Original Article

The Effect of the Crime Index on the Growth of Regency Investment in East Java with Consideration of Sustainable Effects

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Abstract: *Investment plays a crucial role in promoting regional economic growth; however, its performance is strongly influenced by the quality of governance and security conditions. This study aims to examine the effect of bureaucratic effectiveness, proxied by the crime index, on investment growth across regencies/cities in East Java Province, considering the sustainable impact of investment from the previous period. This research employs a quantitative, panel-data approach using data from regencies/cities in East Java for the period 2015–2023. The analytical methods include panel data regression and a dynamic panel model using the Generalized Method of Moments (GMM) Arellano–Bond to capture lag effects and address potential dynamic bias. The empirical results indicate that the crime index has no statistically significant effect on investment growth, despite substantial regional variation in security conditions.*

In contrast, investment growth in the previous period has a positive and significant impact on current investment growth, indicating the presence of investment persistence. These findings suggest that regional investment dynamics in East Java are driven more by the sustainability of past investment performance and structural economic factors than by variations in crime levels alone. Policy implications underscore the importance of fostering a conducive, sustainable investment climate through improvements in infrastructure, regulatory certainty, and consistent regional policies.

Keywords: *Crime Index, The Growth of Regency/City Investment, Consideration of Sustainable Effects.*

I. INTRODUCTION

Investment is one of the primary drivers of regional economic growth. Sustainable investment flows not only increase production capacity and labor absorption but also accelerate the structural transformation of the regional economy towards high-value-added sectors (Yamani, Lubis, & Albar, 2025). Regional autonomy, as measured by the ability of district/city governments to attract investment, is an important indicator of the success of regional economic development, especially in provinces with high economic heterogeneity, such as East Java.

However, the success of attracting investment is determined not only by economic potential and resource availability, but also by the quality of governance. The efficiency of bureaucracy, based on how easy it was to obtain licenses, how much regulatory uncertainty there is, and the ease of law enforcement carried out, was very important for creating a friendly investment environment. Furthermore, the level of criminality could be conceived as an indicator of security and of investors' concerns regarding their investment decisions (Putra & Satrianto, 2024). With its high crime rate, transaction costs and risks are also increased in processes to create new investments and sustain existing ones.

In empirical terms, East Java is one of the provinces that has a relatively large role in investment contribution in Indonesia, yet there are still inequalities in inter-district/citizen investment distribution. Some areas, such as the City of Surabaya and Sidoarjo/Mojokerto Regency/Gresik Regency (SAURI), consistently rank among the top priority investment areas. In contrast, other areas are still constrained in terms of supporting market share, to raise capital's GSitation (GS 2020: 21). On the other hand, the crime rate in East Java districts/cities also shows a high variation, both in terms of numbers and trends over time (Kuciswara, Muslihatinningsih, & Santoso, 2021). This condition indicates a disparity in bureaucratic effectiveness and security levels across regions, which can affect investment growth unevenly.

Although previous studies have examined the influence of institutional factors and security on investments, most studies still use a static approach that ignores the dynamics of investment between periods (Widianatasari & Purwanti, 2021). In fact, investment decisions are sustainable, where the realization of investment in the previous period can affect investment growth in the next period through the effect of consistency, investor confidence, and capital accumulation. This research gap warrants further study, especially at the regional level, using a dynamic panel approach that can capture these sustainable effects.

Based on this background, this study aims to analyze the effect of bureaucratic effectiveness, as proxied by the crime index, on investment growth in districts/cities in East Java, considering the sustainable effect (*lag effect*) from the previous period. The results of this research are expected to make an empirical contribution to the development of the regional economic literature and to serve as the basis for policy formulation to improve the regional investment climate sustainably.

II. LITERATURE REVIEW

Several studies indicate that crime and delinquency rates have significant implications for economic stability and the performance of the financial sector. Study Pancca-galindo (2024) asserts that high levels of non-performing loans negatively impact the profitability of financial institutions, ultimately narrowing the capacity of banking intermediaries. Similar findings were presented by Sum (2013) and Koyuncu & Saka (2011), which suggest that an increase in non-performing loans reduces investor confidence and hinders credit flows to the productive sector, potentially suppressing investment growth.

Crime as an exogenous variable that can affect the economy has also been mentioned in several studies, while focusing on its impact on the investment climate. Landín (2024) directly shows that increases in crime rates reduce Foreign Direct Investment (FDI) in Ecuador, as they negatively affect perceptions of stability and security. These results are consistent with the work of Loncan (2023) for Brazil and Loureiro (2010), who show that violence and crime increase business risk, leading companies to be more conservative in investment decisions, especially small and medium-sized companies.

Some studies from other countries also confirm the inverse relationship between crime and economic growth. Research in India (Raj & Kalluru, 2023), Pakistan (Ahmad, Ali, & Ahmad, 2014), China (Chen et al., 2012), and Mexico (Cortez & Islas-Camargo, 2017) has uncovered that an increase in crime deters economic development through lower productivity and financial sector development as well as high asset protection costs. While they are not direct measures of investment, these studies corroborate the idea that crime makes the economic environment more hostile, and that this is one of the leading factors discouraging investment.

On the other hand, studies such as Hedder et al. (2000) focus on financial variables and financing decisions in investment decision-making. Botoc and Enache (2013), Kumar et al., and Rodríguez Nava (2011) demonstrate that high leverage and financial constraints may lead to underinvestment. While the main discussion is not about crime, these results are relevant in that delinquency and insecurity levels may aggravate firm financial health and financing risk, thus strengthening investment constraints.

Overall, the literature indicates that both financial system delinquency and socio-economic environment criminality have a negative impact on investment, both directly and indirectly. However, most studies are still sectoral or national, or do not account for dynamic effects across periods. Therefore, this study makes an essential contribution by examining the influence of bureaucratic effectiveness, proxied by the crime index, on regional investment growth, while accounting for the sustainable effects of the previous period within a panel data framework.

III. METHODOLOGY

A) Research Hypothesis
H1: Crime index negatively affects investment growth
H2: Investment growth in the previous period has a positive effect on investment growth in the current period

B) Types and Approaches to Research
This study employs a quantitative research approach with an explanatory design to elucidate the causal relationship between the crime index, serving as the independent variable, and investment growth, the dependent variable, at the district/city level in East Java Province. This study utilizes secondary data in the form of panel data, which combines time and regional dimensions, allowing for the analysis of investment dynamics across periods by considering the sustainable effects (*lag effect*) of previous investment growth.

C) Data and Data Sources
The data used in this study are panel data covering all districts/cities in East Java Province, spanning 2015–2023. The data source was obtained from the Central Statistics Agency (BPS) for investment data and supporting variables, the Indonesian National Police or local police agencies for crime data, and the Investment Coordinating Board (BKPM) or other related agencies for investment realization data.

D) Variable Operational Definition
Table 1: Operational Definition and Measurement of Variables Used in the Study

Yes	Variabel	Variable Type	Indicators/Measurements	Units	Data Source
1	Investment Growth	They depend	Percentage change in annual investment realization: $((Investasi\_t - Investasi\_{t-1}) / Investasi\_{t-1} \times 100\%)$	Percent (%)	BPS, BKPM

| 2 | Crime Index | Independent | Number of crimes per 100,000 population or regional crime index | Index / Cases per 100,000 population | Indonesian Police, BPS |
| 3 | Investment Growth (t–1) | Variable Layer | The value of investment growth in the previous year (lag one period) | Percent (%) | BPS, BKPM |

E) Analysis Model

Empirically, the model includes the previous year's investment growth variable as an explanatory variable to capture the persistence of regional investment, in addition to the crime index, which serves as the primary variable. Preliminary estimates were obtained using a static panel data model, with model selection based on the Chow and Hausman tests. Furthermore, to overcome the potential problems of endogeneity, autocorrelation, and dynamic bias associated with the use of lag variables in panel data, this study also employs the Dynamic Panel Model using the Generalized Method of Moments (GMM) Arellano-Bond.

IV. RESULTS

A) Description of Data Statistics

Variabel	Red	Std. Dev.	Minimum	Maximum
Investment Growth	1.459,26	867,435	12	2.998
Crime Index	250,38	141,810	3	500

Based on the statistical description, the investment growth variable (Y) has an average of 1,459.26 and a standard deviation of 867,435, indicating considerable variation in investment across regions and periods. A minimum value of 12 and a maximum of 2,998 indicate an inequality in investment performance between regions. Meanwhile, the crime index variable (X) has an average of 250.38, a standard deviation of 141.810, and a range of 3 to 500, reflecting significant differences in security conditions across districts/cities. The variation in these two variables confirms the presence of spatial and temporal heterogeneity, warranting further analysis of the effect of crime on investment growth.

B) Model Estimation Results

a. Chow Test Results

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	0.898545	(37,303)	0.6417
Cross-section Chi-square	35.605854	37	0.5344

Prob value. $0.5344 > 0.05$. So what is chosen is the CEM model

b. Hausman Test Results

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.412084	1	0.5209

Prob value. $0.5209 > 0.05$. So what was chosen was the REM model

c. Lagrange Multiplier Test Results

Lagrange Multiplier Tests for Random Effects
Null hypotheses: No effects
Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided
(all others) alternatives

	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	0.264344	2.962647	3.226991
	(0.6072)	(0.0852)	(0.0724)
Honda	-0.514144	-1.721234	-1.580651
	(0.6964)	(0.9574)	(0.9430)
King-Wu	-0.514144	-1.721234	-1.777536
	(0.6964)	(0.9574)	(0.9623)
Standardized Honda	-0.411765	-1.575143	-6.522093
	(0.6597)	(0.9424)	(1.0000)
Standardized King-Wu	-0.411765	-1.575143	-5.821050
	(0.6597)	(0.9424)	(1.0000)
Gourieroux, et al.	--	--	0.000000
			(1.0000)

Prob value. 0.6072 > 0.05. So what is chosen is the CEM model
Based on the results of the Chow, Hausman, and LM tests, the best model for this study is the CEM model

C) Panel Data Regression Equation
Y = 1.35 + 0.41*X
The explanation is that the constant value is 1.35, which means that without the X variable, the Y variable will increase by 135%

D) Model Specification Test
Dependent Variable: Y
Method: Panel Generalized Method of Moments
Transformation: First Differences
Date: 12/31/25 Time: 12:24
Sample (adjusted): 2017 2023
Periods included: 7
Cross-sections included: 38
Total panel (balanced) observations: 266
White period (period correlation) instrument weighting matrix
White period (cross-section cluster) standard errors & covariance (d.f. corrected)
Standard error and t-statistic probabilities adjusted for clustering
Instrument specification: @DYN(Y,-2)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Y(-1)	0.079936	0.096842	0.825420	0.4144
X	2.980458	1.294538	2.302333	0.0270

Table 2: Comparison of Estimated Coefficients Across Econometric Models

EMC	GMM	REM
0,018	0,079	-0,094

Based on the above comparison, the estimator does not fall between the pooled least squares and fixed-effect estimators.

E) Uji Arellano Bond (AB) test

Arellano-Bond Serial Correlation Test
Equation: Untitled
Date: 12/31/25 Time: 12:51
Sample: 2015 2023
Included observations: 266

Test order	m-Statistic	rho	SE(rho)	Prob.
AR(1)	-7.408216	-1895957...	25592628...	0.0000
AR(2)	-1.003267	-2241034...	22337362...	0.3157

Based on the value of the AR prob (2), the estimation results are consistent because the prob value > 0.05

F) Uji Hypothesis

Dependent Variable: Y
Method: Panel Least Squares
Date: 12/31/25 Time: 10:59
Sample: 2015 2023
Periods included: 9
Cross-sections included: 38
Total panel (balanced) observations: 342

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1356.120	95.20710	14.24390	0.0000
X	0.411929	0.330982	1.244568	0.2141

The influence of independent variables on the dependent variable is partially the result of the t-test on variable (X), which obtained a calculated t-value of 1.244568 < the t-table value of 1.966966 and a significance level. The value of 0.2141 is greater than 0.05, meaning that the Investment Growth variable has no significant effect on the Crime Index in East Java. In the sense that Hypothesis 1 is accepted

While the Y variable is based on the prob value AR(2), the estimated results are consistent because the prob value > 0.05 indicates that the variable Investment Growth in the previous period has a positive effect on the lag variable, namely the investment growth of the current period. In the sense that Hypothesis 2 is accepted

G) Coefficient Determination Test

R-squared	0.004535
Adjusted R-squared	0.001607
S.E. of regression	866.7377
Sum squared resid	2.55E+08
Log likelihood	-2797.814
F-statistic	1.548950
Prob(F-statistic)	0.214148

The adjusted R-squared value is 0.001607, or 0.16%. The value of the determination coefficient indicates that the independent variable accounts for only 16.07% of the variation in Investment Growth in East Java. In comparison, the remaining 83.93% (100 – adjusted R-squared value) is described by other variables.

V. DISCUSSION

Based on the statistical descriptions, the investment growth variable in East Java districts/cities has an average of 1,459.26 and a relatively high standard deviation of 867.435. This condition shows that investment growth between regions and between periods has varied considerably. The wide range of values, from a minimum of 12 to a maximum of 2,998,

indicates regional inequality in investment performance, with some regions attracting large amounts of investment while others still face significant limitations. This heterogeneity reflects differences in economic capacity, infrastructure, and governance quality across districts and cities in East Java. Meanwhile, the crime index variable has an average of 250.38, a standard deviation of 141.81, and a range of 3 to 500, indicating significant differences in security levels across regions. This high variation in crime indicates that security conditions are uneven and have the potential to create different risk perceptions for investors. Overall, the magnitude of variation in the two variables confirms the presence of firm spatial and temporal heterogeneity, making the panel data approach relevant for capturing the dynamics of differences in regional characteristics in analysing the relationship between the crime index and investment growth in East Java.

The results of the statistical description indicate that investment growth in East Java districts/cities exhibits considerable variation both across regions and over time. The relatively high average investment growth, coupled with a large standard deviation, indicates regional inequality in investment performance. This condition reflects the difference in regional economic capacity, infrastructure quality, and the effectiveness of local policies and governance in attracting investment. On the other hand, the crime index also shows a high level of variation, highlighting differences in security conditions and social stability across districts/cities in East Java.

In theory, the degree of criminality should affect investment decisions as a greater incidence reduces dividends." The reason is that a rising crime rate implies increased business risk and transaction costs for investors. However, the regression estimates suggest that the crime index is not a significant determinant of investment growth. These results suggest that despite descriptive differences in security conditions across regions, these differences are not statistically significant enough to account for the discrepancy in investment growth between East Java. It means investors are more likely to weigh the presence of infrastructure, regional fiscal incentives, licensing simplicity and market potential rather than just crime.

On the other hand, the regression results indicate a positive influence of investment growth in the previous period on investment growth in the current period. These findings align with the concepts of investment persistence and path dependency, where investment success during the last period creates a demonstration effect, increases investor confidence, and encourages both reinvestment and new investment inflows. The significant variation in investment growth between periods, as evident in the statistical description, reinforces this result: the dynamics of investment in East Java are sustainable and closely tied to past performance.

IV. CONCLUSION

Overall, the integration of statistical descriptions and regression estimates reveals that the dynamics of investment growth in East Java are more influenced by investment sustainability factors and regional economic characteristics than by variations in the crime index. This finding has a policy implication: local government efforts to encourage investment should be more focused on creating a structurally conducive and sustainable business climate, without ignoring the importance of security and stability as a basic prerequisite for economic development.

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