Review of Applied Economics*, *19*(3), 289–300. https://doi.org/10.1080/02692170500119748

Taresh A, A., Sari, D. W., & Purwono, R. (2021). Analysis of the relationship between income inequality and social variables: Evidence from Indonesia. *Economics and Sociology*, *14*(1), 103-119. https://doi.org/10.14254/2071-789X.2021/14-1/7

Tomul, E. (2009). Measuring regional inequality of education in Turkey: An evaluation by Gini index. *Procedia - Social and Behavioral Sciences, 1*(1), 949–952. https://doi.org/10.1016/j.sbspro.2009.01.168

Ucal, M., Haug, A. A., & Bilgin, M. H. (2016). Income inequality and FDI: Evidence with Turkish data. *Applied Economics*, *48*(11), 1030–1045. https://doi.org/10.1080/00036846.2015.1093081

van Leeuwen, B., & Földvári, P. (2016). The development of inequality and poverty in Indonesia, 1932–2008. *Bulletin of Indonesian Economic Studies*, *52*(3), 379–402. https://doi.org/10.1080/00074918.2016.1184226

Wang, W., & Lee, L. (2018). GMM estimation of spatial panel data models with common factors and a general space-time filter. *Spatial Economic Analysis*, *13*(2), 247–269. https://doi.org/10.1080/17421772.2017.1353128

Wicaksono, E., Amir, H., & Nugroho, A. (2017). *The sources of income inequality in Indonesia: A regression-based inequality decomposition*. No. 667, ADBI Working Paper. https://www.adb.org/sites/default/files/publication/229411/adbi-wp667.pdf

Yusuf, A. A., & Sumner, A. (2015). Growth, poverty, and inequality under Jokowi. *Bulletin of Indonesian Economic Studies*, *51*(3), 323–348. https://doi.org/10.1080/00074918.2015.1110685