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Modeling the U.S. Federal Reserve Influence on Indonesia's Interest Rates: A Markov-Switching Approach

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Bintang Satrio Wibowo[1]✉, Mohammad Aulia Rachman[2], Ahmad Syahrul Fauzi[3], Abi Fadillah[4]

[1,2,3]Universitas Negeri Semarang, Indonesia

[4]Universitas Gadjah Mada, Indonesia

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Abstract

This study aims to examine how changes in the United States' monetary policy, such as interest rates and GDP, affect Indonesia's economic policy, as reflected in Indonesia's interest rate. The study employs the Markov Switching Dynamic Regression (MSDR) method to analyze these effects, using secondary data obtained from the Federal Reserve. This data includes variables for Indonesia's and the United States' interest rates, as well as other control variables. The results show that Indonesia's interest rate, both in expansionary and contractionary conditions, tends to be influenced by the U.S. interest rate. In contrast, the U.S. GDP has no significant effect on Indonesia's monetary policy. These findings suggest that external financial conditions, particularly those from the United States, have a significant impact on the economic situation of developing countries, including Indonesia.

✉ Corresponding author: Bintang Satrio Wibowo
E-mail: bintangsatrio@mail.unnes.ac.id

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INTRODUCTION

Indonesia's interest rate movement has demonstrated relative stability in recent years. Domestic factors that have remained favorable over the past decade, on average, have prevented the central bank's policy rate from experiencing drastic surges or sharp declines, despite the temporary economic disruptions caused by the COVID-19 recession. By the end of 2020, the central bank's policy rate stood at 3.75 percent, a decrease from 5 percent in the previous year. In 2023, the rate rose again to 6 percent, compared to 3.75 percent recorded three years earlier, as previously noted. This trend suggests that Indonesia has experienced a relatively robust recovery to date. Nevertheless, central bank interest rates are influenced not only by domestic economic conditions but also by global factors, including the policies of major economies such as the United States. (Fuddin, 2014; Huruta, 2018; Sebayang et al, 2022; Ntshangase et al., 2023).

Furthermore, the sustained trend of relatively stable interest rates reflects Bank Indonesia's effective policy stance in maintaining a balance between fostering economic recovery and mitigating inflationary pressures. This condition also signifies a high level of market confidence in the credibility of domestic monetary policy. Historical data indicate that Indonesia's policy rate remained within the range of 4.75% to 5.75% throughout 2025 (Bank Indonesia, 2025). In contrast, on the external front, the United States experienced a substantial increase in its benchmark interest rate—from near-zero levels to approximately 4–5% since 2022—which subsequently served as a significant source of global financial tightening (The Federal Reserve, 2025).

The United States economy is undeniably one of the most influential in shaping global economic dynamics. In 2023, the U.S. Gross Domestic Product (GDP) was recorded at approximately USD 27.72 trillion and later increased to USD 29.18 trillion, despite an average annual growth rate of only around 2 to 3 percent. Nevertheless, U.S. economic indicators such as GDP, inflation, exchange rate strength, and the Federal Reserve's interest rate often serve as critical benchmarks for global financial markets, as well as reference points for other countries in assessing their own economic conditions. Consequently, fluctuations in these indicators frequently generate volatility in international capital flows, exchange rate stability, and risk levels in emerging markets, including Indonesia.

Theoretically, central bank monetary policy responses are often influenced by changes in foreign economic policy. (Yildirim & Ivrendi, 2021). An increase in U.S. interest rates, for instance, raises the demand for the U.S. dollar, which in turn leads to its appreciation. In response to this appreciation, other countries may also raise their own interest rates to prevent excessive depreciation of their domestic currency against the dollar. Generally, maintaining exchange rate stability often requires upward adjustments in domestic interest rates in response to external interest rate hikes. In addition, other sources of risk include the economic growth performance of foreign economies, domestic economic growth, and inflationary pressures originating from both domestic and international sources.

Although numerous studies have examined the determinants of domestic interest rates, most of them primarily emphasize internal factors such as inflation, economic growth, and the stability of the national financial system. However, the linkages between global economic indicators, particularly those originating from the United States, and monetary policy responses in Indonesia remain relatively underexplored in a comprehensive manner. In today's era of financial globalization, even minor adjustments in the Federal Reserve's monetary policy can trigger substantial capital inflows or outflows in emerging markets. Such dynamics inevitably affect Bank Indonesia's interest rate decisions and may further influence other macroeconomic indicators, including GDP growth, inflation, and overall financial stability (Danladi & Sanusi, 2024; Suroso et al., 2025). This research gap highlights the need for further investigation into the extent to which U.S. macroeconomic indicators are interconnected with Indonesia's interest rate policy. A deeper understanding of this relationship is crucial, as it not only enriches the existing literature but also provides important policy

implications for maintaining economic stability in an increasingly interconnected global financial environment.

It is undeniable that the economic dynamics of major powers, particularly the United States, exert substantial influence on markets in neighboring as well as developing countries, including Indonesia. Economic shifts in the United States frequently generate shocks for countries that maintain bilateral relations or are highly dependent on the U.S. economy, often triggering waves of adjustments that require policy responses at the domestic level beyond the influence of internal factors (Nurmalasari et al., 2024; Wuri et al., 2024). Within this framework, further examination is essential to understand how cross-country monetary policy transmission operates and the extent to which such external factors can influence the direction of Indonesia's interest rate policy. Accordingly, this study focuses on analyzing how the economic conditions of the United States may affect Indonesia's interest rate levels, utilizing time series data to address this research question.

RESEARCH METHODS

This study examines how U.S. macroeconomic variables affect Indonesia's interest rate policy by utilizing time series data covering the period from 1990Q1 to 2023Q4. The time series used in this research consists of quarterly data, resulting in a total of 136 observations. The macroeconomic variables under investigation are secondary data obtained from the Federal Reserve database, which include Indonesia's central bank policy rate, U.S. GDP growth, and the U.S. Federal Reserve's policy interest rate.

The literature explains that interest rates may operate under different conditions, such as during periods of economic overheating and periods of economic slowdown. Indonesia has experienced several monetary crises in the past decades, including the 1998 Asian Financial Crisis, the 2008 Global Financial Crisis, and the COVID-19 crisis between 2020 and 2022. In these contexts, monetary policy can function in two alternative ways: through expansionary monetary policy, by lowering interest rates to stimulate economic activity, or through contractionary monetary policy, by raising interest rates to prevent the economy from overheating due to inflationary pressures (Mankiw, 2019; Dornbusch et al., 1998; Mishkin, 2012). Recognizing that interest rates exhibit distinct behaviors depending on the prevailing economic conditions, it becomes relevant to model how macroeconomic variables contribute to interest rate dynamics under either expansionary or contractionary regimes. In this paper, we employ a **Markov-switching dynamic regression** model to investigate how U.S. macroeconomic variables affect Indonesia's interest rate policy across different monetary regimes.

The regression model employed in this study is the Markov-Switching Dynamic Regression (MSDR) model. This model provides an opportunity to examine how U.S. macroeconomic variables influence Indonesia's interest rate under both expansionary (loose) and contractionary (tight) monetary conditions. Initially introduced by Quandt (1972) and later advanced by Hamilton (1989), the model is designed for time series data that are assumed to switch between several unobserved states, allowing the process to evolve differently under each regime. In essence, the MSDR model enables us to capture the effects of independent variables on the dependent variable across distinct regimes. Furthermore, it allows us to estimate the probability of transitioning from one regime (or state) to another, thereby accommodating potential shifts in economic conditions (Kangogo & Volkov, 2022; Mumtaz & Smith, 2019). In its simplest form, the MSDR regression can be expressed as follows

$$y_t = \mu_{s_t} + X_t\alpha + Z_t\beta + \varepsilon_s \qquad (1)$$

In the above equation, y represents the dependent variable, while μ serves as the constant or intercept of y within each regime or state. X denotes the vector of exogenous (independent) variables with coefficients α that remain constant across regimes. In contrast, Z represents the vector of exogenous variables with coefficients β that vary across different regimes. This

specification indicates that the estimated β coefficients provide insights into how the vector Z influences y under different regimes or states. It should be noted that the regimes (or states) are unobserved. In this study, regime identification is justified based on the intercept values mu sub, s sub t, end subscripts estimated for each state, which are used to characterize whether the monetary condition corresponds to an expansionary or contractionary regime.

To obtain the values of subscripts and thereby identify the regimes, we employ a simple MSDR regression approach with the following specification.

$$r_t = \mu_{s_t} + \varepsilon_s \quad (2)$$

In this model, r denotes Indonesia's interest rate, which serves as the primary dependent variable. By estimating the intercept against the interest rate, and given that the default MSDR model assumes s = 2, the estimation results will illustrate two distinct regimes: one representing a deteriorating interest rate condition and the other reflecting a relatively stable interest rate condition. The MSDR model equation is specified in detail and expressed as

$$r_t = \mu_{s_t} + \emptyset_{s_t} r_{t-1} + \gamma_{1s_t} usgrowth_t + \gamma_{2s_t} usrates_t + \varepsilon_s \quad (3)$$

In this equation, r sub t minus one end subscript denotes the lagged value of Indonesia's interest rate, growth represents U.S. GDP growth, and you rates refers to the Federal Reserve's policy interest rate. Each coefficient reflects parameters that vary depending on the regime. In this paper, the set of coefficients α in Equation (1) is temporarily excluded from the model, as the primary focus is on how the independent variables influence the dependent variable across regimes, which constitutes the main emphasis of this study. Prior to estimation, we conducted unit root tests for each variable as a precautionary step in time series analysis to avoid the problem of spurious regression (Choi et al., 2008; Lin & Tu, 2020). These tests aim to determine whether the variables are stationary at level (I(0)) or require transformation into first differences (I(1)). To assess the order of integration, we applied two types of unit root tests: the Augmented Dickey–Fuller (ADF) test and the Phillips–Perron (PP) test.

RESULTS AND DISCUSSION

Before proceeding with the estimation, we conducted unit root tests to determine whether the variables exhibited unit root problems at levels (I(0)) or first differences (I(1)). The results indicate that, on average, the variables employed in this study are stationary, either at the level or in first differences. Consequently, the likelihood of spurious regression in the estimation results is considerably reduced.

Table 1. ADF and PP Unit Root Test

	ADF		*PP*	
	level	**1st diff**	**level**	**1st diff**
(r)				
None	-1.936*	-9.983***	-2.085**	-9.821***
Intercept	-2.968**	-9.958***	-3.335**	-9.784***
Trend	-3.699**	-9.821***	-4.180***	-9.744***
(usgrowth)				
None	-7.255***	-22.245***	-7.637***	-33.854***
Intercept	-12.383***	-22.162***	-12.364***	-33.702***
Trend	-13.341***	-22.079***	-12.326***	-33.552***
(usrates)				
None	-1.782*	-5.288***	-1.881*	-5.414***
Intercept	-2.111	-5.275***	-2.518	-5.405***
Trend	-0.487	-5.482***	-1.965	-5.581***

Source: data processed

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.05$

Following the MSDR estimation, Table 3 shows that the average estimated interest rate in regime 1 is 9.72, while in regime 2 it is 50.63. These results suggest that regime 1 represents a stable interest rate condition, as indicated by its lower mean value, whereas regime 2 corresponds to a contractionary regime. As presented in Table 2, the ed intereononet rate r_{t-1}, representing the previous quarter, exhibits a positive effect on the current quarter's interest rate. This finding is reasonable, as interest rate adjustments are inherently persistent and tend not to change drastically within short periods. Additionally, the U.S. interest rate variable is positively associated with Indonesia's domestic interest rate. This result reflects the fact that changes in U.S. interest rate behavior influence other economies, thereby prompting countries—including Indonesia—to respond with monetary policy adjustments by raising their domestic interest rates accordingly. In other words, a change in U.S. monetary policy may have a spillover effect on foreign economic activity. (Abobaker & Gokmenoglu, 2023; Yildirim & Ivrendi, 2021)

Table 2. MSDR Results

	Regime 1 (State 1)	
	Coefficient	**SE**
C	2.2606***	0.389
usgrowth	-0.048	0.037
usrates	0.620***	0.095
r (-1)	0.613**	0.028
	Regime 2 (State 2)	
	Coefficient	**SE**
C	2.888***	3.895
usgrowth	-0.023	0.374
usrates	8.070***	0.977
r (-1)	0.372***	0.105
	Transition Matrix Parameter	
	Coefficient	**SE**
P11	0.989	0.010
P21	0.517	0.343
AIC	4.701	
HQIC	4.798	
SBIC	4.938	

Source: data processed

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.05$

Table 3. MSDR Constant Result

	Regime 1 (State 1)	
	Coefficient	**SE**
_cons *(r)*	9.726***	0.465
	Regime 2 (State 2)	
	Coefficient	**SE**
_cons *(r)*	50.630***	2.811
	Transition Matrix Parameter	
	Coefficient	**SE**
P11	0.992	0.007
P21	0.253	0.214
AIC	6.381	
HQIC	6.425	
SBIC	6.488	

Source: data processed

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.05$

The results in Table 2 indicate that U.S. interest rates have a positive and significant effect on Indonesian interest rates across both states. This finding suggests that, whether under expansive or contractive conditions, Indonesian interest rates tend to respond to U.S. monetary policy in a procyclical manner rather than adopting a countercyclical stance. In other words,

domestic interest rate policy appears to follow global interest rate movements more closely, instead of acting countercyclically to cushion external shocks. This result is consistent with Ahmed et al. (2024), who argue that tight monetary policy in the United States poses significant risks for vulnerable emerging markets. Such policies incentivize investors to reallocate their assets toward the U.S., which in turn leads to currency depreciation in domestic economies. A typical response to such depreciation is to raise domestic interest rates (Iacoviello & Navarro, 2018; Ridho, 2023).

Another finding shows that U.S. GDP growth has no significant influence on Indonesian interest rates across both regimes. This aligns with the literature, which emphasizes that external transmission from the United States to emerging markets is driven primarily by U.S. monetary policy and global financial conditions (Ahmed et al., 2024; Engler et al., 2023; Iacoviello & Navarro, 2018), while the output growth channel is not a key determinant of Indonesia's interest rate dynamics. Moreover, since domestic household consumption constitutes the most significant component of GDP in both countries, the likelihood that foreign output factors will directly influence the Indonesian economy is relatively limited.

As previously discussed, the MSDR model can also simulate transition probabilities, indicating the likelihood of either remaining in the same state or shifting to a different one. The transition probabilities derived from the MSDR estimation are presented in the "estimates" section of Table 4 below. The results indicate that the probability of remaining in regime 1 is exceptionally high, with an estimated value of 0.989. In other words, Indonesia is highly persistent in regime 1, with a 98% probability of remaining in that state. Conversely, the lowest probability observed is the transition from regime 1 to regime 2, which is only 1 percent. Meanwhile, the probability of switching from regime 2 to regime 1 (P21) is 0.517, while the probability of remaining in regime 2 (P22) is 0.482, or approximately 48 percent.

Table 4. Expected Transition

Transition Prob.	Estimates	Std. Error
P11	0.989	0.010
P12	0.010	0.010
P21	0.517	0.343
P22	0.482	0.343

Source: data processed

From the results above, it can be predicted that Indonesia's interest rates are likely to remain in a low or stable regime, while still being influenced by external factors, particularly the U.S. Federal Reserve's policy rate. These findings are related to the economic condition of Indonesia, which has already been impacted by several crises in the past, including the COVID-19 pandemic and other crises such as the 2008 financial crisis and the monetary crisis in 1998. (IMF, 2023). However, these findings also come with certain limitations. One of these possibilities is that domestic factors may play a significant role in shaping Indonesia's interest rate fluctuations. Additionally, other elements beyond macroeconomic variables may also exert a substantial influence on the behavior of domestic interest rates.

CONCLUSION

This study aims to investigate the impact of the U.S. economy on changes in Indonesia's interest rates from 1990 to 2023. To capture these effects, we employ the Markov-Switching Dynamic Regression (MSDR) model, which enables us to assess the impact of U.S. factors on Indonesia's interest rates under two regimes: a stable interest rate regime and a high interest rate regime. Our findings reveal a significant positive relationship between the U.S. Federal Reserve rate and Indonesia's interest rate across both regimes. This indicates that, whether under stable or high-interest conditions, Indonesia's interest rates are

consistently and significantly influenced by U.S. monetary policy. In addition, domestic factors—captured in our results through the lagged interest rate variable—also play a role in shaping the dynamics of Indonesia's interest rate movements.

Another result shows that U.S. GDP growth has no significant influence on Indonesia's interest rates, whether under a stable regime or a high-interest rate regime. This finding suggests that fluctuations in U.S. output have a limited impact on the Indonesian economy, with monetary conditions in the United States playing a more significant role instead.

Naturally, this study has several limitations. One of the main constraints is that we have not yet incorporated domestic factors that may affect interest rates, such as domestic inflation, Indonesia's GDP, and other relevant variables. Future research is expected to enrich the MSDR framework by incorporating these domestic variables, allowing the model's estimation results to more accurately reflect the actual dynamics of Indonesia's interest rate behavior.

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