# The Influence of Foreign and Domestic Investment on Regional GDP Growth: A Panel Data Analysis



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***ABSTRACT***

*Economic growth in regions depends heavily on investment flows, both from foreign and domestic sources. Understanding how Foreign Direct Investment (FDI) and Domestic Investment (DI) affect regional development is crucial, especially in resource-rich but diverse areas like Sumatra. This study aims to analyze the influence of FDI and DI on Gross Regional Domestic Product (GRDP) growth across ten provinces in Sumatra and to explore their role in achieving Sustainable Development Goal 9 (SDG 9), which promotes inclusive and sustainable industrialization. Using panel data from 2010 to 2023 and employing a fixed effects model, the research examines provinces including Aceh, North Sumatra, West Sumatra, Riau, Jambi, South Sumatra, Bengkulu, Lampung, Riau Islands, and Bangka Belitung. The results indicate that both FDI and DI positively and significantly contribute to GRDP growth across all provinces studied. The findings also emphasize the critical role of government policies in fostering sustainable investment practices that align with SDG 9 targets. The study recommends that local governments prioritize sustainable investment strategies and strengthen the local industrial sector to promote long-term economic growth, supporting both regional development and global sustainability agendas.*

***Keywords**: Domestic Investment, Foreign Direct Investment, Gross Regional Domestic Product, Regional Growth, Sustainable Development Goal 9.*

***ABSTRAK***

*Pertumbuhan ekonomi di berbagai daerah sangat bergantung pada arus investasi, baik dari sumber asing maupun domestik. Memahami bagaimana Penanaman Modal Asing (PMA) dan Penanaman Modal Dalam Negeri (PMDN) memengaruhi pembangunan daerah sangatlah penting, terutama di daerah yang kaya sumber daya namun beragam seperti Sumatera. Studi ini bertujuan untuk menganalisis pengaruh PMA dan PMDN terhadap pertumbuhan Produk Domestik Regional Bruto (PDRB) di sepuluh provinsi di Sumatera dan untuk mengeksplorasi peran mereka dalam mencapai Tujuan Pembangunan Berkelanjutan 9 (SDG 9), yang mendorong industrialisasi yang inklusif dan berkelanjutan. Dengan menggunakan data panel dari tahun 2010 hingga 2023 dan menggunakan model efek tetap, penelitian ini mengkaji provinsi-provinsi termasuk Aceh, Sumatera Utara, Sumatera Barat, Riau, Jambi, Sumatera Selatan, Bengkulu, Lampung, Kepulauan Riau, dan Bangka Belitung. Hasilnya menunjukkan bahwa PMA dan PMDN berkontribusi positif dan signifikan terhadap pertumbuhan PDRB di semua provinsi yang diteliti. Temuan ini juga menekankan peran penting kebijakan pemerintah dalam mendorong praktik*

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*investasi berkelanjutan yang selaras dengan target SDG 9. Studi ini merekomendasikan agar pemerintah daerah memprioritaskan strategi investasi berkelanjutan dan memperkuat sektor industri lokal untuk mendorong pertumbuhan ekonomi jangka panjang, yang mendukung pembangunan regional dan agenda keberlanjutan global.*

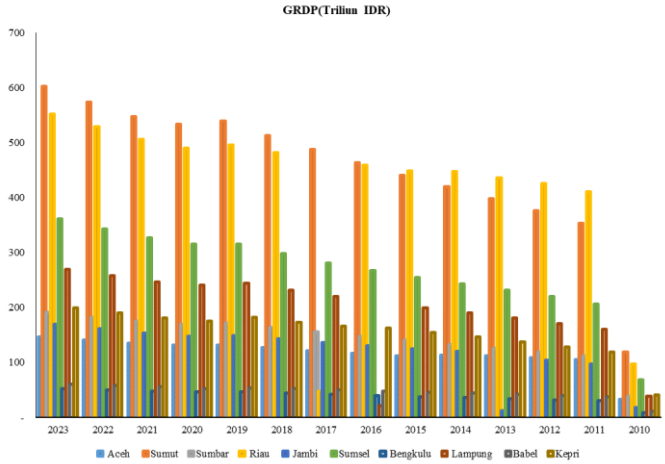
***Kata kunci**: Investasi Domestik, Investasi Asing Langsung, Produk Domestik Regional Bruto, Pertumbuhan Regional, Tujuan Pembangunan Berkelanjutan 9.*

## INTRODUCTION

Regional economic development is commonly evaluated through sustained economic growth over time, most often measured by increases in Gross Regional Domestic Product (GRDP). A higher GRDP contributes to increased government revenues, which in turn support development projects and enhance public service quality. Improved services are expected to boost operational productivity and efficiency, while long-term growth strengthens regional independence as a driver of socio-economic progress (Nandita et al., 2019). As noted by Lubis et al. (2025), expansion in the economic sector not only increases GRDP but also creates new jobs, reinforcing the foundations of regional development.

Globally, sustainable development gained momentum with the 2000 adoption of the Millennium Development Goals (MDGs) by 189 United Nations member states, aimed at reducing poverty and improving human welfare (Choong et al., 2004; Todaro & Smith, 2015). In 2015, these goals evolved into the Sustainable Development Goals (SDGs), a universal framework consisting of 17 goals and 169 targets to be achieved by 2030. The SDGs emphasize inclusivity, interconnectedness, and integration to ensure no one is left behind. Indonesia's commitment was formalized through the attendance of Vice President H.M. Jusuf Kalla at the UN General Assembly in 2015 and the enactment of Presidential Regulation No. 59 of 2017, which outlines national strategies for achieving the SDGs. Despite this commitment, disparities in GRDP growth persist across Sumatra's provinces from the high-performing industrial centres of North Sumatra, Riau, and South Sumatra to provinces like Bengkulu, Bangka Belitung, and the Riau Islands, where industrial contributions remain limited. This imbalance indicates challenges in achieving equitable economic growth across regions (Naqellari & Mici, 2020; Hakim & Suhendi, 2021).

One of the SDGs' key targets, SDG 9, focuses on promoting industry, innovation, and infrastructure. Achieving this goal in the Sumatran context requires examining the role of investment, particularly Foreign Direct Investment (FDI) and Domestic Investment (DI), in driving GRDP growth. FDI can bring capital, technology transfer, and managerial expertise, while DI often aligns more closely with local economic structures and policy frameworks (Thahir et al., 2021; Nisa & Juliprijanto, 2022). Both forms of investment have the potential to stimulate industrial development, expand productive capacity, and create employment opportunities, thereby contributing to sustainable and inclusive regional growth (Arrafiqi & Arifin, 2024). This study investigates the simultaneous impact of FDI and DI on GRDP in ten Sumatran provinces, with a focus on supporting SDG 9 objectives.




*Source: BPS Indonesia GRDP at 2010 constant market price*

**Figure 2.** GDRP Data 2010-2023

Figure 2 shows the GRDP graph from 2010 to 2023, showing economic disparities among Sumatra's provinces. North Sumatra, Riau, and South Sumatra lead due to strong industrial, mining, and energy sectors, while Bengkulu, Bangka Belitung, and Riau Islands have lower GRDP, reflecting limited industrialization. This highlights uneven economic growth despite the island's rich resource potential.

Previous studies, such as Thahir et al. (2021) and Nisa and Juliprijanto (2022) on the impact of Foreign Direct Investment (FDI) and Domestic Investment (DI) on Gross Regional Domestic Product (GRDP) growth have several limitations, especially in the context of Sumatra's provinces. While Manihuruk et al. (2024) found that both FDI and DI (PMDN) significantly influenced GRDP in North Sumatra from 2001 to 2020, this study focused on only one province and did not consider the Sustainable Development Goal (SDG) 9 indicators, such as industrialization and innovation. Similarly, Aprina et al. (2021) and Andreadi et al. (2023) demonstrated the positive effects of FDI and DI on national GDP between 2014 and 2021; however, their analysis did not explore regional or sectoral differences, nor did it link the findings to SDG 9. Other studies, like Prasetiadi (2021), Sijabat (2023), and Ali et al. (2024), provided insights into investment effects but lacked detailed regional panel data and did not measure how these investments contribute to SDG 9 targets. Additionally, sectoral and provincial studies, such as those by Fazaalloh (2024) and Siboro et al. (2025), revealed mixed and sometimes contradictory results regarding FDI's role in growth, with few incorporating sustainability or innovation aspects of SDG 9. This highlights significant gaps, including the absence of comprehensive panel analysis covering all 10 Sumatra provinces, limited integration of SDG 9 indicators, a lack of sectoral focus on DI, and missing moderation models that consider regulatory and technological factors influencing investment outcomes (Mahadika et al., 2017; Sudarmawan, 2022).

This study aims to fill these gaps by examining the simultaneous effects of FDI and DI on GRDP growth across all 10 provinces of Sumatra in a panel data framework. It uniquely integrates SDG 9 indicators such as infrastructure quality, innovation, and inclusive industrialization to provide a more complete understanding of how investment drives sustainable regional development. This research explores how regulatory quality, infrastructure, and technology use may moderate the relationship between investment and growth. By addressing regional diversity and linking investment performance to SDG 9 targets, this study offers innovative insights to support evidence-based policymaking for achieving inclusive and sustainable development in Sumatra.

## LITERATURE REVIEW

### Foreign Direct Investment (FDI) and GRDP Growth

Foreign Direct Investment (FDI) refers to cross-border capital flows in which an investor from one country establishes a lasting interest and significant influence over the operations of a business entity in another country. In Indonesia, FDI has been encouraged since the enactment of Law No. 1 of 1967, with the Investment Coordinating Board (*Badan Koordinasi Penanaman Modal*/BKPM) serving as the approving authority for all foreign investment projects. Over the past decade, Indonesia has experienced consistent FDI inflows, particularly in the manufacturing, mining, renewable energy, and infrastructure sectors. These investments contribute not only to capital formation but also to technology transfer, managerial expertise, and workforce skill enhancement (Awodumi, 2021; Ahmed & Kialashaki, 2023).

The economic literature suggests that FDI promotes Gross Regional Domestic Product (GRDP) growth through several channels: first, increasing capital stock and productive capacity; second, fostering innovation and industrial upgrading via technology spillovers from multinational corporations; and third, generating employment that strengthens household consumption (Kim et al., 2023). The "crowding-in" effect identified by Prasetiadi (2021) further implies that FDI can stimulate domestic entrepreneurship by integrating local suppliers into global value chains. However, its impact on GRDP may vary across regions due to disparities in infrastructure readiness, institutional quality, and sectoral specialization (Fazaalloh, 2024; Siboro et al., 2025).

Empirical studies in Indonesia provide mixed evidence: some show strong positive effects of FDI on provincial GRDP, while others find insignificant results depending on local absorptive capacity and industrial composition (Asmara, 2024; Ali et al., 2024). In the context of Sumatra, the current study's findings using the Fixed Effect Model confirm that FDI exerts a significant and positive influence on GRDP growth between 2010 and 2023, with a p-value of 0.0217 (< 0.05). This supports the neoclassical growth theory's proposition that foreign capital inflows enhance productivity and long-term output (Bisaglia et al., 2020; Diewert & Fox, 2024).

H1: Foreign direct investment has a significant impact on gross regional domestic product growth.

### Domestic Investment (DI) and GRDP Growth

Domestic Investment (DI), or *Penanaman Modal Dalam Negeri* (PMDN), refers to capital allocation within Indonesia by domestic entities, including individuals, corporations, and local governments. Governed under Law No. 25 of 2007 and BKPM Regulation No. 4 of 2021, DI serves as a cornerstone of regional economic development due to its responsiveness to local fiscal policies and political stability (Setiyanto, 2022; Lusardi, 2022). DI is often concentrated in strategic sectors such as manufacturing, infrastructure, and services, where it can have immediate and localized economic impacts (Prasetiadi, 2021; Sutanto et al., 2024).

Theoretically, DI contributes to GRDP growth by expanding production capacity, enhancing infrastructure, and creating forward and backwards linkages in regional economies. Since domestic investors are more familiar with local markets, regulations, and cultural contexts, their projects tend to have higher operational resilience and alignment with regional development goals (Sutanto et al., 2024). Moreover, DI can complement FDI by providing supporting industries and services that facilitate foreign projects (Malenković, 2023; Nguyen, 2023).

Empirical evidence at the provincial level demonstrates that DI is often more consistently linked to GRDP growth than FDI, particularly in regions with strong domestic entrepreneurial bases and adequate infrastructure (Manihuruk et al., 2024; Hamdani & Puspitasari, 2025). In this study, DI shows a highly significant positive effect on GRDP growth in Sumatra's provinces, with a p-value of 0.000 and a higher coefficient (0.005412) compared to FDI (Mashita & Anggresta, 2022; Harahap et al., 2023). This

suggests that DI plays a pivotal role in regional economic expansion, supporting the government's Sustainable Development Goal (SDG) 9 agenda on promoting inclusive and sustainable industrialization.

H2: Domestic investment has a significant influence on gross regional domestic product growth.

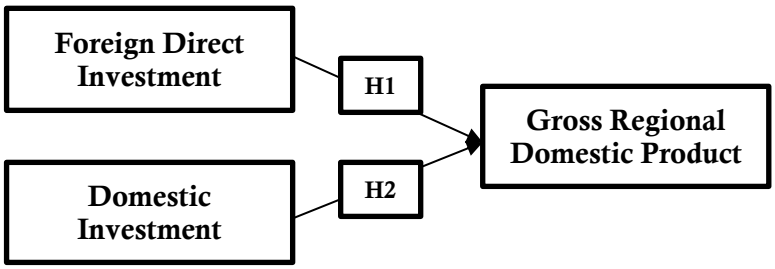



**Figure 1.** Conceptual Framework

The conceptual framework incorporates Sustainable Development Goal 9 (SDG 9) Industry, Innovation, and Infrastructure as the policy context linking investment to sustainable and inclusive growth. Both FDI and DI are hypothesized to have direct positive effects on GRDP, with the expectation that they contribute to structural transformation by expanding industrial output and improving infrastructure quality. The research framework is illustrated in Figure 1, which outlines the hypothesized relationships between the independent variables (FDI and DI) and the dependent variable (GRDP growth), under the overarching objective of supporting sustainable industrialization in line with SDG 9.

## RESEARCH METHODS

This study applies a quantitative approach using panel data regression to examine the effects of Foreign Direct Investment (FDI) and Domestic Investment (DI) on Gross Regional Domestic Product (GRDP) growth in ten provinces across Sumatra Aceh, North Sumatra, West Sumatra, Riau, Jambi, South Sumatra, Bengkulu, Lampung, Riau Islands, and Bangka Belitung over the period 2010–2023. The analysis relies on secondary data obtained from official institutions, including Statistics Indonesia (BPS), Bank Indonesia, the Investment Coordinating Board (BKPM), the World Bank, and the IMF. The dependent variable is GRDP growth at constant 2010 prices, reflecting real economic expansion. Independent variables consist of FDI (measured in million US dollars) and DI (measured in billion rupiah), representing annual realized investment at the provincial level.

Panel data, which combines time-series and cross-sectional dimensions, allows the study to capture both temporal dynamics and regional heterogeneity. Three models are evaluated: the Common Effect Model (CEM), assuming homogeneity across provinces and time; the Fixed Effect Model (FEM), controlling for time-invariant provincial characteristics through dummy variables; and the Random Effect Model (REM), treating individual effects as random and uncorrelated with explanatory variables. To determine the most appropriate model, the Chow Test compares FEM against CEM, while the Hausman Test assesses FEM against REM. The test results indicate that FEM provides more accurate and unbiased estimates, making it the preferred specification. FEM is particularly suited to this research because it accounts for structural differences among provinces, such as industrial base, infrastructure quality, and governance, that may influence how FDI and DI affect GRDP. This methodological alignment ensures that the findings accurately reflect the relationship between investment and regional economic growth, in line with Sustainable Development Goal 9 on promoting inclusive and sustainable industrialization.

The methods are the pool model, which is used when no specific variations exist across cross-sections or time, the fixed effect model, which is used when variations are constant over time or units, and the random effect model, which is used when variations are assumed to be random. Panel data combines cross-sectional and time-series elements, allowing analysis of both dimensions simultaneously.

The main structure of panel data can be explained as follows:

$$y_{it} = \beta_0 + \sum_{i=1}^{k} \beta_1 X_{it} + \varepsilon_{it}$$

k

Information:

$y_{it}$ = Growth Domestic Product
$\beta_0$ = constant
$\beta_1$ = regression coefficient
$X_{it}$ = Foreign direct investment
i = Province; i = 1, 2…….n
t = Time period; t =1,2……. n
$\varepsilon_{it}$ = error term

The Chow Test, or Likelihood Ratio Test, determines the optimal panel data model by comparing the Fixed Effect Model (FEM) and the Common Effect Model (CEM) to identify the best data fit. Meanwhile, the Hausman Test compares the Random Effect Model with FEM, where rejecting the null hypothesis indicates FEM provides more accurate and unbiased estimates.

**RESULTS**

Investments made within the country are a main factor in the region's economic growth. Therefore, analyzing the development of realized Domestic Investment (DI) is essential to assess domestic investors' confidence in the national business climate. The following table presents data on the realization of Domestic Investment (DI) in Indonesia, illustrating trends in domestic investment growth based on the 2024 report by Statistics Indonesia (BPS).

Based on the data in Table 1 regarding Domestic Investment (DI), sourced from Statistics Indonesia (BPS) in 2024, there is a noticeable growth trend in domestic investment, reflecting increasing confidence among local business actors in the national investment climate. The rise in DI value indicates a significant contribution from specific sectors in driving national economic activity, particularly in the manufacturing, infrastructure, and services sectors. This could be seen as an outcome of enhanced regulations, financial benefits, and the government's efforts to make business operations smoother in order to entice domestic investments. Nevertheless, to sustain this positive trend, consistent efforts are needed to ensure legal stability, improve infrastructure quality, and strengthen synergy between central and regional governments in supporting strategic national projects funded by domestic capital.

Referring to Table 2, the trend of foreign investment reflects dynamics that indicate global investors' confidence in Indonesia's business climate. The rise in foreign direct investment in key industries like manufacturing, renewable energy, and infrastructure implies that the government has effectively established a favorable atmosphere for international investors, particularly through bureaucratic reform policies and streamlined licensing procedures. On the other hand, fluctuations in investment values across certain sectors reflect structural challenges such as regulatory uncertainty, labor issues, and regional political stability. Therefore, this data affirms that although Indonesia remains a promising investment destination, there is a need to strengthen regulations, ensure legal certainty, and improve supporting infrastructure to enhance long-term investment competitiveness.

**Table 1.** Domestic Investment (DI)

| GRDP (Billion IDR) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Region** | **2023** | **2022** | **2021** | **2020** | **2019** | **2018** | **2017** | **2016** | **2015** | **2014** | **2013** | **2012** | **2011** | **2010** |
| Aceh | 8883 | 4424 | 7905 | 8241 | 3607 | 970 | 783 | 2456 | 4192 | 5110 | 3636 | 620 | 259 | 41 |
| North Sumatera | 21574 | 22789 | 18485 | 18190 | 19749 | 8372 | 11684 | 4864 | 4287 | 4224 | 5069 | 2550 | 1673 | 663 |
| West Sumatera | 4488 | 2560 | 4184 | 3106 | 3027 | 2310 | 1517 | 3796 | 1533 | 421 | 678 | 885 | 1026 | 74 |
| Riau | 48243 | 43062 | 24998 | 34118 | 26292 | 9056 | 10830 | 6614 | 9943 | 7708 | 4874 | 5450 | 7463 | 1037 |
| Jambi | 8939 | 8883 | 6204 | 3512 | 4437 | 2877 | 3007 | 3885 | 3540 | 908 | 2800 | 1446 | 2135 | 167 |
| South Sumatera | 25602 | 23256 | 16267 | 15825 | 16921 | 9520 | 8200 | 8534 | 10944 | 7043 | 3396 | 2931 | 1069 | 223 |
| Bengkulu | 7219 | 6957 | 4924 | 5399 | 5458 | 4903 | 297 | 949 | 554 | 8 | 110 | 53 | 0 | 1738 |
| Lampung | 7626 | 5809 | 10513 | 7121 | 2429 | 1235 | 7015 | 6032 | 1102 | 3496 | 1325 | 304 | 824 | 0 |
| Bangka Belitung | 7961 | 6309 | 3367 | 1864 | 2915 | 3113 | 1735 | 2202 | 1024 | 616 | 608 | 534 | 514 | 9 |
| Riau Islands | 8857 | 4817 | 9769 | 14249 | 5656 | 4386 | 1398 | 493 | 612 | 29 | 418 | 44 | 1370 | 272 |

**Table 2**. Foreign Direct Investment (FDI)

| FDI (Million US $) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Region** | **2023** | **2022** | **2021** | **2020** | **2019** | **2018** | **2017** | **2016** | **2015** | **2014** | **2013** | **2012** | **2011** | **2010** |
| Aceh | 249 | 128 | 203 | 51 | 138 | 71 | 23 | 1345 | 21 | 31 | 94 | 172 | 23 | 5 |
| North Sumatera | 1181 | 1316 | 580 | 975 | 380 | 1228 | 1515 | 1015 | 1246 | 551 | 888 | 645 | 754 | 181 |
| West Sumatera | 121 | 96 | 67 | 126 | 157 | 181 | 194 | 79 | 57 | 112 | 91 | 75 | 23 | 8 |
| Riau | 2042 | 2749 | 1921 | 1078 | 1034 | 1033 | 1061 | 869 | 653 | 1370 | 1305 | 1153 | 212 | 87 |
| Jambi | 45 | 39 | 51 | 27 | 55 | 102 | 77 | 61 | 108 | 51 | 34 | 156 | 20 | 6 |
| South Sumatera | 1479 | 1226 | 1260 | 1544 | 737 | 1079 | 1183 | 2794 | 646 | 1057 | 486 | 786 | 557 | 37 |
| Bengkulu | 76 | 52 | 24 | 192 | 145 | 137 | 139 | 56 | 21 | 19 | 22 | 30 | 43 | 186 |
| Lampung | 221 | 248 | 174 | 498 | 155 | 132 | 121 | 86 | 258 | 157 | 47 | 114 | 80 | 22 |
| Bangka Belitung | 73 | 130 | 45 | 48 | 89 | 46 | 153 | 53 | 83 | 105 | 112 | 59 | 146 | 25 |
| Riau Islands | 764 | 934 | 1044 | 1649 | 1363 | 831 | 1032 | 519 | 640 | 392 | 316 | 537 | 220 | 31 |

**Table 3**. Fixed Effect Model Results

| | Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|---|
| Fixed Effects (Cross) | C | 1.45E+11 | 7.70E+09 | 18.86947 | 0.0000 |
| | PMA (FDI) | 0.002657 | 0.001144 | 2.323655 | 0.0217 |
| | PMDN (DF) | 0.005412 | 0.000990 | 5.463942 | 0.0000 |
| Effects Specification | _ACEH--C | -5.46E+10 | | | |
| | _SUMUT--C | 2.22E+11 | | | |
| | _SUMBAR--C | -1.56E+10 | | | |
| | _RIAU--C | 1.35E+11 | | | |
| | _JAMBI--C | -4.89E+10 | | | |
| | _SUMSEL--C | 2.50E+10 | | | |
| | _BENGKULU--C | -1.24E+11 | | | |
| | _LAMPUNG--C | 1.40E+10 | | | |
| | _BABEL--C | -1.14E+11 | | | |
| | _KEPRI--C | -3.84E+10 | | | |
| Cross-section fixed (dummy variables) | R-squared | 0.865418 | Mean dependent var | | 1.95E+11 |
| | Adjusted R-squared | 0.853852 | S.D. dependent var | | 1.54E+11 |
| | S.E. of regression | 5.89E+10 | Akaike info criterion | | 52.51839 |
| | Sum squared resid | 4.44E+23 | Schwarz criterion | | 52.77053 |
| | Log likelihood | -3664.287 | Hannan-Quinn criteria. | | 52.62085 |
| | F-statistic | 74.82647 | Durbin-Watson stat | | 1.762797 |
| | Prob(F-statistic) | 0.000000 | | | |

Based on Table 3, the fixed effect method yielded an R-squared value of 86.54%, showing an improvement when dummy variables were applied. Comparing the Fixed Effect Model and the Random Effect Model is essential in determining the best model to use, and the decision should be made after a thorough examination of the statistical data available.

**Table 4**. Chow Test Results

| Effects Test | Statistic | d.f. | Prob. | |
|---|---|---|---|---|
| Cross-section F | 32.551846 | (9,128) | 0.0000 | |
| Cross-section Chi-square | 166.673256 | 9 | 0.0000 | |
| **Variable** | **Coefficient** | **Std. Error** | **t-Statistic** | **Prod.** |
| C | 9.97E+10 | 1.13E+10 | 8.787869 | 0.0000 |
| PMA (FDI) | 0.007849 | 0.001554 | 5.050220 | 0.0000 |
| PMDN (DF) | 0.007616 | 0.001594 | 4.777966 | 0.0000 |

The Chow test on Table 4 was used for statistical analysis, and it showed a Chi-Square probability value of 0.000 when looking at the cross-sectional data. This implies that the Fixed Effect Model is better suited for analyzing panel data.

**Table 5.** R-Square

| Model | Statistic | | Value |
|---|---|---|---|
| R-squared | 0.557386 | Mean dependent var | 1.95E+11 |
| Adjusted R-squared | 0.550924 | S.D. dependent var | 1.54E+11 |
| S.E. of regression | 1.03E+11 | Akaike info criterion | 53.58034 |
| Sum squared resid | 1.46E+24 | Schwarz criterion | 53.64338 |
| Log likelihood | -3747.624 | Hannan-Quinn criterion | 53.60596 |
| F-statistic | 86.26226 | Durbin-Watson stat | 0.709737 |
| Prob(F-statistic) | 0.000000 | | |

Table 5 shows the regression results with an R-squared value of 0.557, meaning the model explains approximately 55.7% of the variation in the dependent variable. The adjusted R-squared value is slightly lower at 0.551, indicating a good model fit. An F-statistic of 86.26 with a probability of 0.000 indicates the model is statistically significant. A Durbin-Watson value of 0.71 indicates the possibility of autocorrelation in the residuals.

**Table 6**. Hausman Test Results

| **Test Summary** | | **Chi-Sq. Statistic** | **Chi-Sq. d.f.** | **Prob.** |
|---|---|---|---|---|
| Cross-section random | | 11.045434 | 2 | 0.0040 |
| Cross-section random effects test comparisons: | | | | |
| Variable | Fixed | Random | Var (Diff.) | Prob. |
| PMA (FDI) | 0.002657 | 0.003193 | 0.000000 | 0.0113 |
| PMDN (DF) | 0.005412 | 0.005525 | 0.000000 | 0.2055 |
| Cross-section random effects test equation: | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| C | 1.45E+11 | 7.70E+09 | 18.86947 | 0.0000 |
| PMA (FDI) | 0.002657 | 0.001144 | 2.323655 | 0.0217 |
| PMDN (DF) | 0.005412 | 0.000990 | 5.463942 | 0.0000 |
| Effects Specification | | | | |
| Cross-section fixed (dummy variables) | | | | |
| R-squared | 0.865418 | Mean dependent var | | 1.95E+11 |
| Adjusted R-squared | 0.853852 | S.D. dependent var | | 1.54E+11 |
| S.E. of regression | 5.89E+10 | Akaike info criterion | | 52.51839 |
| Sum squared resid | 4.44E+23 | Schwarz criterion | | 52.77053 |
| Log likelihood | -3664.287 | Hannan-Quinn criteria | | 52.62085 |
| F-statistic | 74.82647 | Durbin-Watson stat | | 1.762797 |
| Prob(F-statistic) | 0.000000 | | | |

According to the Hausman test results on Table 6, the Fixed Effect Model outperformed the Random Effect Model in this research. The study looked at economic development in all ten Sumatran provinces from 2010-2023. It also examined how Sustainable Development Goals are connected to the growth of quality industrial sectors using analysis of Foreign Direct Investment and domestic investment trends.

According to the results of the Chow Test, the Fixed Effect Model was more successful than the Common Effect Model, with a cross-sectional F probability of 0.000. These findings supported the validation of Hypothesis 1 (H1: Cross-Section F < 0.05), indicating that the Fixed Effect Model provides more precise estimates compared to the Common Effect Model. Similarly, the Hausman Test yielded a cross-sectional probability of 0.004, further confirming Hypothesis 1 (H1: Cross-Section F < 0.05) and solidifying the Fixed Effect Model's superior dependability when compared to the Random Effect Model.

The Fixed Effect Model applied to panel data yielded significant findings. The t-statistic and probability values at $\alpha$ = 0.05 indicated that the probability for FDI was p = 0.0217, and the probability for PMDN was p = 0.000, both of which are below the significance threshold of $\alpha$ = 0.05. Furthermore, the t-statistics for both FDI and DI exceed 2, confirming their statistically significant positive influence on GRDP growth across the ten provinces. The R-squared value of 0.865418 suggests that foreign and domestic investment collectively account for 86.54% of the variations in GRDP growth, with the remaining 13.46% attributed to other determinants.

These findings align with SDG Target 9.2, which emphasizes the promotion of inclusive and sustainable industrialization, with the objective of significantly increasing the industrial sector's share in employment and GDP by 2030, thereby fostering economic growth and development particularly in developing countries. In the ten provinces studied, the role of FDI and DI in boosting GRDP growth supports the national agenda for sustainable industrialization. The respective provincial governments can further advance this on the island of Sumatra.

## DISCUSSION

This study's findings affirm and extend prior research on the critical role of both Foreign Direct Investment (FDI) and Domestic Investment (DI) in driving regional economic growth, particularly across Sumatra's provinces from 2010 to 2023. Consistent

with Fitri (2022) and Widiarsih et al. (2023), the results show that FDI remains a vital driver of economic development, albeit with sometimes delayed effects, largely due to technology transfer and job creation mechanisms. This complements the conclusions by Widarni and Bawono (2021b) and (2021a), who highlighted that foreign investment in industrial and manufacturing sectors significantly spurs provincial GDP growth in Indonesia, with outcomes influenced by sectoral and regional characteristics. The use of the Fixed Effect Model (FEM), supported by robust Chow and Hausman tests ($p < 0.05$), aligns with methodological recommendations by Hsiao and Hsiao (2006) and Nguyen (2023) for analyzing heterogeneous panel data, thus ensuring precise estimation in contexts marked by provincial disparities in infrastructure and labor absorption.

The importance of domestic investment as a responsive instrument to local fiscal policies and political stability, as noted by Hamdani and Puspitasari (2025), echoes insights from Naqellari and Mici (2020) and Thahir et al. (2021) on the essential complementary role DI plays alongside FDI. This complementarity reflects Prasetiadi (2021) "crowding in" effect theory, whereby foreign investments stimulate local capital formation and enhance growth capacity. Moreover, the significant p-values for FDI (0.0217) and DI (0.000), alongside t-statistics greater than 2, confirm their meaningful impact on GRDP growth, corroborating findings by Mahadika et al. (2017) and Suparta et al. (2025). These results further resonate with Nisa and Juliprijanto (2022) and Sutanto et al. (2024), who emphasize the role of sustained investments in industrial and infrastructure sectors as key drivers in Sumatra's economic adjustment amid global uncertainties (Junaidi et al., 2021).

The findings support neoclassical growth theory, showing that investments boost capital and productivity for long-term growth (Ioan et al., 2020; Mwakabungu & Kauangal, 2023). Damayanti (2022) highlights that FDI, DI, and exports jointly drive over 90% of growth in North Sumatra, a pattern seen provincially here. This study links investment to SDG 9.2 on sustainable industrialization, emphasizing FDI's role in technology transfer and job creation, further enhanced by green investments (Hakim & Suhendi, 2021; Parhimpunan, 2022; Sudarmawan, 2022).

Despite the model's high explanatory power (R-squared 86.54%), approximately 13.46% of GRDP growth variability remains unexplained, likely influenced by factors such as institutional quality, fiscal policy, and human capital development. Amin (2024) and Sari and Maysarah (2024) stress that good governance, regulatory frameworks, and environmental mitigation efforts are critical to maximizing investment benefits, especially in large-scale projects like the National Capital (*Ibu Kota Nasional*/IKN). Similarly, Ioan et al. (2020) and Yurioputra (2022) argue that initiatives like the Indonesia Investment Authority require enhanced coordination with local governments to ensure equitable investment outcomes.

The policy implications are clear: cross-sectoral coordination between central and regional governments is essential to create a stable, inclusive, and sustainable investment climate. Tailored sector-specific strategies that consider each province's unique economic structure, infrastructure needs, and human resource capabilities must be prioritized. Fiscal incentives, development of industrial support infrastructure, and capacity building for the workforce should be integral parts of regional development plans. These measures will strengthen the complementary effects of FDI and DI, helping to realize the SDG 9 agenda by fostering sustainable industrialization, innovation, and resilient economic growth across Sumatra's diverse provinces. This approach not only advances academic understanding in sustainable investment studies but also provides practical guidance for policymakers aiming to balance economic growth with environmental and social sustainability (Hakim & Suhendi, 2021; Nisa & Juliprijanto, 2022; Mwakabungu & Kauangal, 2023).

## CONCLUSION

This research clearly demonstrates that both Foreign Direct Investment (FDI) and Domestic Investment (DI) have a significant and positive impact on Gross Regional Domestic Product (GRDP) growth across the ten provinces of Sumatra between 2010 and

2023. The Fixed Effect Model (FEM), validated by Chow and Hausman tests at a 5% significance level, provides robust estimates, with an R-squared of 86.54%, indicating that FDI and DI explain most of the variation in GRDP growth. These results reinforce the critical role of investment in fostering regional economic development and align with Sustainable Development Goal (SDG) 9, emphasizing inclusive and sustainable industrialization. Practically, the findings suggest that local governments should prioritize investment policies that support sustainability and green industrialization, emphasizing job creation and enhancing local value addition. Strengthening public-private partnerships, simplifying regulations, and upgrading infrastructure are vital for maximizing investment benefits. Theoretically, the study contributes to understanding how investment dynamics interact with sustainable development frameworks, providing empirical support for neoclassical growth theories in the regional context.

However, this study has limitations, including the exclusion of other important factors such as institutional quality, fiscal policy, and human capital, which likely influence GRDP growth. Additionally, the analysis focuses on provincial-level data, which may overlook micro-level variations within provinces or sectors. Future research should incorporate additional variables such as governance quality, environmental impact, and innovation capacity, as well as explore sector-specific and micro-level analyses to deepen insights and guide more targeted policy interventions for sustainable growth.

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