

The Effect Of Monetary Policy On The Natural Level Unemployment In Indonesia's Fluctuation Economy 2008-2023

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Abstract

This research aims to analyze the influence of monetary policy on fluctuations in the natural unemployment rate in the Indonesian economy from 2008 to 2023. This research focuses on the variables of real interest rates, money supply and real exchange rates, using multiple linear regression analysis with monthly time series data. The research results show a strong positive correlation between real interest rates and the natural unemployment rate. This indicates that an increase in real interest rates will be related to an increase in the natural unemployment rate, while a decrease in real interest rates will be related to a decrease in the natural unemployment rate, in accordance with classical theory which suggests that real interest rates function as loan prices that influence investment, economic productivity, labor demand, and unemployment rates. In addition, the amount of money in circulation has a significant positive effect on the natural unemployment rate, indicating that an increase in the money supply will have an impact on increasing the natural unemployment rate, and vice versa, in accordance with the quantity theory of money and the Phillips curve. Empirical data also show a significant inverse correlation between the real exchange rate and the natural rate of unemployment, indicating that a decrease in the real exchange rate is associated with a decrease in the natural rate of unemployment, while an increase in the real exchange rate is associated with an increase in the natural rate of unemployment. Recommendations include coordination of monetary and fiscal policy, as well as future research that expands the model with more sophisticated methods and additional variables to provide a more comprehensive picture of the influence of monetary policy on the natural rate of unemployment. Therefore, the main aim of this research is to provide deeper insights to assist more effective policies in managing the natural rate of unemployment in a fluctuating economy.

Keywords: Monetary Policy, Natural Unemployment Rate, Realinterest Rate.

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Introduction

Mbilla, Atindaana, Gadzo, Adeniyi, & Salifu. (2021) examined Monetary policy is a key tool employed by governments to manage the macroeconomic conditions within a nation. This policy have the potential to impact a range of economic variables, including but not limited to interest rates, money supply, exchange rates, inflation, and economic growth. The primary goal of monetary policy is to attain the optimal natural unemployment rate, which refers to the unemployment rate that arises when the labor market is in a state of equilibrium, devoid of

inflationary or deflationary influences (Gornemann, Kuester, & Nakajima, 2021). The determination of the natural unemployment rate is subject to the effect of multiple elements, including but not limited to the labor market structure, the educational attainment and skill levels of individuals in the workforce, the degree of labor mobility, and other factors that possess a structural or frictional nature. The natural rate of unemployment is subject to fluctuations over time as a result of alterations in various factors. Nevertheless, it is important to note that the natural unemployment rate does not necessarily align with the observed unemployment rate in practice. The current level of unemployment may deviate from the natural rate of unemployment as a result of cyclical dynamics that are impacted by the conditions of aggregate demand (Carrillo-Tudela & Visschers, 2023).

Narulita, Fajary, Abdillah, Djuwansah, Sutjiningsih, Kusratmoko, & Moersidik. (2023) examined Indonesia underwent notable economic oscillations over the timeframe spanning from 2008 to 2023. In 2008, Indonesia saw the repercussions of the global financial crisis, resulting in a downturn in economic development, inflation, and depreciation of the rupiah exchange rate. In the year 2009, Indonesia experienced a notable recovery from the crisis, as evidenced by the achievement of positive economic growth, a low inflation rate, and the maintenance of a stable exchange rate for the rupiah. During the period of 2010-2011, Indonesia saw a notable upswing in its economic growth, effectively managed inflation, and witnessed a strengthening of the rupiah exchange rate (Andersson, Axelsson, & Palacio, 2021). Nevertheless, throughout the period of 2012-2013, Indonesia had a deceleration in its economic growth, accompanied by a rise in inflation rates and a depreciation of the rupiah exchange rate. During the period of 2014-2015, Indonesia encountered economic difficulties as a result of declining global commodity prices, the implementation of stricter monetary policies by the United States, and internal political instability. During the period of 2016-2017, Indonesia experienced notable advancements in its economic performance, characterized by an upsurge in economic growth, a decline in inflation, and a stable exchange rate of the rupiah (Angelina & Nugraha, 2020). During the period of 2018-2019, Indonesia encountered economic challenges as a result of the trade conflict between the United States and China, escalating global oil prices, and political instability preceding the election. During the period of 2020-2021, Indonesia encountered a decline in its economic growth, a decrease in inflation rates, and a depreciation of the national currency, the rupiah, as a result of the adverse effects caused by the COVID-19 epidemic. In the upcoming fiscal year of 2022-2023, Indonesia will endeavor to navigate the aftermath of the crisis and attain favorable economic development, maintain a moderate level of inflation, and establish a competitive exchange rate for the rupiah (Islamaj, Mattoo, & Vashakmadze, 2022).

Purwono, Wardana, Haryanto, & Mubin. (2021) examined A distinction exists between the natural unemployment rate and the actual unemployment rate observed in Indonesia. Based on data provided by the Central Statistics Agency, it can be observed that the natural unemployment rate in Indonesia throughout the period of 2008-2023 exhibited a fluctuation between 5.5% and 6.5%. Conversely, the actual unemployment rate within the same timeframe had a wider range, varying from 5.3% to 9.7%. This observation highlights the existence of a disparity between the anticipated unemployment rate as projected by the government and the actual unemployment rate experienced throughout society. The existence of this gap has the potential to result in a range of social and economic challenges, including but not limited to poverty, inequality, crime, and political instability (Lahore & Nazir, 2022).

Sulaksmo, Chaiboonsri, & Intapan. (2023) examined Bank Indonesia, as the designated monetary authority of Indonesia, is responsible for implementing alterations in monetary policy.

Based on statistics provided by Bank Indonesia, the monetary policy conducted throughout the period of 2008-2023 experienced multiple revisions in response to evolving economic circumstances. In the year 2008, Bank Indonesia implemented a measure to mitigate inflation and stabilize the rupiah exchange currency by increasing its benchmark interest rate from 8% to 9.5%. In 2009, Bank Indonesia implemented a reduction in its benchmark interest rate, lowering it from 9.5% to 6.5%, with the aim of stimulating economic growth and facilitating recovery from the prevailing crisis. In 2013, Bank Indonesia implemented a measure to address the challenges posed by the devaluation of the rupiah and the deficit in the balance of payments. This involved raising the benchmark interest rate from 5.75% to 7.5%. In 2016, Bank Indonesia implemented a reduction in the benchmark interest rate, lowering it from 7.5% to 4.75% (Brahmachary, 2019). This measure was undertaken with the aim of stimulating both aggregate demand and investment. In the year 2018, Bank Indonesia implemented a measure to raise the benchmark interest rate from 4.75% to 6% with the objective of preserving macroeconomic and financial system stability. In the year 2020, Bank Indonesia implemented a reduction in its benchmark interest rate, lowering it from 6% to 3.75%. This measure was undertaken with the objective of providing support to the economic recovery efforts in response to the adverse effects of the COVID-19 epidemic (Fakhrudin, Blanchard, & Ragupathy, 2020). Bank Indonesia is expected to raise its benchmark interest rate from 3.75% to 4.25% in 2023 as a precautionary measure against the projected increase in inflation and the anticipated normalization of global monetary policy. The alterations in monetary policy can exert an influence on the natural rate of unemployment, both in a direct and indirect manner, via the transmission mechanism of monetary policy (Slacalek, Tristani, & Violante, 2020).

The research of this study is to investigate the impact of monetary policy on the natural unemployment rate within the framework of economic fluctuations in Indonesia from 2008 to 2023. The objective of this study is to offer a comprehensive analysis of the efficacy of monetary policy interventions in the management of unemployment rates, specifically examining their influence on social and economic stability. The selection of this topic is predicated upon the pressing necessity to comprehend the role of monetary policy as the primary tool for addressing volatile economic dynamics, particularly within the framework of the global crisis in 2008 and the ongoing economic circumstances in Indonesia till 2023 (Stiglitz, & Regmi, 2023). Therefore, the expectation is that this study will not only make a theoretical contribution to the existing economic literature but also offer practical insights that can serve as a foundation for the development of more efficient policies aimed at attaining a harmonious equilibrium between economic growth and optimal employment in subsequent periods.

Literature Review

Tavlas. (2023) examined The concept of monetary policy and its influence on the natural rate of unemployment, especially in the context of the economic theory of Monetarism developed by Milton Friedman. Friedman put forward the view that loose monetary policy, such as increasing the money supply, could potentially cause inflation. According to him, increasing inflation can disrupt economic stability and ultimately increase natural unemployment through a decrease in people's purchasing power. This view describes the close relationship between inflation, monetary policy, and natural unemployment (Fitzgerald, Jones, Kulish, & Nicolini, 2020).

Donaghy. (2021) examined The theory of the Expectations-augmented Phillips Curve, a significant concept in macroeconomic theory, offers valuable insights into the impact of monetary policy on the natural rate of unemployment. According to this theoretical framework,

the unemployment rate is significantly influenced by inflation expectations. To clarify, individuals' expectations of elevated inflation resulting from a lenient monetary policy might have an impact on their actions regarding salaries and prices. Consequently, this can lead to a rise in the degree of natural unemployment (Huang, Burtch, Hong, & Pavlou, 2020).

Meanwhile, in the Keynesian Monetary Policy theory explained in the work of John Maynard Keynes, government intervention with loose monetary policy is considered as a tool to stimulate aggregate demand and reduce the natural level of unemployment. Keynes viewed that in situations where the economy is experiencing a recession or high levels of unemployment, government actions that loosen monetary policy, such as lowering interest rates, can help increase investment and consumption, which in turn can reduce the natural level of unemployment. The natural unemployment rate refers to the level of unemployment in an economy that is the result of natural factors and cannot be completely eliminated (Martin, Markhvida, Hallegatte, & Walsh, 2020). This means that if the unemployment rate only reaches the range of 2 to 3 percent, this indicates that the economy is in a condition of full employment or what is often referred to as "full employment" (Osberg, 2020). Aksakal. (2019) examined In the theory of Keynesian Monetary Policy theory, as elucidated by John Maynard Keynes, the utilization of loose monetary policy by the government is regarded as a means to invigorate aggregate demand and diminish the inherent level of unemployment. According to Keynes, during periods of economic crisis or elevated unemployment rates, the implementation of government measures aimed at relaxing monetary policy, such as interest rate reductions, can effectively stimulate investment and consumption. Consequently, this can lead to a decrease in the equilibrium level of unemployment. The concept of the natural unemployment rate pertains to the extent of unemployment within an economy that arises from inherent factors and is not entirely eradicable. Fatás. (2021) examined when the unemployment rate falls within the range of 2 to 3 percent, it signifies a state of full employment in the economy, also known as "full employment."

Tran, Phan, Tan, & Rahimi. (2022) examined Full employment refers to a state in which the majority of the labor force within a certain country or region has successfully secured employment that aligns with their skills and aspirations. The primary objective of economic management endeavors is to enhance societal welfare and mitigate economic uncertainty (Sharma, Vanapalli, Samal, Cheela, Dubey, & Bhattacharya, 2021). Nevertheless, it is crucial to acknowledge that an economy will usually have a natural rate of unemployment, even when it is operating at full employment. Various factors, including job transitions, disparities in skill levels, geographical considerations, and individual inclinations, contribute to the enduring nature of the natural rate of unemployment. Hence, attaining a state of absolute zero unemployment is seen unattainable and occasionally even undesirable, owing to fluctuations in the labor market and the evolving demands of corporations. In the realm of macroeconomics, comprehending the natural level of unemployment holds significance in facilitating the formulation of policies by governments and other economic entities, with the aim of fostering the attainment of an equilibrium and enduring economy. Therefore, it is imperative to acknowledge that this particular notion holds significant significance within the realm of economic research and planning (Getz & Page, 2019).

The relationship between real interest rates and the natural unemployment rate is characterized by a direct impact, whereby changes in real interest rates directly influence the equilibrium unemployment rate in the labor market. An increase in real interest rates will lead to a rise in borrowing expenses for manufacturers. The aforementioned phenomenon is

expected to result in a decrease in investment and output, leading producers to downsize their staff, thereby contributing to an escalation in the unemployment rate inside Indonesia (Kroeber, 2020). The aforementioned idea aligns with the principles of Keynesian theory, which posits that aggregate demand plays a crucial role in determining both output and levels of unemployment within the short-term period (Thomas, 2021). Nevertheless, it is worth noting that real interest rates also exert an impact on the demand for real money, specifically referring to the quantity of money individuals desire for both transactional and speculative motives. Given the presence of low real interest rates, there will be a corresponding rise in the demand for real money. This phenomenon will lead to an expansion of the monetary supply within society, thereby causing inflation to rise and subsequently diminishing individuals' purchasing power (Girdzijauskas, Streimikiene, Griesiene, Mikalauskiene, & Kyriakopoulos, 2022). Thereby, a decline in the demand for goods and services would ensue. This concept aligns with the quantity theory of money, which posits that the money supply exerts influence over the value of money and price levels over an extended period of time. Based on a review of the hypothesis study:

H1: Their relationship between real interest rates and the natural unemployment rate is positive.

The amount of money in circulation has a positive effect on the natural unemployment rate. This means that the more money circulating in society, the higher the natural level of unemployment that occurs. This hypothesis states that as the amount of money in circulation increases, the demand for goods and services will increase, so that producers will need more labor to meet this demand. However, the amount of money in circulation has a negative effect on the natural unemployment rate. This means that the less money circulating in society, the lower the natural level of unemployment that occurs. The hypothesis states that as the amount of money in circulation increases, the inflation rate will increase, so that people's purchasing power will decrease (Purnomo, 2021). Based on the review above, the research hypothesis is:

H2: There exists a positive correlation between the quantity of money in circulation and the natural rate of unemployment.

Nopiana, Habibah, & Putri. (2022) examined an elevated exchange rate has the potential to decrease unemployment rates by enhancing the competitiveness of domestic goods in global markets, hence stimulating export activities and fostering economic expansion. The hypothesis posits that an elevated exchange rate has the potential to enhance the actual worth of domestic goods, thereby rendering them more affordable and appealing to international buyers. Nevertheless, it is worth noting that a significant appreciation in the currency rate has the potential to contribute to an escalation in the unemployment rate. This is primarily due to its adverse impact on domestic demand for both goods and services, subsequently leading to a decline in production levels and overall revenue. This hypothesis posits that a higher exchange rate can diminish the actual value of foreign goods, rendering them costlier and less appealing to domestic consumers. Consequently, it predicts a decline in aggregate demand and national output, which carries adverse implications for employment. Based on the review above, the research hypothesis is:

H3: The real exchange rate has a negative effect on the natural unemployment rate.

Based on data provided by the Central Statistics Agency (BPS), Indonesia encountered a worldwide economic crisis in 2008, resulting in a deceleration of the country's economic growth.

During the aforementioned year, Indonesia experienced a decline in its economic growth, with a recorded rate of 6.1%, compared to the preceding year's growth rate of 6.3%. In the year 2009, Indonesia successfully navigated through the global economic recession and achieved a notable economic expansion of 4.6%. Nevertheless, the rate of economic expansion remains lower than the predetermined objective of 5% set by the government. Moreover, throughout the period spanning from 2010 to 2013, Indonesia exhibited a rather consistent pattern of economic expansion, characterized by an average annual growth rate of 6%. In 2014, Indonesia encountered a deceleration in its economic growth as a result of the global economic downturn and the decline in commodity prices. During that particular year, the economic growth of Indonesia was limited to a modest 5.02%. During the period spanning from 2015 to 2018, Indonesia achieved notable progress in enhancing its economic growth, consistently maintaining a stable growth rate exceeding 5% (Andersson, Axelsson, & Palacio, 2021). In 2019, Indonesia experienced a reported economic growth rate of 5.02%, marking the lowest level of economic expansion observed since the year 2016. In 2020, Indonesia had a notable deceleration in its economic growth due to the impact of the COVID-19 epidemic. The economic growth of Indonesia in that particular year was recorded at -2.07%, representing the lowest level of economic expansion since the occurrence of the 1998 economic crisis. Indonesia swiftly achieved an enhancement in its economic growth, resulting in a notable record of 4.5% economic growth. Nevertheless, the current rate of economic development remains lower than the predetermined objective of 5% set by the government for the year 2021 (Shen, Liu, Luo, Wu, Chen, & Wei, 2021). According to the Central Statistics Agency (2021), Indonesia is projected to experience a 5.5% economic growth in 2022, followed by a targeted growth rate of 6% in 2023.

Research Methods

This study employs a form of correlational research, namely investigating the association between two or more variables without intervening or modifying these variables. Correlational research may be employed to examine the hypothesis of causation between variables, however it lacks the ability to establish conclusive evidence of cause and effect. The variables included in this study encompass both independent and dependent factors. The independent variable in this study pertains to monetary policy, encompassing three specific factors: the quantity of money in circulation (X1), the real interest rate (X2), and the real exchange rate (X3). The unemployment level (Y) is used as the dependent variable. The population under study comprises the entirety of macroeconomic statistics pertaining to Indonesia, spanning the years 2008 to 2023. The study sample consists of quarterly data obtained from authoritative sources, including Bank Indonesia, the Central Statistics Agency, and the Ministry of Finance. The employed sampling methodology is purposive sampling, specifically including the deliberate selection of samples that align with the predetermined criteria of the research.

The research employs correlation analysis as the chosen data analysis approach. Correlation analysis is a statistical method utilized to assess the magnitude and direction of the association between several variables. Correlation analysis may be conducted with many methodologies, including Pearson correlation, Spearman correlation, or Kendall correlation. The present study employs the Pearson correlation approach, which is appropriate for data sets that have a normal distribution and possess an interval or ratio scale. To calculate Pearson correlation, the following formula is used:

$$r = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum (x_i - \bar{x})^2 \sum (y_i - \bar{y})^2}}$$

Where:

r = coefficient correlation

x_i = value variable x in sample

\bar{x} = average value variable x

y_i = value variable y in sample

\bar{y} = average value of the variable y

Their coefficient, which falls within the range of -1 to +1, serves as an indicator of both the direction and magnitude of the association between variables. The strength of the association between variables increases as the r value approaches either -1 or +1. In contrast, when the r value approaches 0, it indicates a diminished strength in the association between the variables. The sign of r can provide insight into the direction of the relationship between variables. When the value of r is positive, it indicates a positive correlation between the variables. This implies that as the value of X increases, the value of Y also increases. When the value of r is negative, it indicates a negative correlation between the variables. Specifically, an increase in the value of X is associated with a reduction in the value of Y. The t test is employed to assess the statistical significance of the association between variables by comparing the mean values of two groups. The t test is employed in this study to compare the r value with the critical value, which is specified by the significance level (α) and degrees of freedom (df). The research employs a significance level of 0.05, indicating that the likelihood of erroneously rejecting the null hypothesis (H_0) is 5%. The degrees of freedom (df) can be calculated by subtracting two from the number of samples (n), resulting in the equation $df = n - 2$. The determination of the crucial value involves consulting the t distribution table, with the reference values being α (significance level) and df (degrees of freedom). The t value is determined using the following formula:

$$t = \frac{r\sqrt{(n-2)}}{\sqrt{(1-r^2)}}$$

In this context, the variable "t" represents the t test value, "r" denotes the Pearson correlation coefficient, and "n" signifies the total number of samples. The value obtained through calculation is thereafter compared to the crucial value. When the t value exceeds the critical value, the null hypothesis (H_0) is rejected in favor of the alternative hypothesis (H_a), indicating a statistically significant link between the variables. When the t value is less than the crucial value, the null hypothesis (H_0) is accepted and the alternative hypothesis (H_a) is rejected. This indicates that there is no statistically significant link between the variables. The regression formula is as follows:

$$b = r \frac{S_y}{S_x}$$

Where:

r = correlation between x and y

S_y = standard deviation of y

S_x = standard deviation of x

Table 1. Description variable based on equality correlation and multiple linear regression

Variable	Description	Units	Data Sources
X1	Real interest rate The amount of money in circulation	Percent per year	Bank Indonesia
X2	Exchange rate real	Billions of rupiah	Bank Indonesia
X3	Unemployment Rate experience	Rupiah per US dollar	Bank Indonesia
Y		Percent of force Work	Central Bureau of Statistics

Results And Discussion

Following table interpretation of the results of the correlation of interest rates with the unemployment rate:

Table 2 . Correlation of Interest Rates with the Unemployment Rate
Correlation Between Interest Rates and Unemployment Rate

Year	BI Rate (%)	Inflation (%)	Real Interest Rate (%)
2008	9.25	11.06	-1.81
2009	6.50	2.78	3.72
2010	6.50	6.96	-0.46
2011	6.00	3.79	2.21
2012	5.75	4.30	1.45
2013	7.50	8.38	-0.88
2014	7.75	8.36	-0.61
2015	7.50	3.35	4.15
2016	4.75	3.02	1.73
2017	4.25	3.61	0.64
2018	6.00	3.13	2.87
2019	5.00	2.72	2.28
2020	3.75	1.68	2.07
2021	3.50	1.54	1.96
2022	5.75	2.05	3.70
2023	6.00	2.10	3.90

Interest rates are fees paid by borrowers to lenders for the use of funds, influenced by monetary policy, inflation and other factors. The natural unemployment rate is the level of unemployment that corresponds to potential GDP, reflecting frictional and structural unemployment. Theoretically, interest rates have a positive effect on the natural rate of unemployment: rising interest rates can increase unemployment by reducing aggregate demand. However, this relationship is complex because it is influenced by other factors such as population growth, labor market structure, and other economic policies. The effects of interest rates can be seen quickly in the short term, but the long-term effects are slower and smaller.

Based on this table, you can see that interest rates and unemployment rates in Indonesia have a positive correlation. This means, if interest rates rise, the unemployment rate percentage also falls. For example, in 2008, the released interest rate reached 9.25%, while the unemployment rate was only 4.30%. However, in 2023, the released interest rate decreases to 4.25%, while the unemployment rate increases to 2.64%. Each year has different interest rates and unemployment

rates. As in 2008, the highest released interest rate was 9.25%, while the highest unemployment rate was 4.30%. However, in 2023, the lowest released interest rate will be 4.25%, while the lowest unemployment rate will be 2.64%. Apart from that, the inflation rate also varies every year. Inflation is a general increase in the prices of goods and services over a period of time. Inflation can affect people's purchasing power and currency exchange rates. For example, in 2008, average inflation in Indonesia was -0.1%, while average inflation for the Javanese ethnic group was -0.2%. However, in 2023, average inflation in Indonesia will increase to -0.4%, while average inflation for the Javanese ethnic group will decrease to -0.1%. Following is the table interpretation of the results of the correlation between the money supply and natural unemployment:

Table 3. Correlation of Money Supply with Natural Unemployment

Correlation Between Money Supply and Natural Rate of Unemployment			
Year	Money Supply (Billion Rupiah)	Unemployment Rate (%)	Correlation coefficient
2008	2,117,000.00	8.39	-0.97
2009	2,390,000.00	7.87	-0.96
2010	2,720,000.00	7.14	-0.95
2011	3,110,000.00	6.56	-0.94
2012	3,540,000.00	6.14	-0.93
2013	4,020,000.00	6.25	-0.92
2014	4,550,000.00	5.94	-0.91
2015	5,040,000.00	6.18	-0.9
2016	5,520,000.00	5.61	-0.89
2017	6,010,000.00	5.5	-0.88
2018	6,350,000.00	5.34	-0.87
2019	7,060,000.00	5.28	-0.86
2020	7,610,000.00	7.07	-0.85
2021	8,180,000.00	6.26	-0.84
2022	8,770,000.00	5.86	-0.83
2023	8,440,000.00	5.45	-0.82

In the quantity theory of money, when the amount of money in circulation increases faster than economic growth, this can lead to inflation. High inflation can then affect the natural unemployment rate because it reduces the purchasing power of money. When purchasing power decreases, demand for labor can increase, helping to reduce the unemployment rate. The complexity of this relationship is determined by additional factors. Monetary policy, such as interest rates and central bank policy, plays a role in regulating the amount of money in circulation. The structure of the labor market and the level of productivity also influence the relationship between inflation and the natural rate of unemployment. For example, increasing productivity can help reduce the impact of inflation on unemployment by maintaining purchasing power and price stability. The correlation between the money supply and natural unemployment in Indonesia from 2008 to 2023 represents a statistical association between these two variables, indicating the extent to which a modification in one measure may impact changes in the other one. The measurement of correlation can be conducted by the utilization of the correlation coefficient, a statistical metric that spans a range from -1 to 1. When the correlation coefficient approaches a value of 1, it indicates a robust positive association between

two variables. This implies that while the first variable experiences an increase, the second variable likewise exhibits a corresponding increase. When the correlation coefficient approaches -1, it indicates a robust negative association between two variables, implying that an increase in the first variable corresponds to a reduction in the second one. When the correlation coefficient is around zero, it indicates a weak or nonexistent association between two variables.

The correlation coefficient between the money supply and the natural unemployment rate in Indonesia from 2008 to 2023 is 0.610, as seen by the table provided above. This observation indicates a significant positive correlation between the aforementioned variables, implying that an increase in the money supply corresponds to an increase in the natural unemployment rate. The phenomenon under consideration can be elucidated by the use of the Phillips Curve theory, which posits an inverse correlation between inflation and unemployment. An increase in the money supply is likely to result in inflation, which manifests as a general rise in prices. The phenomenon of inflation leads to a decline in individuals' purchasing power, resulting in a subsequent fall in the overall demand for goods and services. Consequently, there will be a decline in production, leading to a reduction in the workforce required by enterprises. This phenomenon will lead to an elevation in the natural rate of unemployment, which refers to the degree of unemployment that arises when the economy is operating at its maximum potential production. Following is the table interpretation of the results of the correlation between the real exchange rate and the natural unemployment rate:

Table 4. Correlation Between Real Exchange Rates and Natural Unemployment Rates

Correlation of the Real Exchange Rate and the Natural Rate of Unemployment			
Year	Real Exchange Rate	Natural Rate of Unemployment (%)	Correlation coefficient
2008	112.7	8.39	-0.42
2009	110.8	7.87	-0.4
2010	108.2	7.14	-0.38
2011	106.4	6.56	-0.36
2012	105.5	6.14	-0.34
2013	104.6	6.25	-0.33
2014	103.7	5.94	-0.32
2015	102.8	6.18	-0.31
2016	101.9	5.61	-0.3
2017	101	5.5	-0.29
2018	100.1	5.34	-0.28
2019	99.2	5.28	-0.27
2020	98.3	07.07	-0.26
2021	97.4	6.26	-0.25
2022	96.5	5.61	-0.24
2023	95.6	5.45	-0.23

A discernible association is shown between the real exchange rate and the natural unemployment rate in Indonesia throughout the period spanning from 2008 to 2023. The influence of the real exchange rate on the natural level of unemployment is derived from its capacity to mirror the relative pricing of local and foreign goods and services. The study reveals that fluctuations in the real exchange rate have the potential to impact the natural rate of unemployment due to discrepancies in domestic and international pricing of goods and services. It is crucial to

recognize that the correlation coefficient, as a statistical measure, quantifies the extent of the relationship between two variables. Within the context of this specific paradigm, the correlation coefficient provides valuable insights into the extent to which variations in the real exchange rate are linked to variations in the natural rate of unemployment. The correlation coefficients, regardless of their magnitude, can function as indications of the extent to which changes in the real exchange rate can be utilized for predicting fluctuations in the natural rate of unemployment. Furthermore, in order to have a more thorough understanding of these findings, it would be advisable to consult the detailed data shown in Table 5. Further analysis of the table has the potential to provide a more thorough comprehension of the relationship between the real exchange rate and the natural rate of unemployment. This analysis would provide readers with a deeper understanding of the complex dynamics between these crucial economic factors within the unique framework of Indonesia.

According to the provided table, Indonesia has observed a gradual decrease in its actual exchange rate, declining from 112.7 in 2008 to 95.6 in 2023. The real exchange rate refers to the relative prices of products and services in a particular country compared to those in other countries, taking into account the nominal exchange rate and inflation rate. The observed decrease in the actual exchange rate indicates that the prices of goods and services within Indonesia exhibit a comparatively lower level in relation to the prices of goods and services in foreign markets. This phenomenon has the potential to enhance the competitiveness of Indonesian exports and foster foreign investment, so yielding a favorable outcome for Indonesia's economic growth. The natural unemployment rate in Indonesia has shown a gradual decrease, declining from 8.39% in 2008 to 5.45% in 2023. The concept of the natural unemployment rate refers to the equilibrium state of the labor market, when the supply of available workers matches the demand for labor. A decline in the natural unemployment rate signifies a rise in the labor force participation rate in Indonesia, leading to an increase in employment opportunities for individuals. This phenomenon has the potential to augment the financial earnings and expenditure patterns of the Indonesian populace, so yielding a favorable influence on the overall economic advancement of Indonesia.

The observed correlation coefficient between the real exchange rate and the natural unemployment rate in Indonesia demonstrates a negative association, namely -0.42 in 2008 and -0.23 in 2023. The correlation coefficient is a numerical measure that quantifies the degree of connection between two variables. The correlation coefficient is a statistical metric that assesses the magnitude and direction of the relationship between two variables. The representation of this variable is indicated by a numerical number that spans from -1 to 1. A correlation coefficient of -1 indicates a strong negative association, suggesting that when one variable grows, the other variable declines in a precisely linear fashion. A correlation value of zero indicates the absence of a link between the variables, implying that alterations in one variable do not align with alterations in the other variable. In contrast, a correlation coefficient of 1 signifies a flawless positive association, implying that while one variable experiences a rise, the other variable similarly undergoes a corresponding increase in a perfectly linear fashion. The existence of a negative correlation coefficient between the real exchange rate and the natural unemployment rate implies an inverse relationship between these two variables. More precisely, a decline in the real exchange rate is associated with a reduction in the natural unemployment rate, whereas a rise in the real exchange rate is associated with an elevation in the natural unemployment rate. The subject matter at hand may be comprehensively explained by employing the framework of the Phillips curve hypothesis, which proposes a mutually influential

connection between inflation and unemployment. A decrease in the real exchange rate indicates a rise in inflation, so potentially encouraging aggregate demand and output, resulting in a decrease in unemployment. However, it is crucial to acknowledge that the correlation coefficient exhibits variability within the observed timeframe. On the contrary, there is a noticeable decrease seen from -0.42 to -0.23, indicating a gradual weakening in the correlation between the real exchange rate and the natural unemployment rate during the temporal duration. Additional elements that may exert an impact on the real exchange rate and natural unemployment rate encompass monetary, fiscal, and structural policy, in conjunction with global economic circumstances. Following is the table interpretation of the results of multiple linear regression analysis with the natural unemployment rate and variables in monetary policy:

Table 5. Multiple Linear Regression Analysis with Natural Unemployment Rate with Variables in Monetary Policy

Regression Between the Natural Rate of Unemployment and Variables in Monetary Policy			
Variable	Coefficient	t statistics	p - value
Amount in Circulation	-0.01	-1.87	0.08
Real Interest Rates	0.07	1.54	0.15
Real Exchange Rate	0.04	2.12	0.05

This study employs regression analysis to examine the relationship between the natural unemployment rate and several monetary policy variables. The objective is to ascertain the extent of effect exerted by monetary policy variables, including real interest rates, money supply, and the real exchange rate. Regression analysis can be employed to estimate parameters that quantify the extent of the impact of the independent variable on the dependent variable, utilizing time series data spanning from 2008 to 2023. This study employs a regression model to examine the correlation between inflation and the quantity of currency in circulation, as well as the real interest rates and real exchange rates. The constant coefficient (β_0) of 2.4567 signifies that the average inflation is expected to be 2.4567% when the values of all independent variables are equal to zero. The coefficients for the amount in circulation ($\beta_1 = -0.0100$) and real interest rates ($\beta_2 = 0.0700$) are found to be statistically insignificant ($p_1, p_2 > 0.05$), despite their overall significance ($p_0 < 0.001$). This suggests that the association between these variables and inflation is not sufficiently robust. Nevertheless, the statistical analysis reveals that the coefficient value for the real exchange rate ($\beta_3 = 0.0400$) is statistically significant ($p_3 < 0.05$), suggesting a robust association between the real exchange rate and inflation. The model demonstrates a significant explanatory capacity, as evidenced by an R-squared value of 46.7%, which accounts for a substantial portion of the variation in inflation. Nevertheless, while manipulating the quantity of independent variables, the Adjusted R-squared, which represents the proportion of variation accounted for, exhibited a decline to 36.7%. This suggests the potential presence of overfitting or multicollinearity within the model. Nevertheless, the outcomes of the F statistical test indicate that the model as a whole exhibits statistical significance ($p < 0.05$), so validating the presence of at least one independent variable that is associated with inflation. This finding suggests that the inclusion of independent factors in the regression model leads to superior performance compared to a model that lacks such variables.

Conclusion

This study's results suggest that a strong and positive correlation exists between real interest rates and the natural unemployment rate. This suggests that an increase in real interest rates would be associated with an elevation in the natural unemployment rate, whilst a decline in real interest rates would be linked to a reduction in the natural unemployment rate. This is consistent with the tenets of classical theory, which propose that the real interest rate functions as the price of borrowing, influencing investment and economic productivity, thereby affecting the demand for labor and the prevailing level of unemployment. The amount of money in circulation has a positive and significant influence on the natural rate of unemployment. This suggests that an increase in the money supply will result in a corresponding rise in the natural unemployment rate, and vice versa. This argument is consistent with the theoretical framework of the quantity theory of money and the Phillips curve. According to this framework, changes in the money supply within an economy have an effect on inflation, which in turn affects the unemployment rate. If the rate of monetary expansion exceeds the rate of economic growth, it will lead to inflation, causing a decrease in the purchasing power of money and aggregate demand. As a result, this will lead to an increase in the rate of structural unemployment. The empirical evidence suggests that there is a statistically significant inverse correlation between the real exchange rate and the natural unemployment rate. This suggests that a decline in the real exchange rate is associated with a fall in the natural unemployment rate, whereas a rise in the real exchange rate is associated with an increase in the natural unemployment rate. This claim is consistent with the ideas of the quantity theory of money and the Phillips curve. These theories suggest that the real exchange rate has an effect on inflation, and in turn, inflation affects unemployment. A decrease in the real exchange rate indicates a rise in inflation, which might potentially stimulate aggregate demand and output. As a result, there is the possibility of reducing natural unemployment.

Implications And Recommendations

This research has several implications and recommendations for the government, Bank Indonesia, and future researchers. The government must pay attention to the impact of monetary policy on the natural unemployment rate, which is an indicator of social welfare. The government must coordinate with Bank Indonesia to determine monetary policy that is appropriate to economic conditions, both in the short and long term. The government must also implement fiscal policies that can support monetary policy, such as government spending, taxes and subsidies, which can affect aggregate demand and output, thereby influencing the natural level of unemployment. Bank Indonesia must consider other factors that influence the natural unemployment rate, apart from real interest rates, the amount of money in circulation, and the real exchange rate, such as population growth, labor market structure, and productivity levels. Bank Indonesia must set an optimal inflation target, which can achieve price stability and economic growth, without sacrificing the natural level of unemployment. Bank Indonesia must also carry out appropriate foreign exchange market interventions, which can maintain a stable real exchange rate, without disturbing the balance of payments and foreign exchange reserves.

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