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Interest Rate Policy and Investment Behavior: A Panel Dataset Analysis of Corporate Financial Decisions in Indonesia

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Abstract

Interest rate policy plays a central role in shaping corporate investment decisions, particularly in emerging markets where firms often rely on external financing. This research analyzes the effect of Bank Indonesia's benchmark policy rate on the investment behavior of non-financial firms listed on the Indonesia Stock Exchange during 2015–2023. Using a balanced panel dataset of 185 firms across nine industrial sectors, comprising 1,665 firm-year observations, the analysis applies fixed-effects and random-effects panel regression models, complemented by two-step system Generalized Method of Moments estimation to address potential endogeneity. Corporate investment is measured by capital expenditure scaled by lagged total assets, while the main explanatory variable is the policy interest rate. Firm-level controls include Tobin's Q, cash flow-to-assets ratio, leverage, firm size, and GDP growth. The empirical results indicate that higher interest rates significantly reduce corporate investment. A one-percentage-point increase in the policy rate is associated with a 2.34 percentage-point decline in the average investment rate. The effect is more pronounced among younger firms, highly leveraged firms, and firms operating in capital-intensive sectors, supporting the financial accelerator mechanism. Tobin's Q and cash flow positively influence investment, whereas leverage has a negative effect. These findings provide firm-level evidence on the monetary policy transmission mechanism in Indonesia and emphasize the importance of incorporating corporate heterogeneity into interest rate policy formulation.

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1. INTRODUCTION

Interest rate policy is a central instrument in monetary policy because it directly affects financing costs, corporate liquidity, asset valuation, and real economic activity. In Indonesia, the role of the policy rate is particularly important because corporate financing remains closely

connected to bank credit, external funding conditions, and macroeconomic stability. Bank Indonesia has used the BI-Rate and, since 2016, the BI 7-Day Reverse Repo Rate as key policy instruments to guide monetary conditions, maintain inflation expectations, and support financial system stability (Indonesia, 2026), (Warjiyo & Juhro, 2016). Changes in the policy rate may therefore influence corporate investment decisions through several channels, including the cost of capital, credit availability, balance-sheet conditions, and firms' expectations of future economic prospects.

Corporate investment is one of the main drivers of productive capacity, industrial expansion, and long-term economic growth. For listed firms, investment decisions are commonly reflected in capital expenditure, which indicates how firms allocate resources to expand or maintain productive assets. These decisions are not determined only by macroeconomic conditions, but also by firm-specific characteristics such as market valuation, internal cash flow, leverage, firm size, and sectoral capital intensity. When interest rates rise, firms may reduce or postpone capital expenditure because external financing becomes more expensive and the expected net return from investment declines. This response may be stronger among firms that are more financially constrained, particularly younger firms, highly leveraged firms, and firms operating in capital-intensive sectors.

The theoretical basis for this relationship is grounded in several complementary frameworks. The neoclassical theory of investment explains that firms adjust their capital stock according to the user cost of capital, in which interest rates play a central role (Jorgenson, 1963). Tobin's Q theory further suggests that investment depends on the relationship between firm market value and replacement cost, implying that higher discount rates may weaken firm valuation and reduce investment incentives (Tobin, 1969), (Hayashi, 1982). Meanwhile, the financial accelerator framework emphasizes that monetary tightening may amplify financial constraints by reducing firm net worth, increasing the external finance premium, and strengthening the negative effect of interest rates on investment among financially vulnerable firms (Bernanke et al., 1999), (Gertler & Gilchrist, 1994).

Empirical studies in advanced economies show that the investment response to monetary policy is heterogeneous across firms. (Cloyne et al., 2023) find that younger and financially constrained firms respond more strongly to monetary policy shocks, while (Ottonello & Winberry, 2020) show that financial heterogeneity shapes the strength of the investment channel of monetary policy. (Jeenas, 2023) highlights the role of liquidity and leverage in explaining firm-level investment responses, whereas (Gnewuch & Zhang, 2025) show that monetary policy affects not only average investment but also the distribution of investment rates across firms. These findings indicate that firm heterogeneity is essential for understanding how monetary policy is transmitted to corporate investment.

In the Indonesian context, however, firm-level evidence remains relatively limited. Existing studies and policy discussions have mainly focused on aggregate monetary transmission, bank credit, and macrofinancial stability (Juhro & Goeltom, 2021), (Widarjono, 2022). Although these studies provide important insights into Indonesia's monetary policy framework, they do not fully explain how non-financial firms adjust capital expenditure in response to policy rate changes. This limitation is important because aggregate or banking-sector analysis may conceal differences in investment responses across firms with different ages, leverage positions, and sectoral characteristics.

This research addresses this gap by examining the effect of Bank Indonesia's benchmark policy rate on corporate investment behavior using a balanced panel dataset of 185 non-financial firms

listed on the Indonesia Stock Exchange during 2015-2023. Corporate investment is measured by capital expenditure scaled by lagged total assets. The analysis employs fixed-effects and random-effects panel regression models, complemented by two-step system Generalized Method of Moments estimation to address potential endogeneity in investment determinants, following the dynamic panel approach developed by (Arellano & Bover, 1995) and (Blundell & Bond, 1998).

This study contributes to the literature in three main ways. First, it provides firm-level evidence on the interest rate channel of monetary policy transmission in Indonesia. Second, it examines whether the effect of interest rate policy differs across younger firms, highly leveraged firms, and firms in capital-intensive sectors, thereby testing the relevance of the financial accelerator mechanism in an emerging market setting. Third, it integrates firm-level financial variables and macroeconomic policy variables within a panel data framework, offering policy-relevant evidence for assessing the distributional consequences of interest rate adjustments on corporate investment.

2. LITERATURE REVIEW

2.1 Interest Rate Policy and the Investment Channel

Interest rate policy affects corporate investment primarily through the cost of capital and the expected profitability of investment projects. In the neoclassical investment framework, firms determine their desired capital stock by comparing the marginal productivity of capital with the user cost of capital (Jorgenson, 1963). Since interest rates are a key component of the user cost, an increase in the policy rate raises the cost of financing capital accumulation. As a result, firms may reduce investment when the expected return on new capital is no longer sufficient to compensate for higher financing costs.

Tobin's Q theory provides another explanation of how monetary policy affects investment. According to (Tobin, 1969), firms have stronger incentives to invest when the market value of capital exceeds its replacement cost. (Hayashi, 1982) formalizes this relationship by linking investment to marginal Q under adjustment-cost assumptions. In empirical corporate finance, average Q is often used as a proxy for firm investment opportunities. Higher interest rates may reduce asset prices and firm valuation, thereby lowering Tobin's Q and weakening investment incentives.

The monetary transmission literature also emphasizes that policy rate changes influence real economic activity with dynamic and sometimes delayed effects. (Christiano et al., 2005) show that monetary policy shocks can generate persistent effects on output and investment, while (Mankiw et al., 1992) demonstrate that identifying monetary shocks is essential for measuring their real consequences. (Ramey, 2016) further explains that macroeconomic shocks can propagate through several channels, including firm expectations, financing conditions, and aggregate demand. These perspectives support the view that interest rate policy may influence corporate investment through both direct financing-cost effects and broader macroeconomic channels.

2.2 Financial Accelerator and Firm Heterogeneity

The financial accelerator framework explains why the effect of monetary policy may differ across firms. (Bernanke et al., 1999) argue that credit market imperfections cause external finance to be more costly than internal finance. When interest rates increase, firm cash flows and asset values may decline, weakening firm balance sheets and increasing the external finance premium. This mechanism amplifies the initial effect of monetary tightening and produces stronger investment contractions among firms with weaker financial positions.

(Bernanke et al., 1999) provide early evidence that smaller firms are more sensitive to monetary policy shocks than larger firms. This supports the argument that firm characteristics

influence the strength of monetary transmission. Younger firms may face greater informational asymmetry, shorter credit histories, and fewer collateralizable assets. Highly leveraged firms may also be more exposed to interest rate increases because higher debt-servicing costs reduce internal funds and restrict additional borrowing capacity.

Recent empirical studies reinforce the importance of firm heterogeneity. (Cloyne et al., 2023) show that younger and non-dividend-paying firms exhibit stronger investment responses to monetary policy shocks. (Jeenas, 2023) finds that firms with high leverage and low liquidity experience stronger declines in investment after monetary tightening. (Ottonello & Winberry, 2020), however, show that monetary policy effects may also depend on default risk and lender willingness to extend credit, suggesting that the investment channel is shaped not only by borrower weakness but also by credit allocation mechanisms.

(Gnewuch & Zhang, 2025) extend this discussion by showing that monetary policy affects the distribution of investment rates across firms. Their findings indicate that monetary policy does not only change average investment but also influences the probability that firms undertake large investment projects or remain inactive. This perspective is relevant for Indonesia because listed firms differ substantially in age, financial structure, and sectoral investment needs.

2.3 Financing Conditions, Leverage, and Corporate Investment

Corporate investment is strongly influenced by financing conditions. Firms with sufficient internal cash flow may be less dependent on external finance, while firms with limited liquidity may become more sensitive to interest rate changes. (Hadlock & Pierce, 2010) show that firm characteristics such as size and age are useful indicators of financial constraints. Their findings are relevant for this research because younger firms may face more severe financing constraints and therefore respond more strongly to changes in policy rates.

Leverage is another important determinant of investment behavior. Highly leveraged firms may reduce investment when interest rates increase because higher borrowing costs raise debt-servicing burdens and reduce financial flexibility. (Kim & Stock, 2014) show that interest rate volatility affects corporate bond yield spreads, indicating that changes in interest rate conditions can influence corporate financing costs. (Bukalska & Skibinska-Fabrowska, 2023) also show that investment behavior among bank-dependent firms is strongly affected during periods of crisis, reinforcing the importance of external financing conditions in explaining capital expenditure decisions.

Uncertainty may further strengthen the negative effect of interest rates on investment. (Azimli, 2022) finds that policy, political, and economic uncertainty reduce corporate capital investment in emerging markets, particularly among firms with greater external financing dependence. (De la Horra et al., 2022) show that economic policy uncertainty and monetary policy conditions influence R&D investment, while (De la Horra et al., 2024) document asymmetric effects of unconventional monetary policy on corporate investment. These studies suggest that investment decisions are shaped not only by the level of interest rates but also by the uncertainty surrounding policy and financial conditions.

2.4 Monetary Policy Transmission in Indonesia

Indonesia provides an important setting for analyzing the firm-level investment channel of monetary policy. Bank Indonesia's monetary policy framework operates through several channels, including the interest rate channel, credit channel, exchange rate channel, and expectations channel (Indonesia, 2026), (Warjiyo & Juhro, 2016). In this framework, changes in the policy rate are expected to influence lending rates, credit conditions, asset prices, and ultimately real economic activity.

(Juhro & Goeltom, 2021) explain that Indonesia's monetary policy regime has evolved in response to inflation targeting, financial globalization, and macrofinancial stability challenges. This evolution highlights the importance of understanding how monetary policy affects different sectors of the economy. (Widarjono, 2022) provides evidence that monetary policy is linked to bank credit in Indonesia, supporting the relevance of the credit channel. However, bank-credit studies do not directly capture how non-financial firms adjust capital expenditure in response to changes in the policy rate.

The Indonesian context is also characterized by heterogeneous firm structures. Listed non-financial firms differ in terms of sector, asset size, leverage, age, and access to external financing. Capital-intensive sectors such as mining, infrastructure, property, and manufacturing may be more sensitive to interest rate changes because they require larger capital expenditures and are often more dependent on long-term financing. Therefore, examining firm-level responses is essential for understanding the distributional consequences of monetary policy.

2.5 Research Gap and Hypothesis Development

The literature indicates that interest rate policy can affect corporate investment through the user cost of capital, firm valuation, balance-sheet conditions, and credit availability. However, the strength of this effect depends on firm-level characteristics. Firms that are younger, more leveraged, or more dependent on capital-intensive investment may be more sensitive to monetary tightening.

Although international studies have provided strong evidence on the firm-level investment channel of monetary policy, empirical research in Indonesia remains limited. Existing Indonesian literature has mainly emphasized aggregate monetary policy transmission and bank credit, while direct evidence on firm-level capital expenditure responses among listed non-financial firms remains underdeveloped. This creates an important research gap because aggregate analysis cannot identify whether policy rate changes impose stronger investment effects on financially constrained firms.

3. METHODOLOGY

3.1 Research Design

This research employs a quantitative explanatory design to examine the effect of interest rate policy on corporate investment behavior in Indonesia. The study focuses on non-financial firms listed on the Indonesia Stock Exchange (IDX) during the 2015–2023 period. This period is selected because it captures important monetary policy dynamics in Indonesia, including the transition from the BI-Rate to the BI 7-Day Reverse Repo Rate as the main policy rate since 2016. The use of firm-level panel data enables the analysis to capture both cross-sectional differences across firms and time-series variation in macroeconomic policy conditions.

The empirical strategy is designed to test whether changes in Bank Indonesia's benchmark policy rate affect firm-level investment decisions and whether this effect varies across firm characteristics. Specifically, the study examines whether younger firms, highly leveraged firms, and firms operating in capital-intensive sectors are more sensitive to policy rate changes. This design is consistent with the neoclassical investment framework, Tobin's Q theory, and the financial accelerator mechanism, which suggest that investment responses to interest rate movements may differ according to firms' financing conditions and balance-sheet strength.

3.2 Data and Sample Selection

This study uses secondary data obtained from the Indonesia Stock Exchange, Bank Indonesia, and the World Bank. The firm-level data are collected from annual financial statements of non-financial firms listed on the IDX, while macroeconomic data are obtained from Bank Indonesia and the World Bank's World Development Indicators. The sample consists of 185 non-financial firms observed over the 2015–2023 period, resulting in a balanced panel of 1,665 firm-year observations.

Financial firms, including banks, insurance companies, securities companies, and other financial institutions, are excluded from the sample because their investment behavior, balance-sheet structure, regulatory environment, and capital requirements differ substantially from those of non-financial corporations. The final sample covers nine industrial sectors based on the Jakarta Stock Industrial Classification (JASICA), namely agriculture, mining, basic industry and chemicals, miscellaneous industry, consumer goods industry, property and real estate, infrastructure and transportation, trade and services, and manufacturing.

Firm-level variables include capital expenditure, total assets, fixed assets, net income, depreciation, total debt, market capitalization, firm age, and sectoral classification. Macroeconomic variables include the annual average benchmark policy rate, real GDP growth, consumer price index, and GDP deflator. All monetary variables are expressed in billions of Indonesian rupiah and adjusted using the GDP deflator with 2015 as the base year to reduce potential bias from inflation.

3.3 Variable Operationalization

The dependent variable is corporate investment, measured by the investment rate. Following the standard approach in firm-level investment studies, the investment rate is defined as capital expenditure in year *t* divided by total assets in year *t–1*. This scaling procedure controls for firm size and allows investment intensity to be compared across firms.

$$INV_{i,t} = \frac{CapEx_{i,t}}{Total\ Assets_{i,t-1}} \quad (1)$$

The main independent variable is Bank Indonesia's benchmark policy rate. For 2015, the BI-Rate is used, while for 2016–2023, the BI 7-Day Reverse Repo Rate is used to reflect Bank Indonesia's policy rate framework. The variable is measured as the annual average policy rate.

$$BIRATE_t = \frac{1}{12}\sum_{m=1}^{12} PolicyRat\, e_{m,t} \quad (2)$$

Tobin's Q is included to capture firm investment opportunities. It is calculated as the ratio of market capitalization plus total debt to total assets.

$$TOBQ_{i,t} = \frac{Market\ Capitalization_{i,t} + Total\ Debt_{i,t}}{Total\ Assets_{i,t}} \quad (3)$$

Cash flow is measured as net income plus depreciation scaled by lagged total assets. This variable captures internal financing capacity and is expected to have a positive effect on investment.

$$CF_{i,t} = \frac{Net\ Income_{i,t} + Depreciation_{i,t}}{Total\ Assets_{i,t-1}} \quad (4)$$

Leverage is measured as total debt divided by total assets. Higher leverage may reduce investment because debt-servicing obligations limit financial flexibility.

$$LEV_{i,t} = \frac{Total\ Debt_{i,t}}{Total\ Assets_{i,t}} \quad (5)$$

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Firm size is measured as the natural logarithm of total assets, while GDP growth is included to control for macroeconomic conditions. Firm age is measured as the number of years since incorporation. Younger firms are identified using a dummy variable equal to one if the firm belongs to the bottom tercile of the age distribution and zero otherwise. Highly leveraged firms are identified using a dummy variable equal to one if the firm's leverage is above the sample median. Capital-intensive firms are identified based on sectoral classification, particularly sectors with relatively high fixed-asset requirements such as mining, infrastructure, property, basic industry, and manufacturing.

Table 1. Variable Operationalization and Data Sources

Variable	Symbol	Measurement	Source
Investment Rate	*INV*	CapEx / Lagged Total Assets	IDX Annual Reports
BI-Rate	*BIRATE*	Annual average benchmark rate (%)	Bank Indonesia
Tobin's Q	*TOBQ*	(Market Cap + Total Debt) / Total Assets	IDX, Bloomberg
Cash Flow	*CF*	(Net Income + Depreciation) / Lagged Total Assets	IDX Annual Reports
Leverage	*LEV*	Total Debt / Total Assets	IDX Annual Reports
Firm Size	*SIZE*	Ln (Total Assets)	IDX Annual Reports
GDP Growth	*GDPG*	Annual real GDP growth rate (%)	World Bank
Firm Age	*AGE*	Years since incorporation	IDX Company Profiles

3.4 Empirical Model Specification

The baseline model follows an augmented neoclassical investment equation that incorporates firm-level financial variables and macroeconomic conditions. The model is specified as follows:

$$INV_{i,t} = \alpha + \beta_1 BIRATE_t + \beta_2 TOBQ_{i,t} + \beta_3 CF_{i,t} + \beta_4 LEV_{i,t} + \beta_5 SIZE_{i,t} + \beta_6 GDPG_t + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (6)$$

where $INV_{i,t}$denotes the investment rate of firm $i$in year t. $BIRATE_t$represents Bank Indonesia's benchmark policy rate. $TOBQ_{i,t}$, $CF_{i,t}$, $LEV_{i,t}$, and $SIZE_{i,t}$represent firm-level determinants of investment, while $GDPG_t$captures the macroeconomic environment. $\mu_i$denotes firm-specific effects, $\lambda_t$represents year effects, and $\varepsilon_{i,t}$is the idiosyncratic error term. The coefficient of primary interest is β_1, which is expected to be negative.

To test whether the effect of interest rate policy differs across firm characteristics, the model is extended by including interaction terms. The heterogeneity model is specified as follows:

$$INV_{i,t} = \alpha + \beta_1 BIRATE_t + \beta_2 (BIRATE_t \times YOUNG_i) + \beta_3 (BIRATE_t \times HIGHLEV_{i,t}) + \beta_4 (BIRATE_t \times CAPINT_i) + \gamma X_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (7)$$

where $YOUNG_i$identifies younger firms, $HIGHLEV_{i,t}$identifies firms with above-median leverage, and $CAPINT_i$identifies firms operating in capital-intensive sectors. $X_{i,t}$represents the vector of control variables, including Tobin's Q, cash flow, leverage, firm size, and GDP growth. The coefficients β_2, β_3, and $\beta_4$measure the additional investment sensitivity of young firms, highly leveraged firms, and capital-intensive firms to interest rate changes. Negative and statistically significant coefficients on these interaction terms would support the financial accelerator mechanism.

3.5 Estimation Strategy

The empirical analysis is conducted in several stages. First, descriptive statistics are used to summarize the distribution of all variables, including mean, standard deviation, minimum, and maximum values. This step provides an initial overview of investment behavior, financial characteristics, and macroeconomic variation in the sample.

Second, pooled Ordinary Least Squares, random-effects, and fixed-effects panel regression models are estimated. The pooled OLS model provides a basic benchmark, while the random-effects and fixed-effects models account for the panel structure of the data. The Hausman specification test is then used to determine whether fixed effects or random effects are more appropriate. If unobserved firm-specific characteristics are correlated with the explanatory variables, the fixed-effects estimator is preferred.

Third, the preferred fixed-effects model is estimated using robust standard errors clustered at the firm level. This adjustment is important because firm-level panel data may contain heteroskedasticity and serial correlation. Firm fixed effects are included to control for time-invariant unobserved characteristics, such as managerial style, corporate culture, business model, and sector-specific operating structure. Year effects are included to capture common macroeconomic shocks that affect all firms in a given year.

Fourth, to address potential endogeneity, the study applies two-step system Generalized Method of Moments estimation. Endogeneity may arise because investment, Tobin's Q, cash flow, and leverage may be jointly determined. For example, firms with higher investment may generate higher future valuation, while firms with strong cash flow may both invest more and attract better market valuation. The system GMM estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998) is appropriate for dynamic panel data because it combines moment conditions from the differenced and level equations, using lagged variables as internal instruments.

The dynamic specification can be expressed as follows:

$$INV_{i,t} = \delta INV_{i,t-1} + \beta_1 BIRATE_t + \beta_2 TOBQ_{i,t} + \beta_3 CF_{i,t} + \beta_4 LEV_{i,t} + \beta_5 SIZE_{i,t} + \beta_6 GDPG_t + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (8)$$

where $INV_{i,t-1}$is the lagged investment rate, included to capture the persistence of corporate investment behavior. The validity of the instruments is evaluated using the Hansen test of overidentifying restrictions. The Arellano-Bond AR(1) and AR(2) tests are also applied to examine serial correlation in the differenced residuals. A valid GMM specification requires significant AR(1), insignificant AR(2), and a Hansen test that does not reject the validity of instruments.

3.6 Robustness Checks

Several robustness checks are conducted to assess the stability of the empirical findings. First, the dependent variable is redefined as capital expenditure scaled by lagged fixed assets rather than lagged total assets. This alternative measure evaluates whether the results are sensitive to the scaling of investment.

$$INVFA_{i,t} = \frac{CapEx_{i,t}}{Fixed\ Assets_{i,t-1}} \quad (9)$$

Second, the sample is restricted to firms with complete financial information for at least seven consecutive years to ensure that the results are not driven by firms with irregular reporting patterns. Third, the COVID-19 period is excluded as an additional robustness test because the 2020–2021 period may contain abnormal investment behavior due to pandemic-related

disruptions. Fourth, a two-year moving average of the policy rate is used to capture the delayed transmission of monetary policy to corporate investment.

$$MABIRATE_t = \frac{BIRATE_t + BIRATE_{t-1}}{2} \quad (10)$$

These robustness checks are intended to verify whether the negative relationship between interest rate policy and corporate investment remains consistent across alternative specifications, sample restrictions, and policy-rate measurements.

3.7 Conceptual Framework

The conceptual framework of this research links Bank Indonesia's benchmark policy rate to corporate investment behavior through firm-level financial conditions and macroeconomic controls. The main relationship assumes that an increase in the policy interest rate raises the cost of capital and reduces investment incentives. However, this relationship is expected to vary across firms. Younger firms, highly leveraged firms, and firms in capital-intensive sectors are expected to experience stronger investment responses because they tend to face greater financing constraints and higher exposure to external funding conditions.

The framework also incorporates Tobin's Q, cash flow, leverage, firm size, and GDP growth as control variables. Tobin's Q represents investment opportunities, cash flow captures internal financing capacity, leverage reflects financial risk, firm size controls for scale and access to financing, and GDP growth captures macroeconomic demand conditions. Together, these variables provide a comprehensive framework for analyzing how monetary policy affects firm-level investment behavior in Indonesia.

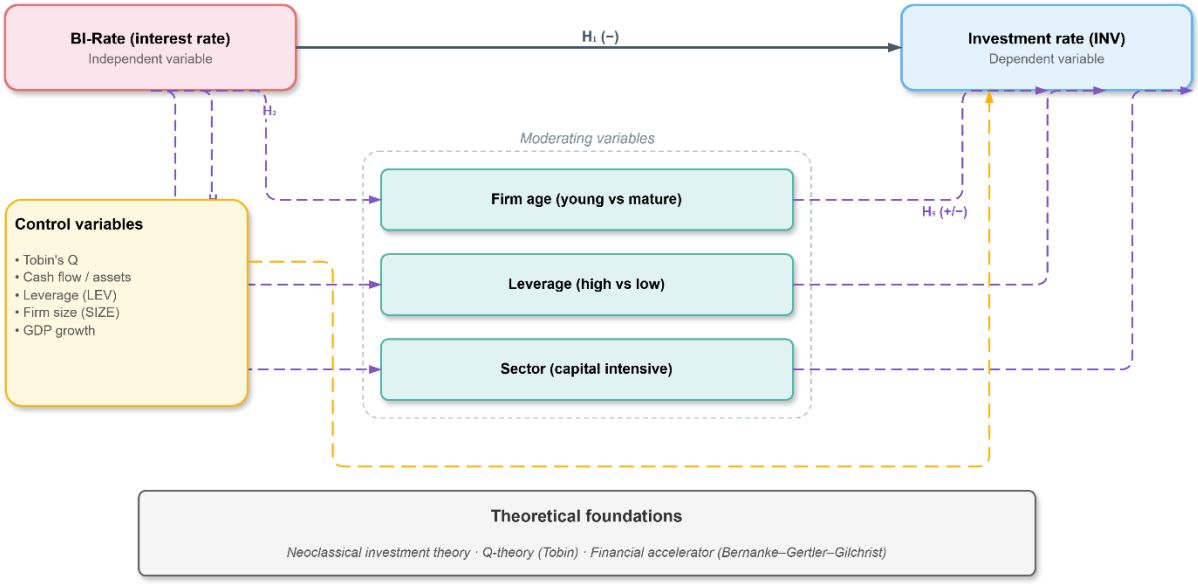

Figure 1. Conceptual Framework of the Study

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

Table 2 presents the descriptive statistics of the variables used in the empirical analysis. The average investment rate is 6.82 percent of lagged total assets, with a standard deviation of 7.45 percent. This relatively large dispersion indicates substantial heterogeneity in capital expenditure intensity across non-financial firms listed on the Indonesia Stock Exchange. The minimum

investment rate is 0.01 percent, while the maximum reaches 48.23 percent, suggesting that some firms maintained very low investment activity during the observation period, whereas others undertook relatively intensive capital expenditure.

The average policy interest rate is 5.12 percent, with values ranging from 3.75 percent to 7.50 percent. This variation reflects changes in Bank Indonesia's monetary policy stance during the 2015–2023 period. The average Tobin's Q is 1.38, indicating that, on average, listed non-financial firms in the sample were valued above the book value of their assets. This condition suggests the presence of positive investment opportunities, although the relatively high standard deviation of Tobin's Q indicates that these opportunities differ considerably across firms.

The mean cash flow-to-assets ratio is 0.08, suggesting that internal financing remains an important source of funds for corporate investment. The average leverage ratio is 0.47, indicating that debt represents a substantial component of firms' capital structure. Firm size has a mean value of 28.94 in logarithmic form, while the average GDP growth rate during the sample period is 4.21 percent. Firm age averages 31.42 years, with considerable variation from 3 to 98 years, allowing the analysis to examine differences between younger and more mature firms.

Table 2. Descriptive Statistics of Research Variables (N = 1,665)

Variable	Mean	Std. Dev.	Min	Max	Obs.
INV (%)	6.82	7.45	0.01	48.23	1,665
BIRATE (%)	5.12	1.08	3.75	7.50	1,665
TOBQ	1.38	1.21	0.22	11.54	1,665
CF	0.08	0.11	-0.32	0.54	1,665
LEV	0.47	0.22	0.03	0.95	1,665
SIZE (Ln)	28.94	1.72	24.18	34.07	1,665
GDPG (%)	4.21	2.35	-2.07	5.31	1,665
AGE (years)	31.42	15.87	3	98	1,665

Author's computation based on IDX, Bank Indonesia, and World Bank data, 2015-2023.

4.2 Model Selection: Hausman Specification Test

Before estimating the main panel regression model, the Hausman specification test is conducted to determine whether the fixed-effects or random-effects estimator is more appropriate. The test produces a chi-square statistic of 42.87 with a p-value below 0.001. This result rejects the null hypothesis that the random-effects estimator is consistent. Therefore, the fixed-effects model is preferred for the baseline specification.

The rejection of the random-effects model indicates that unobserved firm-specific characteristics are systematically correlated with the explanatory variables. This finding is reasonable in the context of corporate investment because unobserved characteristics such as managerial quality, business strategy, corporate governance, risk appetite, and sector-specific operating structures may influence both investment decisions and firm-level financial indicators. The fixed-effects estimator is therefore more suitable because it controls for time-invariant firm heterogeneity that may otherwise bias the estimated relationship between interest rate policy and corporate investment.

4.3 Baseline Regression Results

Table 3 reports the baseline regression results. Column 1 presents the pooled OLS estimation, Column 2 reports the random-effects estimation, Column 3 presents the fixed-effects estimation, and Column 4 reports the two-step system GMM estimation. Across all specifications, the coefficient of the policy interest rate is negative and statistically significant at the 1 percent level. This consistency indicates that the negative association between interest rate policy and corporate investment is robust across different estimation approaches.

Table 3. Panel Regression Results: Interest Rate Policy and Corporate Investment

Variable	(1) OLS	(2) RE	(3) FE	(4) GMM
BIRATE	-1.876***	-2.043***	-2.341***	-2.187***
	(0.412)	*(0.387)*	*(0.453)*	*(0.521)*
TOBQ	1.234***	1.187***	0.892***	0.943***
	(0.198)	*(0.214)*	*(0.267)*	*(0.312)*
CF	8.432***	7.965***	6.743***	7.128***
	(1.342)	*(1.298)*	*(1.567)*	*(1.834)*
LEV	-3.654***	-3.218***	-4.127***	-3.876***
	(0.876)	*(0.812)*	*(0.987)*	*(1.123)*
SIZE	0.342**	0.287**	0.198	0.234*
	(0.145)	*(0.132)*	*(0.178)*	*(0.134)*
GDPG	0.567***	0.498***	0.423***	0.456***
	(0.123)	*(0.118)*	*(0.134)*	*(0.167)*
Constant	2.876	3.421	4.234	—
	(2.345)	*(2.187)*	*(2.876)*	
Firm FE	No	No	Yes	Yes
Year FE	No	No	No	Yes
N	1,665	1,665	1,665	1,480
R^2	0.187	0.193	0.214	—
Hansen J (p)	—	—	—	0.342
AR(2) (p)	—	—	—	0.567

Indicate significance at the 1%, 5%, and 10% levels, respectively. Robust standard errors clustered at the firm level are reported in parentheses.

In the preferred fixed-effects specification, the coefficient of BIRATE is -2.341. This result indicates that a one-percentage-point increase in Bank Indonesia's benchmark policy rate is associated with a 2.341 percentage-point decline in the average investment rate, holding other factors constant. The magnitude is economically meaningful because it represents approximately one-third of the sample mean investment rate. This finding supports the first hypothesis that higher interest rates reduce corporate investment among non-financial firms listed on the IDX.

The system GMM estimation provides additional support for the baseline finding. The coefficient of BIRATE remains negative and significant, with a value of -2.187. This result suggests that the negative effect of interest rate policy on corporate investment is not merely driven by unobserved heterogeneity or simultaneity bias. The Hansen J-test p-value of 0.342 indicates that

the instruments used in the system GMM model are valid, while the AR(2) p-value of 0.567 suggests that there is no second-order serial correlation in the differenced residuals. These diagnostic results support the reliability of the dynamic panel estimation.

The control variables also show theoretically consistent results. Tobin's Q has a positive and significant coefficient, indicating that firms with stronger market valuation relative to asset replacement cost tend to invest more. This result is consistent with Tobin's Q theory, which suggests that higher firm valuation reflects better investment opportunities. Cash flow is also positive and statistically significant, implying that internal financing capacity plays an important role in supporting capital expenditure. This result suggests that Indonesian listed firms may face financing constraints, making internally generated funds important for investment decisions.

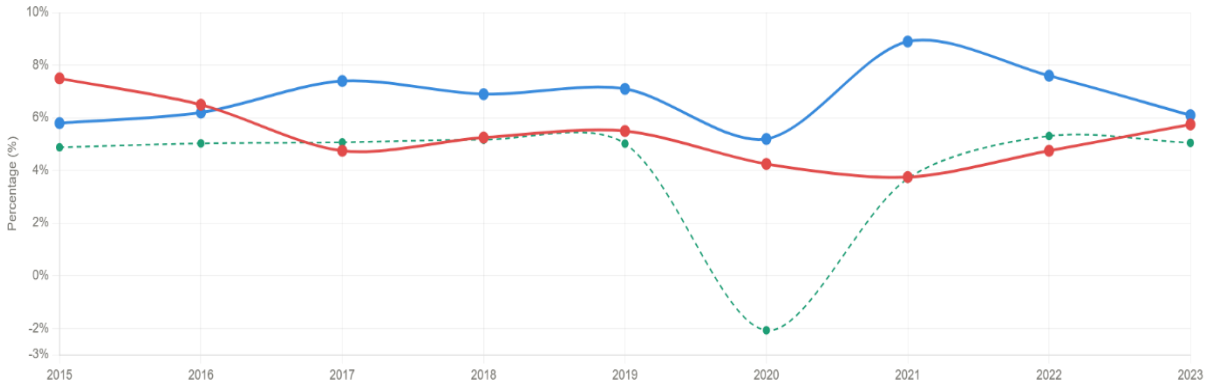

Figure 2. BI-Rate trend versus average investment rate

Leverage has a negative and significant effect on corporate investment. This finding indicates that highly indebted firms tend to reduce investment, possibly because debt-servicing obligations limit financial flexibility and increase the cost of additional external financing. GDP growth has a positive and significant coefficient, confirming that corporate investment is procyclical and tends to increase during periods of stronger macroeconomic performance. Firm size shows a positive but less stable effect, suggesting that larger firms may have better access to financing, although size alone does not fully determine investment intensity after controlling for firm fixed effects.

4.4 Heterogeneous Effects and Financial Accelerator Mechanism

Table 4 presents the interaction models used to examine whether the effect of interest rate policy varies across firm characteristics. The analysis focuses on two main dimensions of financial vulnerability: firm age and leverage. The interaction terms between the policy interest rate and young-firm status, as well as between the policy interest rate and high-leverage status, are used to test whether financially constrained firms are more sensitive to monetary tightening.

Table 4. Interaction Effects: Firm Heterogeneity in Interest Rate Sensitivity

Variable	(1) Age Interaction	(2) Leverage Inter.	(3) Full Model
BIRATE	-1.876***	-1.654***	-1.432***
	(0.478)	*(0.498)*	*(0.512)*
BIRATE × YOUNG	-1.243***	—	-1.087**
	(0.387)		*(0.423)*
BIRATE × HIGHLEV	—	-0.987**	-0.876**
		(0.412)	*(0.398)*

Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
N	1,665	1,665	1,665
R^2	0.228	0.221	0.237

indicate significance at the 1%, 5%, and 10% levels, respectively. Robust standard errors are reported in parentheses. Controls include Tobin's Q, cash flow, leverage, firm size, and GDP growth.

The interaction results provide evidence that the effect of interest rate policy is not uniform across firms. The coefficient of BIRATE × YOUNG is negative and statistically significant. In Column 1, the coefficient is -1.243, while in the full model it remains negative and significant at -1.087. These results indicate that younger firms experience a stronger decline in investment when interest rates increase. This finding supports the financial accelerator mechanism, which predicts that firms with shorter operating histories, weaker credit records, and fewer collateralizable assets face higher external finance premiums during monetary tightening.

The coefficient of BIRATE × HIGHLEV is also negative and statistically significant. In Column 2, the coefficient is -0.987, while in the full model it remains significant at -0.876. This result implies that highly leveraged firms are more sensitive to interest rate increases than firms with lower leverage. The finding is consistent with the balance-sheet channel of monetary policy, where firms with higher debt burdens face greater financial pressure when borrowing costs rise.

In the full model, the baseline coefficient of BIRATE is -1.432. This coefficient represents the estimated effect of interest rate increases on mature and low-leverage firms. For young firms, the total effect becomes -2.519, obtained from the sum of the baseline effect and the age interaction effect. For highly leveraged firms, the total effect becomes -2.308. For firms that are both young and highly leveraged, the combined effect reaches -3.395. This result indicates that financially vulnerable firms experience substantially larger investment contractions than more established and less leveraged firms.

4.5 Sectoral Heterogeneity

Table 5 presents the sectoral analysis by reporting the estimated BIRATE coefficient from separate fixed-effects regressions for each sector. The results show that the sensitivity of corporate investment to interest rate policy differs substantially across industries. Capital-intensive sectors exhibit the largest negative coefficients, indicating that these sectors are more exposed to changes in financing costs.

Table 5. Sectoral Heterogeneity in Interest Rate Sensitivity

Sector	BIRATE Coefficient	N (firm-years)
Mining	-3.421***	189
Basic Industry & Chemicals	-3.087***	234
Infrastructure & Transportation	-2.876***	162
Property & Real Estate	-2.654***	198
Manufacturing (Misc. Industry)	-2.432***	216
Consumer Goods Industry	-2.187***	207
Agriculture	-1.876**	135
Trade & Services	-1.234**	324

indicate significance at the 1% and 5% levels, respectively. Each row represents a separate fixed-effects regression.

The strongest sensitivity is observed in the mining sector, where the BIRATE coefficient is -3.421. This is followed by basic industry and chemicals, infrastructure and transportation, and property and real estate. These sectors generally require large capital expenditures, long investment horizons, and substantial external financing. As a result, increases in the policy interest rate tend to have a stronger effect on their investment decisions.

In contrast, the trade and services sector has the smallest coefficient, at -1.234, although the effect remains statistically significant. This lower sensitivity may reflect the relatively lower capital intensity and shorter investment cycles in service-oriented activities. The sectoral pattern therefore supports H4, which states that capital-intensive sectors exhibit stronger investment responses to interest rate changes than less capital-intensive sectors. These findings indicate that monetary policy can have uneven sectoral consequences, especially when firms differ in their dependence on fixed-asset investment and long-term financing.

4.6 Robustness Checks

Several robustness checks are conducted to assess the stability of the empirical findings. First, the investment rate is redefined as capital expenditure scaled by lagged fixed assets rather than lagged total assets. Under this alternative measurement, the coefficient of BIRATE remains negative and statistically significant at -2.567. This result indicates that the main finding is not sensitive to the choice of investment scaling.

Second, the sample is restricted to firms with at least seven consecutive years of available observations. The estimated coefficient of BIRATE remains negative at -2.198 and statistically significant at the 1 percent level. This finding suggests that the baseline result is not driven by firms with incomplete or irregular reporting patterns.

Third, the COVID-19 period is excluded from the estimation to account for abnormal investment behavior during 2020–2021. After excluding this period, the coefficient of BIRATE remains negative and significant at -2.476. This result confirms that the negative relationship between interest rate policy and corporate investment is not solely driven by pandemic-related disruptions.

Fourth, a two-year moving average of the policy rate is used to capture the delayed transmission of monetary policy. The coefficient remains negative and statistically significant at -1.876. This result indicates that interest rate changes affect corporate investment not only contemporaneously but also through delayed adjustment mechanisms.

The system GMM diagnostics further support the robustness of the results. The Hansen J-test p-value of 0.342 does not reject the null hypothesis of instrument validity, while the AR(2) p-value of 0.567 indicates the absence of second-order serial correlation in the differenced residuals. Taken together, these robustness checks confirm that the negative effect of interest rate policy on corporate investment is stable across alternative measurements, sample restrictions, crisis-period adjustments, and dynamic panel specifications.

4.7 Discussion

The empirical findings provide firm-level evidence that Bank Indonesia's interest rate policy significantly affects corporate investment behavior among non-financial firms listed on the Indonesia Stock Exchange. The negative and statistically significant coefficient of BIRATE across OLS, random-effects, fixed-effects, and system GMM estimations confirms that higher policy rates reduce investment intensity. This result is consistent with the neoclassical investment framework, which argues that an increase in interest rates raises the user cost of capital and reduces the optimal

level of investment. It is also consistent with Tobin's Q theory, as higher interest rates may reduce firm valuation and weaken investment incentives.

The results also support the financial accelerator mechanism. Younger firms and highly leveraged firms show stronger investment responses to policy rate increases. This indicates that monetary tightening does not affect all firms equally. Firms with weaker balance sheets, shorter credit histories, and greater dependence on external financing experience larger declines in capital expenditure. This pattern is consistent with Bernanke et al. (1999), who argue that monetary shocks are amplified through balance-sheet conditions and external finance premiums. It also aligns with empirical evidence from Cloyne et al. (2023), Jeenas (2023), and Gnewuch and Zhang (2025), which emphasizes the importance of firm heterogeneity in monetary policy transmission.

The positive effect of Tobin's Q confirms that firms with stronger investment opportunities tend to undertake higher capital expenditure. The positive coefficient of cash flow further indicates that internal funds are an important determinant of investment. This finding suggests the existence of financing constraints among Indonesian listed firms, because investment remains sensitive to internal liquidity even after controlling for market valuation. Meanwhile, the negative effect of leverage indicates that debt burden limits firms' ability to expand investment, especially during periods of higher interest rates.

The sectoral analysis provides additional insight into the distributional effects of monetary policy. Capital-intensive sectors, particularly mining, basic industry and chemicals, infrastructure and transportation, and property and real estate, are more sensitive to interest rate increases. These sectors typically require large-scale fixed investment and long-term financing, making them more vulnerable to higher borrowing costs. In contrast, sectors with lower capital intensity, such as trade and services, show weaker investment sensitivity. This finding implies that monetary policy may generate uneven effects across sectors, with stronger consequences for industries that are more dependent on external financing and fixed-asset accumulation.

From a policy perspective, the findings suggest that interest rate adjustments should be evaluated not only through aggregate macroeconomic indicators but also through firm-level and sectoral responses. While monetary tightening may be necessary to control inflation and maintain exchange rate stability, it may also impose disproportionate costs on financially constrained firms and capital-intensive sectors. Therefore, complementary policy instruments may be needed to reduce the adverse effects of monetary tightening on productive investment. Such instruments may include targeted credit facilities, macroprudential flexibility, incentives for long-term financing, and policies to deepen the domestic corporate bond market.

Overall, the results confirm that the interest rate channel of monetary policy operates through firm-level investment behavior in Indonesia. The evidence also shows that this transmission is heterogeneous, depending on firm age, leverage, and sectoral capital intensity. These findings strengthen the argument that firm-level analysis is essential for understanding the real effects of monetary policy in emerging market economies.

5. CONCLUSION

This research provides firm-level evidence on the relationship between interest rate policy and corporate investment behavior in Indonesia. Using a balanced panel dataset of 185 non-financial firms listed on the Indonesia Stock Exchange during the 2015-2023 period, the study examines whether changes in Bank Indonesia's benchmark policy rate affect corporate capital expenditure and whether this effect varies across firm characteristics and sectors. The empirical analysis, based

on fixed-effects, random-effects, and two-step system GMM estimations, confirms that interest rate policy plays a significant role in shaping corporate investment decisions.

The findings show that an increase in Bank Indonesia's benchmark policy rate significantly reduces corporate investment. In the preferred fixed-effects specification, a one-percentage-point increase in the policy rate is associated with a 2.34 percentage-point decline in the average investment rate. This result confirms the operation of the interest rate channel of monetary policy transmission at the firm level and supports the argument that higher financing costs weaken firms' incentives to undertake capital expenditure.

The results also demonstrate that the effect of interest rate policy is heterogeneous across firms. Younger firms and highly leveraged firms experience stronger investment contractions in response to interest rate increases. This finding supports the financial accelerator mechanism, which suggests that firms with weaker balance sheets, limited credit histories, and greater dependence on external finance are more vulnerable to monetary tightening. In addition, capital-intensive sectors, particularly mining, basic industry and chemicals, infrastructure, and property-related industries, show greater sensitivity to interest rate changes. These results indicate that monetary policy does not affect corporate investment uniformly, but operates through firm-specific and sector-specific financial conditions.

The control variables further strengthen the interpretation of the findings. Tobin's Q and cash flow have positive effects on investment, indicating that market-based investment opportunities and internal financing capacity are important determinants of capital expenditure. Conversely, leverage has a negative effect, suggesting that higher debt burdens reduce firms' financial flexibility and constrain investment activity. Overall, these findings confirm the relevance of the neoclassical investment framework, Tobin's Q theory, and the financial accelerator mechanism in explaining corporate investment behavior in Indonesia.

This study contributes to the literature by providing micro-level evidence on the monetary policy transmission mechanism in an emerging market context. It extends previous studies by showing that the investment effect of interest rate policy depends not only on aggregate monetary conditions, but also on firm age, leverage, and sectoral capital intensity. From a policy perspective, the findings suggest that Bank Indonesia should consider firm-level heterogeneity when assessing the real effects of interest rate adjustments. While monetary tightening may be necessary to maintain price stability and exchange rate resilience, complementary policies may be required to reduce disproportionate effects on financially constrained firms and capital-intensive sectors. Such policies may include targeted credit support, macroprudential flexibility, incentives for long-term financing, and efforts to deepen the domestic corporate bond market.

Several limitations should be acknowledged. First, the sample is limited to publicly listed non-financial firms, which are generally larger and more transparent than unlisted firms. Therefore, the estimated sensitivity of investment to interest rate changes may not fully capture the behavior of smaller and privately held firms. Second, the use of annual data may not completely reflect the short-term dynamics and transmission lags of monetary policy. Third, the analysis focuses on conventional interest rate policy and does not explicitly examine the role of macroprudential instruments or unconventional monetary policy measures.

Future research may extend this study by using quarterly firm-level data, incorporating unlisted firms through survey-based or administrative datasets, and examining additional channels such as credit supply, exchange rate exposure, debt maturity structure, and liquidity constraints. Further studies may also investigate how macroprudential policies interact with interest rate policy in shaping corporate investment behavior. These extensions would provide a

more comprehensive understanding of how monetary policy affects real economic activity through heterogeneous firm-level responses in Indonesia.

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