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FDI and GDRP in East Java: Analysis for Capital Intensive Industries

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ABSTRACT
This study explores the relationship between foreign direct investment (FDI) and regional economic growth in East Java Province, with a specific focus on capital-intensive industries. The topic is crucial as FDI plays an increasingly strategic role in accelerating regional development, particularly in industrialized provinces like East Java. The novelty of this research lies in its focus on one province and the inclusion of all industrial sectors in the analysis, offering a more comprehensive and localized perspective compared to previous studies that typically cover national or multi-provincial scopes. This study contributes to the literature by filling a theoretical gap regarding how sectoral FDI affects regional economic output and offers new empirical insights with direct implications for policy and regional planning. Employing a quantitative research design, the study uses panel data from 2020 to 2024, sourced from the Central Statistics Agency and the Investment Coordinating Board. The analysis was conducted using non-parametric correlation tests and a simple regression model. Findings reveal a positive and significant relationship between FDI and the gross regional domestic product (GRDP), with capital-intensive sectors playing a key role in driving growth. The study concludes that increasing FDI, supported by infrastructure improvements, export expansion, and technological innovation, can significantly enhance sustainable economic growth in East Java.

Keywords: *Capital Intensive Industries, East Java, FDI, GRDP*

INTRODUCTION

The distribution of capital has long been viewed as a fundamental determinant of economic growth. In classical economic thought, national wealth was linked to productive capacity rather than mere accumulation of resources, shifting the focus toward investments that enhance output. In this context, foreign direct investment (FDI) is widely acknowledged as a critical driver of regional and national development. In developing countries like Indonesia, FDI plays a crucial role in expanding industrial capacity, enhancing productivity, and generating employment—particularly in regions with industrial potential such as East Java. The province is known for its significant contribution to the national economy through its non-oil and gas industries, export performance, and increasing investment realization.

This study investigates the causal relationship between FDI and the gross regional domestic product (GRDP) in East Java, focusing on capital-intensive sectors. The purpose of this research is: (1) to assess whether FDI has a significant impact on GRDP in East Java, and (2) to explore how sectoral FDI shapes long-term economic growth in the region. The complexity of this issue lies in the uneven distribution of capital across sectors and regions, and the lack of detailed studies that analyze FDI impacts within a single province using sector-wide data.

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The research adopts a quantitative method using panel data from 2020 to 2024, derived from the Central Statistics Agency and the Indonesian Investment Coordinating Board. Previous studies (Fazaalloh, 2024; Manihuruk et al., 2024) have analyzed FDI's national impact or multi-provincial data, but few have taken a localized, sector-specific approach. While earlier works confirm the positive effect of FDI on growth (Todaro & Smith, 2020; Hidayat, 2020), this study contributes by narrowing the geographical focus and expanding the sectoral coverage to produce more contextual policy implications.

The gap this study addresses lies in the absence of micro-regional analysis that assesses the full scope of capital-intensive sectors within a single province. By examining the linear correlation and regression between FDI and GRDP in East Java, this study aims to contribute both theoretically—by strengthening localized economic development literature—and empirically—by offering concrete evidence of FDI's sectoral effectiveness.

The findings demonstrate a positive and significant correlation between FDI and GRDP in East Java. Although the overall contribution is moderate, the analysis reveals that capital-intensive sectors like manufacturing, transportation, and mining are vital in leveraging FDI for sustainable growth. These results provide essential insights for policymakers to formulate strategies that enhance FDI effectiveness through infrastructure development, technology adoption, and global market integration.

RESEARCH METHOD

The research approach used is causal by explaining why and how there is a relationship between two aspects of a situation or phenomenon (Kerlinger, 2000). The type of research used in this study is quantitative research. Quantitative research is a type of research used to examine populations or samples with statistical analysis to test hypotheses (Sugiyono, 2017). The method used in this research is descriptive quantitative method. Descriptive quantitative is a type of research used to describe an existing phenomenon, either natural or man-made with the results in the form of numbers (Sugiyono, 2017).

The data used in this study are secondary data from the panel data of the Central Bureau of Statistics of East Java Province with the subject of GRDP Per Capita at Current Prices by Regency / City (Thousand Rupiah) and the Investment Coordinating Board with the subject of Quarterly Investment Realization Data I to VI in 2020-2024. The data collection technique used is by observing data from trusted data sites and analyzing using the testing method using STATA 17. The research location was carried out at the Economics Laboratory, Faculty of Economics and Business, Universitas Brawijaya.

Table 1. Variable Description

Variables	Label	Description	Source
Foreign Investment	PMA	Sectoral accumulation of FDI from quarter VI to I	BKPM
Gross Regional Domestic Product	PDRB	GDP sectoral accumulation	BPS East Java Province

Source: Data processed STATA 17 (2025)

Table 2. Descriptive Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
PDRB	190	65943	84482.37	19778.6	565840.5

PMA	190	1156530 4153232	0	3.98e+07

Source: Data processed STATA 17 (2025)

By making adjustments from the econometric model based on research conducted by Fazaalloh (2024), the econometric model used in this study is as follows:

$$Yi = \beta 0 + \beta 1.FDI + \varepsilon i \ldots\ldots (1)$$

Description:
Yi= Gross Regional Domestic Product in *region-i*
β_0= Constant (when GRDP = 0)
β_1= Regression Coefficient (Foreign Investment)
ε_i = Error factor

The hypothesis formulation carried out by researchers in this study is as follows H_0 does not rejected if α< 0.05, then FDI has a significant difference to GRDP, and H_1 does not rejected if α> 0.05, then FDI has no significant difference to GRDP.

Table 3. Degree of relationship correlation coefficient

Correlation Value	Relationship level
0,00 - 0,20	Very Weak
0,20 - 0,40	Weak
0,40 - 0,60	Medium / Enough
0,60 - 0,80	Strong
0,80 - 1,00	Very Strong

Source: Ahmad Sukron (2024)

The data analysis techniques used in this study are as follows with three tests. Normality Test, which used to determine whether the data used is normally or abnormally distributed that important to see the results of statistical testing can be trusted and used in conducting statistical tests (Ghozali, 2018). Spearman Test, which used to determine the relationship between two variables if the data used is non-normal data and handle data that did not meet the requirements of Pearson correlation (Spearman, 1904). And Robustness Test, which conducted to ensure that the regression results do not violate classical assumptions and performed together with the regression to obtain valid results, even if the assumption of homoscedasticity is not met in the classical assumption test (Wooldridge, 2010).

RESULTS AND DISCUSSION

Normality Test

Table 4. Normality Test in STATA 17

Shapiro-Francia W' test for normal data					
Variable	**Obs**	**W'**	**V'**	**z**	**Prob>z**
PMA	190	0.28257	111.809	9.720	0.0001
PDRB	190	0.46932	82.704	9.099	0.0001

Source: Data processed STATA 17 (2025)

Through the data normality test using the Shapiro-Francia Wilk Test, it was found that the probability against the z-table was 0.0001. This finding indicates that the data used is not normally distributed (<0.05). This is because the data contained in foreign investment is not complete according to districts and cities. Therefore, testing was conducted using non-parametric statistical methods.

Buletin Ekonomika Pembangunan
https://journal.trunojoyo.ac.id/bep
Vol. 6 No. 2 September 2025, hal 44-51

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Table 5. Spearman's test in STATA 17

spearman FDI GRDP		
Number of obs = 190 Spearman's rho = 0.4134		
Test of H0: FDI and GRDP	are	independent
Prob > t = 0.0000		

Source: Data processed STATA 17 (2025)

Through the spearman test, it was found that the significance (α) against the t-table was 0.0000. The significance value is smaller than 0.05 (<0.05) which means Hypothesis 0 is accepted. It can be interpreted that the relationship between foreign investment has a significance on gross regional domestic product. Meanwhile, the correlation value obtained is 0.4134 and is positive. The positive correlation value means that the relationship between foreign investment has a unidirectional relationship with gross regional domestic product with a correlation degree of "Moderate / Sufficient".

Table 6. Degree of relationship of correlation coefficient between FDI and GRDP

Correlation Value	Relationship level
0,00 - 0,20	Very Weak
0,20 - 0,40	Weak
0,40 - 0,60	**Medium / Enough**
0,60 - 0,80	Strong
0,80 - 1,00	Very Strong

Source: Ahmad Sukro (2024)

Robustness Test in Simple Linear Regression

Table 7. Combined Simple Regression and Robustness Test in STATA 17

Source	SS	df	MS	Number of obs = 190
Model	3.1310e+10	1	3.1310e+10	F(1, 188) = 4.47
Residuals	1.3176e+12	188	7.0087e+09	Prob > F = 0.0359
Total	1.3489e+12	189	7.1373e+09	R-squared = 0.0232 Adj R-squared = 0.0180 Root MSE = 83718 Durbin-Watson = 1.928 Jarque-Bara = 4306.7 Condition Number = 4.47e+06

PDRB	Coefficient	Std. err.	t	P>t [95% conf.	interval]
PMA	.003099	.0014662	2.11	0.036 .0002067	.0059914
_cons	62358.88	6305.82	9.89	0.000 49919.63	74798.14

Source: Data processed STATA 17 (2025)

The results of the simple linear regression analysis in the econometric model are as follows:

$$GRDP\ East\ Java = 62358{,}88 + 0{,}003099.FDI + \varepsilon i \ldots\ldots (1)$$

Description:
Y = gross regional domestic product in the East Java region
β0= Constant (Constant Coefficient)
β1= Regression Coefficient (Foreign Investment Coefficient)
εi= Error factor

Through the simple regression statistical test, the research shows that there is a contribution from foreign investment to gross regional domestic product of 0.023 (2.3%). Supporting the results of the Spearman Test, there is a significance of less than 0.05 (<0.05) with an F-test result of 0.0359. The coefficient of foreign investment, .003099, indicates that a 1% increase in foreign investment gives an increase in gross regional domestic product of .003099 (0.31%). The study shows that the researcher accepts H0 with the significance between the two variables. The significance value can be proven by adjusting the F-table of 4.47 which shows the significant effect of foreign investment on gross regional domestic product. Through Robustness Test, the study shows that foreign investment has significance even though the residual variation is not constant (P> t = 0.036). The non-constant residual can be known from the JB of 4306.7 > 0.05. In absolute t, the result shows significant with a value of 2.11 more than 2.00.

The Impact of Foreign Investment in Capital-Intensive Industries on Regional Gross Domestic Product in East Java

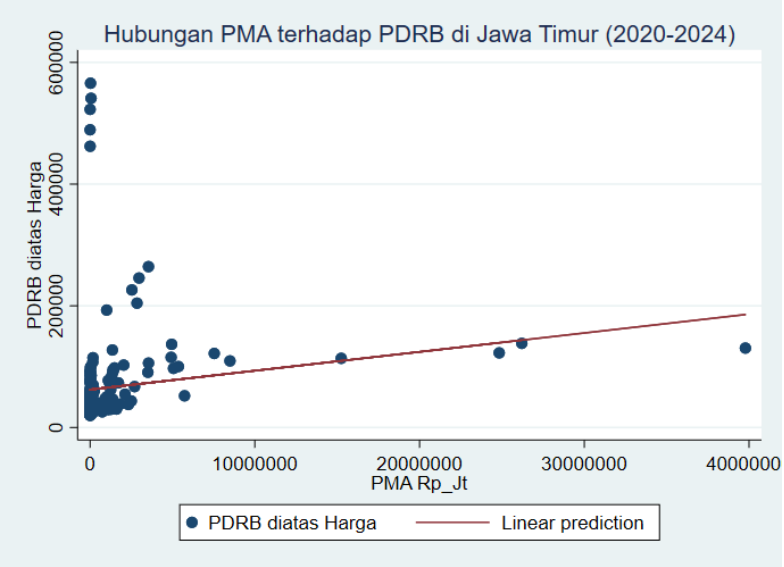

Photo 1. *Scatterplot of* foreign investment prediction on gross regional domestic product (In Indonesia)
Source: Data processed STATA 17 (2025)

The long-term impact of foreign investment on economic growth in East Java through gross regional domestic product can be felt by the people of East Java today. In fact, capital-intensive industries in the East Java region continue to grow in various regions of East Java. For example, the tobacco industry which generated revenue of IDR 115.10 trillion in 2021 and contributed 23.65% of industrial GRDP in East Java. Another industry that can be felt is in the plantation and tourism industry in the Malang Regency area with an investment level of IDR 5.6 trillion. This is supported by the development of the tourism industry around Malang Regency such as beaches, mountains, Pujon Kidul tourism, and others (Isnainiyah, 2024).

The relationship between foreign investment and gross regional domestic product has a linear relationship and tends to increase, although it does not have a drastic increase from the starting point. This can be supported by the coefficient

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https://journal.trunojoyo.ac.id/bep
Vol. 6 No. 2 September 2025, hal 44-51

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of determination (R-squared) about 2.3% of all gross regional domestic product in East Java comes from foreign investment and the addition of 1% of foreign investment can increase gross regional domestic product by 0.003099 (0.31%).

Looking at the reality of capital-intensive industries in East Java, the role of foreign investment is very important. Investment realization that occurs in several capital-intensive industries has a considerable value, such as industries engaged in transportation, warehouses, and telecommunications that get quite a lot of investment of 6.96 trillion rupiah, followed by other capital-intensive industries such as mining at 5.07 trillion rupiah, and so on (East Java Investment and PTSP Office, 2024). This statement also supports previous research, where foreign investment has a positive effect on gross regional domestic product growth in large sectors, such as manufacturing and mining (Fazaalloh, 2024).

Increased investment value from investment in several sectors, especially in capital-intensive sectors, can affect the growth of gross regional domestic product in the long run. This statement can support the theory that foreign investment can boost gross regional domestic product in East Java through increased sector productivity in several industries in East Java which can increase the production output of capital-intensive industries and can increase gross regional domestic product in the East Java region. In other words, if adding one unit of foreign investment in an industry, it will add at least one unit of gross regional domestic product growth.

This assumption proves to be true if it is drawn in the process of how investment works in capital-intensive industries so that it can have an impact on gross regional domestic product. If a foreign country invests in an industry in the East Java region, the industry gets capital to run the industry by expanding the workforce, increasing productivity, or making better quality products. The products of the industry are sold in domestic or foreign markets. The revenue received by the industry can be a source of income for the sector in running the industry and contributing to growing revenue in the gross regional domestic product in the East Java region.

CONCLUSION

Foreign investment has been a source of wealth in the classical era until now. In addition to being a source of wealth, foreign investment is a driving force for capital-intensive industries in creating productivity and income in a region. East Java is clear evidence that foreign investment has an impact on the development of capital-intensive industries in several regions in East Java. Thus, foreign investment can increase revenue in an effort to grow gross regional domestic product in East Java Province.

This study suggests how the relationship and causal effect between foreign investment and gross regional domestic product in the East Java region. Using the spearman test, the study shows a positive and significant relationship in the "Moderate" category with a spearman value of 0.4134. In Robustness testing with simple linear regression statistical test, this study shows that the level of contribution of foreign investment to the entire gross regional domestic product in East Java is 0.023 (2.3%). An additional 1% of foreign investment can increase gross regional domestic product by 0.003099 (0.31%).

The impact of foreign investment on the development of gross regional domestic product in the long run provides an increase of 0.31%. This means that foreign investment is sufficient in impacting capital-intensive industries in the East

Java region in terms of productivity and products produced. The predictions in this study are in line with the theory of foreign investment relationships that can have an impact on the growth of gross regional domestic product.

In increasing foreign investment in the East Java region, capital-intensive industries need to attract investors in investing in capital-intensive industries, such as infrastructure development in the East Java region, accessing product sales in international markets, and increasing product innovation through technology. The East Java government needs to build partnerships with foreign investors and maintain the stability of gross regional domestic product and economic growth in the East Java region. Thus, the presence of foreign investment can have a long-term impact on the growth of gross regional domestic product in East Java

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