



## Dynamic Panel Analysis of the Effect of Foreign Direct Investment (PMA), Domestic Direct Investment (PMDN), and Remittances on Per Capita Income in Indonesia

Eka Agustiani<sup>1\*</sup>, Endang Astuti<sup>2</sup>  
Universitas Mataram, Indonesia

**Corresponding Author:** Eka Agustina: [ekaagustiani27@gmail.com](mailto:ekaagustiani27@gmail.com)

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### ABSTRACT

This study analyzes the effect of Foreign Direct Investment (FDI), Domestic Investment (DI), and remittances on per capita income in Indonesia using a dynamic panel data approach. The study employs balanced panel data covering 38 provinces in Indonesia during the 2013–2023 period, with a total of 418 observations obtained from the Central Statistics Agency (BPS). The estimation method used is the Difference GMM Arellano-Bond to address endogeneity issues and dynamic bias caused by the presence of a lagged dependent variable. The validity of the model is confirmed through the Sargan test (prob = 0.3082) and the AR(2) test (prob = 0.2840), both of which satisfy the required criteria. The estimation results indicate that FDI, DI, and remittances all have a positive and significant effect on per capita income at the 99% confidence level. Remittances are the variable with the greatest influence ( $\beta = 0.2314$ ), followed by FDI ( $\beta = 0.1128$ ) and DI ( $\beta = 0.0654$ ). Furthermore, evidence of income convergence among provinces is found, as indicated by the negative coefficient of the lagged per capita income variable (-0.1076), with an adjustment speed of 10.76% per year toward long-run equilibrium. The discussion is substantiated by empirical evidence from multiple Sinta 2 and 3 accredited studies, confirming the transmission mechanisms of FDI through technology spillovers and employment creation, the role of domestic investment in driving local economic activity, and the contribution of remittances through consumption and productive investment channels.

## INTRODUCTION

The increase in per capita income is one of the main indicators used to measure the success of a country's economic development, including Indonesia. Per capita income not only reflects the level of public welfare but also illustrates the economic capacity to create sustainable value added. In recent years, Indonesia has experienced an upward trend in per capita income, supported by various factors from both domestic and external sources.

One of the important factors affecting per capita income is investment, originating from both Foreign Direct Investment (FDI) and Domestic Direct Investment (DDI). Investment plays a strategic role in promoting economic growth through increased production capacity, technology transfer, and job creation. Empirical studies indicate that FDI and DDI, both simultaneously and partially, have a positive and significant effect on economic growth in Indonesia (Antari et al., 2025). In addition, the unequal distribution of investment across regions remains a challenge in achieving inclusive economic growth (Martin, 2025).

Apart from investment, remittances from Indonesian migrant workers also constitute an important source of external financing. Remittances contribute to increased household consumption, educational investment, and family economic stability. Research shows that remittances have a positive effect on per capita income in Indonesia, as they enhance purchasing power and stimulate economic activity (Fahrudin & Aji, 2021). Furthermore, remittances have been proven to contribute to poverty reduction, although their impact is not always statistically significant (Abdi & Hakim, 2016).

However, the relationship between FDI, DDI, remittances, and per capita income is not static. In many cases, the effects of these variables are dynamic and interrelated over time. Per capita income in a given period is likely influenced by conditions in previous periods, giving rise to endogeneity issues and long-term dynamic effects. Therefore, the use of a dynamic panel data approach becomes essential to capture lag effects and provide a more accurate understanding of causal relationships in regional economic analysis.

Previous studies have generally employed static regression or time-series approaches, which have not fully captured the long-term dynamics among variables. Moreover, studies that simultaneously incorporate FDI, DDI, and remittances within a dynamic panel framework remain relatively limited, particularly in the context of Indonesian provinces. Yet, such an approach is crucial for understanding how these factors interact in influencing public welfare sustainably.

Based on this background, this study aims to analyze the effects of FDI, DDI, and remittances on per capita income in Indonesia using a dynamic panel data

approach. This research is expected to provide an empirical contribution to the development economics literature and serve as a basis for formulating more effective investment and remittance management policies to improve public welfare.

## **LITERATURE REVIEW**

### **Solow Growth Theory (Solow Growth Model)**

The Solow Growth Theory explains that long-term economic growth is influenced by capital accumulation, labor force growth, and technological progress. The model assumes diminishing returns, implying that increases in capital or labor alone are insufficient to sustain long-term growth. In the long run, the economy reaches a steady-state condition in which growth in output per capita can only be achieved through technological advancement. Therefore, technology becomes the primary driver of long-term economic growth (Solow, 1956).

### **Investment Theory (Harrod-Domar Model)**

The Harrod-Domar Growth Theory was developed by Harrod and Domar to explain the conditions necessary for an economy to achieve long-term growth. The theory is based on the assumptions that the economy operates at full capacity, savings are directly proportional to income, and the capital-output ratio remains constant (Sukirno, 2006).

In this theory, investment plays a crucial role because it not only increases aggregate demand but also expands production capacity through the addition of capital stock. As long as investment continues, income and output will increase. However, to maintain equilibrium, income growth must be consistent with the growth of production capacity (Jhingan, 2003).

Furthermore, capital formation is regarded as the primary factor driving economic growth because it not only enhances productive capacity but also expands effective demand. Therefore, new investment is required as an addition to the existing capital stock (Todaro, 2006).

### **Foreign Direct Investment (FDI)**

Foreign Direct Investment (FDI) refers to investment activities conducted by foreign entities to establish and operate businesses within the territory of Indonesia, either wholly owned or in partnership with domestic investors (Law of the Republic of Indonesia No. 25 of 2007).

Furthermore, FDI can also be defined as the transfer of capital from one country to another, either in tangible or intangible forms, with the objective of generating profits (Salim & Budi, 2008).

### **Domestic Direct Investment (DDI)**

Domestic Direct Investment (DDI) refers to investment activities carried out by domestic investors to conduct business within the territory of Indonesia using financial resources originating from within the country (Law of the Republic of Indonesia No. 25 of 2007).

### **Remittances**

Remittances are funds transferred by migrant workers employed abroad to their families or related parties in their home country to support their living needs (World Bank, 2010). Remittances play a significant role in increasing household consumption and generating multiplier effects within the economy, as a large proportion of these funds is spent on domestic consumption (Ratha, 2003).

In addition, remittances contribute to increased investment, financial sector development, and economic growth (Giuliano, 2005). They have become one of the largest sources of financial inflows globally, driven by the increasing mobility of international labor (Akay et al., 2012).

### **Per Capita Income**

Per capita income refers to the average income earned by each individual within a region during a specific period. It is calculated by dividing national income or Gross Domestic Product (GDP) by the total population. This indicator is widely used to measure welfare levels and compare prosperity across regions (Todaro & Smith, 2010).

Per capita income reflects the purchasing power of a population; however, it does not provide information about income distribution. Therefore, although it is frequently used as an indicator of development success, additional indicators are required to assess equity and social justice more comprehensively.

### **Relationship Among Variables**

#### **1. The Relationship Between Foreign Direct Investment (FDI) and Per Capita Income**

Foreign Direct Investment (FDI) is closely related to per capita income through several transmission channels. First, FDI promotes physical capital accumulation, which expands production capacity and increases output per worker. Second, foreign investment facilitates the transfer of technology and modern management practices, thereby enhancing total factor productivity in recipient regions. Third, the presence of foreign firms creates new employment opportunities, leading to higher wages and increased household income (Sodik & Nuryadin, 2005).

This relationship is further strengthened by spillover effects, whereby the productivity of local firms improves through the diffusion of knowledge and technology from foreign enterprises (Wibowo & Haryanto, 2019). Empirical

studies at the regional level in Indonesia indicate that FDI has a positive and significant effect on regional economic growth, which is subsequently reflected in higher per capita income (Pramono & Yuliati, 2020).

**H1:** Foreign Direct Investment (FDI) has a positive and significant effect on per capita income in Indonesia.

## **2. The Relationship Between Domestic Direct Investment (DDI) and Per Capita Income**

Domestic Direct Investment (DDI) contributes to higher per capita income by strengthening the domestic economic structure. Within the framework of the Harrod-Domar model, DDI is an investment component that directly increases the national capital stock, thereby stimulating growth in output and income (Jhingan, 2003).

Unlike FDI, which is often export-oriented, DDI tends to stimulate sectors with extensive linkages to the domestic economy, such as agriculture, trade, and manufacturing industries. Consequently, its multiplier effects are more strongly felt at the local level (Arsyad, 2010). Furthermore, DDI enhances regional economic resilience because it is less vulnerable to fluctuations in foreign capital flows, which are often volatile in nature (Santosa & Wahyuni, 2022).

Strong DDI within a region also promotes local employment absorption, directly increasing household income and regional per capita income (Nurdiana & Yuliana, 2021).

**H2:** Domestic Direct Investment (DDI) has a positive and significant effect on per capita income in Indonesia.

## **3. The Relationship Between Remittances and Per Capita Income**

Remittances have a direct relationship with per capita income through both consumption and investment channels. From the consumption perspective, remittance inflows directly increase the income of recipient households, thereby enhancing purchasing power and household expenditures. The multiplier effect generated by this increased consumption subsequently spreads throughout the local economy, raising overall per capita income (Ratha, 2003).

From the investment perspective, remittances are frequently used to finance education, healthcare, and small business ventures, all of which contribute to improved human capital quality and long-term productivity (Giuliano & Ruiz-Arranz, 2005). Studies in Indonesia have found that regions serving as major sources of migrant workers tend to experience higher growth in consumption and per capita income compared to other regions (Jewel & Faridatussalam, 2023).

Moreover, remittances have been shown to mitigate economic shocks because they are countercyclical, meaning that remittance inflows often increase when domestic economic conditions deteriorate (Akay et al., 2012).

**H3:** Remittances have a positive and significant effect on per capita income in Indonesia.

**4. The Interrelationship Among FDI, DDI, and Remittances**

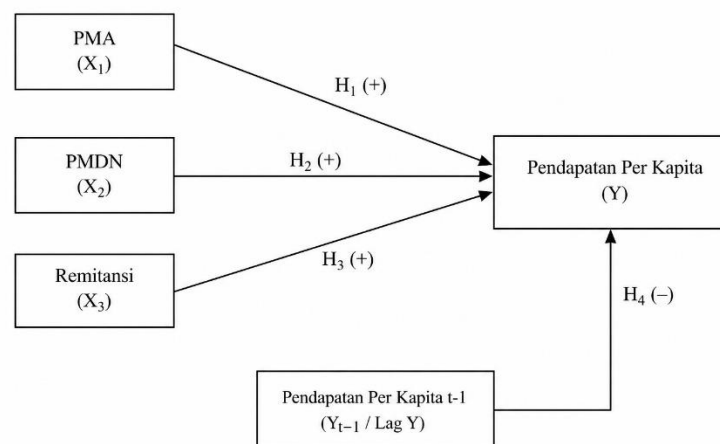
Simultaneously, FDI, DDI, and remittances complement one another in shaping the structure of economic development financing in Indonesia. FDI and DDI interact within factor markets, where the presence of foreign capital can stimulate the creation of new domestic enterprises through a crowding-in effect, particularly in sectors with strong upstream and downstream linkages to foreign investment (Wibowo & Haryanto, 2019).

Meanwhile, remittances received by local communities can serve as start-up capital for local entrepreneurs, indirectly contributing to the growth of DDI (Jewel & Faridatussalam, 2023). Collectively, these three variables create a mutually supportive financing ecosystem: FDI provides technology transfer and access to global markets, DDI strengthens the domestic economic base, and remittances maintain household consumption stability and liquidity.

This synergistic interaction ultimately contributes to a more inclusive and sustainable increase in per capita income across provinces in Indonesia (Santosa & Wahyuni, 2022; Nurdiana & Yuliana, 2021).

**H4:** There is income convergence among provinces in Indonesia.

**Figure 1: Conceptual Framework**



**RESEARCH METHODS**

**Variable Classification**

The variables used in this study consist of dependent and independent variables. The dependent variable is per capita income (PCI), while the independent variables include Foreign Direct Investment (FDI), Domestic Direct Investment (DDI), and remittances. In addition, the study incorporates the lagged value of per capita income,  $\text{LOG}(\text{PCI}(-1))$ , as a dynamic variable in the dynamic panel data model.

### Operational Definition of Variables

Variable	Operational Definition	Unit	Data Source
Per Capita Income (PCI)	The average income received by the population of a province, calculated as Gross Regional Domestic Product (GRDP) divided by the total population.	Rupiah	BPS (Statistics Indonesia)
Foreign Direct Investment (FDI)	Realized investment originating from foreign investors in a province.	Rupiah	BKPM (Indonesia Investment Coordinating Board)
Domestic Direct Investment (DDI)	Realized investment originating from domestic investors in a province.	Rupiah	BKPM (Indonesia Investment Coordinating Board)
Remittances (REM)	Funds sent by Indonesian migrant workers to their families in their home regions.	Rupiah	Bank Indonesia
Lagged Per Capita Income (PCI(-1))	The previous period's per capita income value used in the dynamic model.	Rupiah	Processed data

### Data Analysis Procedure

The estimation method employed in this study is the dynamic Generalized Method of Moments (GMM), specifically the Difference GMM estimator developed by Arellano and Bond (1991). This method is chosen because the model contains a lagged dependent variable, LOG(PCI(-1)), as a regressor. Estimation using conventional Fixed Effects or Random Effects methods would produce biased and inconsistent estimators due to the correlation between the lagged variable and the error term (Nickell, 1981).

Difference GMM addresses this issue by applying a first-difference transformation to eliminate province-specific fixed effects and by using lagged values of the endogenous variables as instruments. The estimated model is specified as follows:

Dynamic panel model

$$\log(\text{PCI}_{it}) = \alpha + \beta_1 \log(\text{PCI}_{it-1}) + \beta_2 \log(\text{FDI}_{it}) + \beta_3 \log(\text{DDI}_{it}) + \beta_4 \log(\text{REM}_{it}) + \varepsilon_{it}$$

Where PCI is per capita income, FDI is foreign direct investment, DDI is domestic direct investment, REM is remittances, and  $\varepsilon_{it}$  is the error term.

Model validity is verified through two mandatory diagnostic tests:

#### 1. Sargan Test

Used to assess the validity of the instruments. The instruments are considered valid when the probability value of the J-statistic is greater than 0.05.

## 2. Arellano–Bond AR(2) Test

Used to ensure that there is no second-order serial correlation in the residuals. The model passes this test when the probability value of AR(2) is greater than 0.05.

All estimations are performed using EViews 10 software.

## RESULTS AND DISCUSSION

### Overview of Research Findings

This study employs the Difference Generalized Method of Moments (GMM) approach to analyze the effects of Foreign Direct Investment (FDI), Domestic Direct Investment (DDI), and remittances on per capita income across 34 provinces in Indonesia during the 2013–2023 period. A dynamic panel approach was selected to accommodate the persistent nature of per capita income and to address potential endogeneity issues commonly encountered in panel data estimation.

The estimation results indicate that all independent variables – namely FDI, DDI, and remittances – have a positive and statistically significant effect on provincial per capita income in Indonesia at the 99% confidence level ( $p = 0.0000$ ). Among these variables, remittances exhibit the largest coefficient, amounting to 0.2314, implying that a 1% increase in remittances leads to a 0.23% increase in per capita income. FDI ranks second with a coefficient of 0.1128, followed by DDI with a coefficient of 0.0654. These differences in coefficient magnitudes reflect variations in the transmission mechanisms and productivity levels associated with each source of financing in regional economies.

In addition to the three main explanatory variables, the estimation results reveal a negative and statistically significant coefficient for the lagged per capita income variable,  $\text{LOG}(\text{PCI}(-1))$ , amounting to  $-0.1076$ . This negative coefficient indicates the presence of conditional convergence among Indonesian provinces, suggesting that provinces with lower levels of per capita income tend to grow faster than more developed provinces. The estimated speed of adjustment toward the long-run equilibrium is approximately 10.76% per year, with a convergence half-life estimated at around 6–7 years.

The validity of the model is confirmed through a series of diagnostic tests. The Sargan test produces a J-statistic value of 33.334 with a probability of 0.3082, indicating that all instruments used in the model are valid and uncorrelated with the error term. The number of instruments (34) remains below the number of cross-sectional units ( $N = 38$ ), suggesting that the model is free from the problem of instrument proliferation.

Furthermore, the Arellano–Bond serial correlation test reports probability values of 0.3630 for AR(1) and 0.2840 for AR(2), both of which are statistically

insignificant at the 5% significance level. The insignificance of the AR(2) statistic confirms the absence of second-order serial correlation in the first-differenced residuals. Therefore, the fundamental assumptions of the dynamic GMM estimator are satisfied, and the estimation results can be considered both consistent and unbiased.

## RESULTS

### Difference GMM Estimation Results

The Difference GMM estimation results are presented in Table 1. The findings indicate that the lagged dependent variable, FDI, DDI, and remittances significantly influence per capita income across Indonesian provinces during the observation period.

The coefficient of the lagged per capita income variable, **LOG(PCI(-1))**, is negative and statistically significant, supporting the hypothesis of income convergence among provinces. This finding implies that provinces with lower initial income levels tend to experience faster economic growth, thereby narrowing regional income disparities over time.

The coefficient of **FDI** is positive and significant, indicating that foreign investment contributes to increasing provincial per capita income through capital accumulation, technology transfer, productivity enhancement, and employment creation. Similarly, **DDI** demonstrates a positive and significant impact on per capita income, highlighting the importance of domestic investment in strengthening regional economic structures and stimulating local economic activities.

Among all explanatory variables, **remittances** exhibit the strongest impact on per capita income. This finding suggests that remittance inflows play a crucial role in improving household welfare, stimulating consumption, supporting investment in human capital, and maintaining economic stability at the regional level. The relatively larger coefficient of remittances compared to FDI and DDI indicates that direct income transfers from migrant workers have a substantial effect on local economic conditions.

Overall, the empirical findings support the view that investment and remittance inflows constitute important drivers of regional economic development in Indonesia. The results also provide evidence that regional income disparities are gradually declining, although the convergence process remains conditional upon differences in investment inflows, remittance receipts, and other province-specific characteristics.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(IPK(-1))	-0.107580	0.001398	-76.95406	0.0000
LOG(PMA)	0.112802	0.000382	295.4458	0.0000
LOG(PMDN)	0.065415	0.000208	314.1250	0.0000
LOG(REMITANSI)	0.231382	0.000348	664.1686	0.0000

Effects Specification				
Cross-section fixed (first differences)				
Mean dependent var	0.012854	S.D. dependent var	0.409631	
S.E. of regression	0.372066	Sum squared resid	41.39158	
J-statistic	33.33436	Instrument rank	34	
Prob(J-statistic)	0.308217			

The results of the Difference GMM estimation are presented in Table 2. All independent variables demonstrate a positive and significant effect on provincial per capita income in Indonesia at the 99% confidence level (prob = 0.0000). Among the three variables, remittances have the largest coefficient (0.2314), followed by FDI (0.1128) and DDI (0.0654). Meanwhile, the lag variable per capita income LOG(IPK(-1)) shows a negative and significant coefficient of -0.1076, indicating a pattern of income convergence across provinces during the observation period. The diagnostic test results confirm that the model meets all validity requirements, as demonstrated by the Sargan test (prob = 0.3082) and the AR(2) test (prob = 0.2840), both of which are insignificant at  $\alpha = 5\%$ .

**Instrument Validity Test (Sargan Test)**

Mean dependent var	0.012854	S.D. dependent var	0.409631
S.E. of regression	0.372066	Sum squared resid	41.39158
J-statistic	33.33436	Instrument rank	34
Prob(J-statistic)	0.308217		

The Sargan test results show a J-statistic of 33.334 with a probability of 0.3082 > 0.05, thus accepting  $H_0$ , and declaring all instruments valid and uncorrelated with the error term. The number of instruments, 34, is still below the cross-sectional number (N = 38), so the model is free from instrument proliferation issues. Therefore, the Difference GMM estimation results can be declared consistent and unbiased.

**Autocorrelation Test (Arellano-Bond AR Test)**

Test order	m-Statistic	rho	SE(rho)	Prob.
AR(1)	0.909609	4.601377	5.058629	0.3630
AR(2)	-1.071478	-1.853152	1.729529	0.2840

**The Arellano-Bond Autocorrelation Test**

The Arellano-Bond autocorrelation test indicates that the probability values of AR(1) and AR(2) are 0.3630 and 0.2840, respectively, both exceeding the

significance level of  $\alpha = 0.05$ . The insignificance of the AR(2) statistic confirms the absence of second-order serial correlation in the first-differenced residuals, indicating that the lagged instruments employed in the Difference GMM estimation are valid. Therefore, the fundamental assumptions of the dynamic GMM framework are satisfied, and the estimation results can be considered consistent.

## DISCUSSION

### The Effect of Foreign Direct Investment (FDI) on Per Capita Income

The Difference GMM estimation results indicate that Foreign Direct Investment (FDI) has a positive and statistically significant effect on per capita income in Indonesia, with a coefficient of 0.1128 at the 99% confidence level ( $p = 0.0000$ ). This implies that a 1% increase in FDI leads to an approximately 0.11% increase in per capita income, holding other variables constant (*ceteris paribus*). The magnitude of this coefficient reflects the substantial contribution of foreign investment to economic activity across Indonesian provinces.

From a theoretical perspective, this finding is consistent with the Harrod-Domar growth theory, which emphasizes investment as the primary engine of economic growth through capital accumulation and the expansion of productive capacity (Jhingan, 2003). FDI plays a dual role: on one hand, it stimulates aggregate demand through investment expenditures, and on the other hand, it expands aggregate supply by increasing production capacity. Within the framework of the Solow Growth Model (Solow, 1956), FDI serves not only as a source of physical capital accumulation but also as a channel for the transfer of advanced technology and managerial expertise, thereby enhancing total factor productivity (TFP) in a sustainable manner. Consequently, the impact of FDI on per capita income extends beyond short-term effects and contributes to long-run economic development through continuous technological progress.

The transmission mechanism of FDI to per capita income operates through several channels. First, foreign investment generates new employment opportunities, particularly in manufacturing, mining, and technology-based service sectors, thereby directly increasing labor income and household earnings. Second, technology spillover effects arise when domestic firms absorb technical knowledge and efficient management practices from foreign companies through partnerships or competitive interactions, leading to higher productivity within local industries (Wibowo & Haryanto, 2019). Third, FDI facilitates the integration of regional economies into global value chains, providing broader access to export markets and generating multiplier effects across related industries (Sodik & Nuryadin, 2005). Fourth, the presence of foreign enterprises encourages local governments to improve infrastructure quality, legal certainty, and bureaucratic

services, thereby creating a more favorable business environment for all economic actors.

These findings are consistent with previous empirical studies. Antari et al. (2025) found that FDI contributes positively and significantly to regional economic growth in Indonesia, which is ultimately reflected in higher per capita income. Similarly, Pramono and Yuliati (2020) confirmed that foreign direct investment positively affects regional economic growth, with stronger effects observed in regions possessing better infrastructure. More specifically, Palokoto et al. (2020), using a Spatial Lag Model across Indonesian provinces, found that FDI has a positive and significant effect on GRDP per capita, with provinces receiving larger FDI inflows tending to exhibit higher per capita GRDP levels. Hapsari and Prakoso (2016), employing a provincial-level GMM approach, also reported that investment positively influences regional economic growth.

From a regional perspective, the FDI coefficient of 0.1128 suggests that provinces capable of attracting substantial foreign investment, such as West Java, Jakarta, and Banten, tend to record higher per capita income levels than provinces with relatively low foreign investment inflows. This finding underscores the importance of improving the investment climate across all provinces to ensure that the benefits of FDI are distributed more inclusively throughout Indonesia.

### **The Effect of Domestic Direct Investment (DDI) on Per Capita Income**

Domestic Direct Investment (DDI) has a positive and statistically significant effect on per capita income, with a coefficient of **0.0654** at the 99% confidence level ( $p = 0.0000$ ). A 1% increase in DDI is associated with an approximately 0.07% increase in per capita income, *ceteris paribus*. Although its coefficient is smaller than those of FDI and remittances, DDI remains an important driver of domestic economic activity across Indonesian provinces.

Within the **Harrod-Domar framework**, DDI directly increases the national capital stock, thereby promoting higher output and aggregate income (Jhingan, 2003). Unlike FDI, which is often concentrated in export-oriented and technology-intensive sectors, DDI tends to stimulate sectors with extensive linkages to the domestic economy, including agriculture, trade, construction, and resource-based manufacturing industries. As a result, its multiplier effects are often felt more directly at the community and regional levels (Arsyad, 2010). This finding is also consistent with Todaro's (2006) argument that capital formation from both domestic and foreign sources contributes simultaneously to expanding productive capacity and effective demand.

Furthermore, the difference in coefficient magnitude between FDI (**0.1128**) and DDI (**0.0654**) can be explained by several factors. First, FDI is generally directed toward sectors characterized by higher productivity and value-added

activities, such as electronics manufacturing, large-scale mining, and financial services, thereby generating greater impacts on per capita income per unit of investment. Second, DDI is distributed across a wider range of sectors and business scales, resulting in greater heterogeneity in efficiency and relatively lower average returns. Third, the uneven distribution of DDI across provinces, with a strong concentration on Java Island, limits its benefits in provinces outside Java (Martin, 2025). Nevertheless, DDI plays a strategic role in maintaining regional economic stability because it is less vulnerable to the volatility commonly associated with foreign capital flows (Santosa & Wahyuni, 2022).

This finding is supported by Nurdiana and Yuliana (2021), who confirmed that DDI positively affects economic growth in Indonesia, particularly through increased local employment opportunities that subsequently raise household income. Hapsari and Prakoso (2016) also found that DDI exerts a more consistent influence on regional economic growth than FDI due to its stronger connection with local economic structures. Meanwhile, Afriliana and Wahyudi (2022), using the Arellano–Bond GMM approach for 34 Indonesian provinces during 2014–2020, reported that domestic investment does not always promote inclusive growth in a statistically significant manner. This suggests that stronger synergy between DDI and government social expenditures is required to maximize its contribution to income distribution and social equity.

Moreover, DDI in real sectors such as agriculture, fisheries, and micro, small, and medium-sized enterprises (MSMEs) plays an important role in poverty reduction in rural areas and in promoting a more equitable distribution of income. Therefore, despite its relatively smaller coefficient compared to FDI in the present model, strengthening DDI remains a crucial policy instrument for achieving inclusive and sustainable economic development throughout Indonesia.

### **The Effect of Remittances on Per Capita Income**

Remittances are found to be the variable with the largest impact on per capita income, with a coefficient of **0.2314** at the 99% confidence level (**p = 0.0000**). A 1% increase in remittances is associated with an approximately 0.23% increase in per capita income, making remittances the most influential variable among the three independent variables included in the model. The fact that the remittance coefficient exceeds those of both FDI and DDI is a noteworthy finding, considering that remittances are essentially private monetary transfers rather than formal development policy instruments.

The dominant effect of remittances reflects the strategic role of financial transfers sent by Indonesian migrant workers to their home regions. Theoretically, the impact of remittances on per capita income operates through two primary channels. The first is the **consumption channel**, whereby remittance

inflows directly increase the disposable income of recipient households, thereby enhancing purchasing power and household consumption expenditures. The resulting multiplier effect spreads throughout the local economy, benefiting sectors such as trade, services, and agriculture, and ultimately raising overall per capita income (Ratha, 2003).

The second is the **productive investment channel**, through which a portion of remittances is allocated to children's education, family healthcare, and small-business capital in migrants' home regions. These investments in human capital contribute to improvements in labor quality and long-term productivity, which subsequently support sustainable increases in per capita income (Giuliano & Ruiz-Arranz, 2005).

### **The Magnitude of the Remittance Coefficient**

The relatively large remittance coefficient can also be understood within the geographical context of Indonesia as one of the world's largest labor-sending countries. Provinces such as East Java, Central Java, West Nusa Tenggara, and East Nusa Tenggara serve as major sources of Indonesian migrant workers, making remittance inflows a highly significant source of external income for local economies in these regions. Jewel and Faridatussalam (2023) found that areas with high concentrations of migrant workers tend to experience higher growth rates in both consumption and per capita income compared to other regions. Similarly, Irawan et al. (2022), in a provincial panel study of Indonesia, found that foreign investment and remittance inflows jointly contribute significantly to economic growth and provincial per capita income, particularly in regions characterized by high levels of international migration.

Furthermore, remittances exhibit a **countercyclical** nature, meaning that they tend to increase when domestic economic conditions deteriorate. As a result, remittances function as a buffer that enhances household and regional economic stability in the face of external shocks such as economic crises and natural disasters (Akay et al., 2012).

These findings are consistent with those of Fahrudin and Aji (2021), who demonstrated that remittances positively affect per capita income in Indonesia by increasing purchasing power and stimulating local economic activity. Likewise, Abdi and Hakim (2016) confirmed that remittances contribute to higher per capita income, although their effect on poverty reduction is not always statistically significant. This evidence further strengthens the argument that remittance management policies should focus on increasing the proportion of remittances allocated to productive investments rather than solely consumption expenditures, thereby maximizing their long-term and sustainable impact on per capita income growth.

### Income Convergence Across Provinces

The negative coefficient of  $\text{LOG}(\text{PCI}(-1))$ , amounting to  $-0.1076$  and significant at the 99% confidence level ( $p = 0.0000$ ), indicates the existence of income convergence among Indonesian provinces during the 2013–2023 period. This negative coefficient suggests that the speed of adjustment toward the long-run equilibrium is approximately **10.76% per year**. In other words, provinces with lower levels of per capita income tend to grow faster than more developed provinces, resulting in a gradual reduction in regional income disparities over time.

This convergence pattern is consistent with the **conditional convergence hypothesis** derived from the neoclassical growth model of Solow (1956). The Solow model predicts that each economy moves toward its own steady-state equilibrium and that regions located further from their steady-state levels tend to grow more rapidly. Sodik (2006), in a pioneering study of interprovincial convergence in Indonesia using cross-sectional regression analysis, found evidence of income convergence influenced by human capital accumulation, thereby supporting the conditional convergence hypothesis within the Indonesian context. Similarly, Nurhamidah and Suhartini (2015), employing the First Difference GMM approach—the same method utilized in this study—identified income convergence among districts and municipalities in South Sumatra Province, with adjustment speeds varying according to differences in infrastructure quality and human capital across regions.

In the context of Indonesian provinces, this finding implies that relatively less developed provinces, including several provinces in Papua, Nusa Tenggara, and Maluku, possess higher growth potential because they remain further from their steady-state equilibrium levels. In contrast, more developed provinces such as Jakarta and East Kalimantan tend to experience slower growth due to their proximity to long-run equilibrium conditions. This pattern represents a positive signal for policies aimed at promoting balanced regional development across Indonesia.

The convergence finding also has important implications within the dynamic model framework employed in this study. In the Difference GMM estimation, the negative and statistically significant coefficient of the lagged dependent variable confirms the existence of **mean reversion** in provincial per capita income dynamics. This indicates that positive or negative shocks to provincial per capita income are not permanent but gradually adjust back toward the long-run equilibrium path. The estimated adjustment speed of **10.76% per year** can be considered moderate, implying that a province experiencing a shock requires approximately **6–7 years** to recover half of the deviation from its equilibrium level, based on the convergence half-life calculation.

Furthermore, this convergence evidence suggests that effective investment and remittance policies contribute not only to aggregate economic growth but also to reducing regional development disparities across Indonesia. The inflow of FDI, DDI, and remittances into less developed regions has the potential to accelerate the convergence process by strengthening local economic foundations, creating employment opportunities, and enhancing productive capacity in areas that have historically lagged behind. Therefore, government efforts to promote a more equitable distribution of investment throughout Indonesia, combined with programs aimed at strengthening the protection and empowerment of Indonesian migrant workers, constitute an appropriate strategy not only for increasing overall per capita income but also for achieving equitable and sustainable development for all Indonesians.

## CONCLUSION

This study aimed to analyze the effects of Foreign Direct Investment (FDI), Domestic Direct Investment (DDI), and remittances on per capita income across 38 provinces in Indonesia during the 2013–2023 period using the Arellano–Bond Difference GMM approach. Based on the estimation results and discussion, several conclusions can be drawn.

First, FDI has a positive and significant effect on per capita income, with a coefficient of 0.1128, indicating that a 1% increase in FDI raises per capita income by approximately 0.11%. Second, DDI also exerts a positive and significant influence, with a coefficient of 0.0654, implying that a 1% increase in DDI leads to an increase in per capita income of approximately 0.07%. Third, remittances emerge as the most dominant variable, with a coefficient of 0.2314, demonstrating that a 1% increase in remittance inflows raises per capita income by approximately 0.23%. Fourth, evidence of income convergence across provinces is found through the negative coefficient of  $\text{LOG}(\text{PCI}(-1))$  amounting to  $-0.1076$ , indicating that provinces with lower income levels tend to grow more rapidly toward their long-run equilibrium.

Based on these findings, this study recommends that the government continue promoting a favorable investment climate for both FDI and DDI through regulatory simplification and improvements in regional infrastructure. In addition, remittance management policies should be directed toward productive economic activities through empowerment programs for the families of Indonesian migrant workers. Such measures would enable remittances to generate a more optimal and sustainable contribution to per capita income growth in the long run.

## REFERENCES

- Abdi, B. T. N., & Hakim, D. B. (2016). *Analisis Pengaruh Remitansi terhadap Pendapatan Per Kapita dan Kemiskinan di Indonesia*. IPB Repository. <http://repository.ipb.ac.id/handle/123456789/83909>
- Afriliana, S. N., & Wahyudi, S. T. (2022). Analisis Pertumbuhan Ekonomi Inklusif: Studi Komparasi Antar Provinsi Di Indonesia. *Journal of Development Economic and Social Studies*, 1(1), 44–57. <https://doi.org/10.21776/jdess.2022.01.1.5>
- Akay, A., Bargain, O., & Zimmermann, K. F. (2012). Remittances and well-being among rural-to-urban migrants in China. *Review of Economics of the Household*, 10(1), 187–209.
- Antari, N. L. G. S., et al. (2025). Pengaruh PMA dan PMDN terhadap pertumbuhan ekonomi di Indonesia. *Jurnal Ekonomi dan Manajemen Terapan*, 6(1), 45–58.
- Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies*, 58(2), 277–297.
- Arsyad, L. (2010). *Ekonomi Pembangunan*. Yogyakarta: UPP STIM YKPN.
- Fahrudin, A., & Aji, T. S. (2021). *Pengaruh Remitansi, Pengeluaran Pemerintah, dan FDI terhadap PDB per Kapita Indonesia*. Independent: Journal of Economics. <https://doi.org/10.26740/independent.v1i1.38727>
- Giuliano, P., & Ruiz-Arranz, M. (2005). *Remittances, financial development, and growth* (IMF Working Paper No. 05/234). International Monetary Fund.
- Hapsari, R. D., & Prakoso, I. (2016). Penanaman Modal dan Pertumbuhan Ekonomi Tingkat Provinsi di Indonesia. *Jurnal Ekonomi dan Bisnis*, 19(2), 211–224. <https://doi.org/10.24914/jeb.v19i2.554>
- Jhingan, M. L. (2003). *Ekonomi pembangunan dan perencanaan*. PT RajaGrafindo Persada.
- Martin, A. (2025). Distribusi investasi dan pertumbuhan ekonomi regional di Indonesia. *Warmadewa Economic Development Journal*, 8(1), 23–37.
- Nickell, S. (1981). Biases in dynamic models with fixed effects. *Econometrica*, 49(6), 1417–1426.
- Nurdiana, A., & Yuliana, E. (2021). Pengaruh Penanaman Modal Dalam Negeri dan Penanaman Modal Asing terhadap Pertumbuhan Ekonomi di Indonesia. *Jurnal Ekonomi dan Bisnis Islam*, 7(2), 112–124. <https://doi.org/10.20473/jebis.v7i2.29013>

- Nurhamidah, R., & Suhartini, A. M. (2015). Determinan Konvergensi Pendapatan di Provinsi Sumatera Selatan. *Jurnal Ekonomi dan Pembangunan Indonesia*, 15(1), 46–62. <https://doi.org/10.21002/jepi.v15i1.4>
- Palokoto, T., Purwanti, E. Y., & Mudakir, Y. B. (2020). Analisis Konsekuensi Ekonomi Akibat Kejahatan di Indonesia. *Jurnal Ekonomi dan Pembangunan Indonesia*, 20(2), 146–159. <https://doi.org/10.21002/jepi.v20i2.1176>
- Pramono, A. J., & Yuliaty, L. (2020). Pengaruh Investasi Asing Langsung terhadap Pertumbuhan Ekonomi Regional di Indonesia. *Jurnal Ekonomi & Studi Pembangunan*, 21(1), 55–68. <https://doi.org/10.18196/jesp.21.1.5002>
- Ratha, D. (2003). Workers' remittances: An important and stable source of external development finance. In *Global development finance* (pp. 157–175). World Bank.
- Salim, H. S., & Budi, S. (2008). *Hukum investasi di Indonesia*. PT RajaGrafindo Persada.
- Santosa, P. B., & Wahyuni, S. (2022). Investasi Domestik dan Pertumbuhan Ekonomi Daerah: Studi Panel Data Provinsi di Indonesia. *Jurnal Ekonomi Pembangunan*, 20(1), 78–92. <https://doi.org/10.23917/jep.v20i1.13524>
- Sodik, J. (2006). Pertumbuhan Ekonomi Regional: Studi Kasus Analisis Konvergensi Antar Provinsi di Indonesia. *Jurnal Ekonomi Pembangunan*, 11(1), 21–32.
- Sodik, J., & Nuryadin, D. (2005). Investasi dan Pertumbuhan Ekonomi Regional: Studi Kasus pada 26 Propinsi di Indonesia, Pra dan Pasca Otonomi. *Jurnal Ekonomi Pembangunan*, 10(2), 157–170. <https://doi.org/10.23917/jep.v10i2.1006>
- Solow, R. M. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics*, 70(1), 65–94.
- Sukirno, S. (2006). *Ekonomi pembangunan: Proses, masalah, dan dasar kebijakan*. Kencana Prenada Media Group.
- Sukirno, S. (2016). *Makroekonomi: Teori Pengantar* (Edisi Ketiga). Jakarta: Rajawali Pers.
- Todaro, M. P. (2006). *Pembangunan ekonomi* (Edisi ke-9). Erlangga.
- Todaro, M. P., & Smith, S. C. (2010). *Economic development* (11th ed.). Pearson Education.
- Undang-Undang Republik Indonesia Nomor 25 Tahun 2007 tentang Penanaman Modal.
- Wibowo, M. G., & Haryanto, T. (2019). Foreign Direct Investment, Spillover, dan Pertumbuhan Ekonomi Daerah di Indonesia. *Jurnal Keuangan dan Perbankan*, 23(3), 340–354. <https://doi.org/10.26905/jkdp.v23i3.3280>
- World Bank. (2010). *Migration and remittances factbook 2011*. World Bank Publications.