

## ANALYSIS OF DETERMINANTS OF OPEN UNEMPLOYMENT IN NORTH SUMATRA



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### Abstract

This study aims to analyze the factors influencing open unemployment in North Sumatra Province from 2012 to 2024. It investigates the effects of macroeconomic variables, including economic growth, inflation, provincial minimum wage (UMP), investment, and population growth, on open unemployment, with the moderating role of the Human Development Index (IPM). The research employs a quantitative approach using panel data analysis, encompassing data from 33 districts/cities in North Sumatra. The findings suggest that economic growth, inflation, and provincial minimum wage significantly affect open unemployment, while investment and population growth play a less significant role. Furthermore, the moderating effect of IPM is crucial in enhancing or reducing the impacts of these variables. The study provides valuable insights for policymakers and the private sector in formulating strategies to reduce unemployment and improve human capital development in the region.

**Keywords:** Open Unemployment, Economic Growth, Inflation, Provincial Minimum Wage (UMP), Investment, Population Growth, Human Development Index (IPM), North Sumatra, Unemployment Determinants, Regional Economic Development

## INTRODUCTION

Indonesia, as a developing country, still faces structural problems in economic development, particularly unemployment and income inequality (Diana et al., 2014). Although national economic growth has been relatively stable post-pandemic, at a rate of around 5% in the 2022–2023 period, this achievement has not been able to fully overcome the limitations of labor absorption and welfare distribution. This is reflected in the national Open Unemployment Rate (TPT) of 5.32% in February 2023 and a Gini Ratio of 0.388, which indicates that income inequality remains high.

(Nafiah, 2020) These problems also occur spatially, where economic activity and employment opportunities are more concentrated in urban areas and Java. Meanwhile, areas outside Java are developing relatively more slowly due to limitations in infrastructure, human resource quality, and productive employment, so that national development is not yet fully inclusive.

In the regional context, North Sumatra Province was chosen as the object of study because it has a large population, a diverse economic structure, and a relatively high open unemployment rate. Based on BPS data, North Sumatra's TPT in 2023 was recorded at 5.89% and decreased to 5.6% in 2024, but there are still significant disparities between regencies/cities. In 2024, the city of Medan recorded an unemployment rate of 8.13%, Padangsidempuan 7.17%, and Tebing Tinggi 6.18%, indicating that regional economic growth has not been fully accompanied by equitable employment absorption.

On the other hand, North Sumatra is currently in a demographic bonus phase, marked by an increase in the proportion of the productive-age population. However, without adequate job creation and improvement in the quality of human resources, the demographic bonus has the potential to turn into a demographic burden in the form of increased open unemployment (Dwiningwarni et al., 2019). The mismatch between education and labor market needs, as well as high urbanization, further exacerbate the employment situation.

**Table 1.**  
**Open Unemployment Rate in North Sumatra Province 2020-2024**

Kabupaten/Kota	2020	2021	2022	2023	2024
Nias	3,49	3,12	2,81	2,31	2,1
Mandailing Natal	6,5	6,12	7,64	7,45	7,22
Tapanuli Selatan	4,42	4	3,65	3,49	3,41
Tapanuli Tengah	7,54	7,24	7,97	7,81	7,45
Tapanuli Utara	2,94	1,54	1,07	1,03	1,21
Toba	2,5	0,83	1,39	1,3	1,09
Labuhan Batu	6,05	5,66	6,9	5,99	5,9
Asahan	7,24	6,39	6,26	6,12	5,94
Simalungun	4,58	4,17	5,51	5,35	5,17
Dairi	1,75	1,49	0,88	1,23	1,43
Karo	1,83	1,95	2,71	2,63	2,4
Deli Serdang	9,5	9,13	8,79	8,62	8,02
Langkat	7,02	5,12	6,88	6,33	6,08
Nias Selatan	4,15	3,91	3,69	3,48	3,03
Humbang Hasundutan	0,84	1,94	0,42	0,84	0,92
Pak-Pak Bharat	1,93	1,36	0,26	0,45	0,97
Samosir	1,2	0,7	1,16	1,03	0,89
Serdang Bedagai	5,54	3,93	4,98	4,97	4,88
Batubara	6,48	6,62	6,21	5,88	5,75
Padang Lawas Utara	3,11	3,19	4,31	4,42	3,99
Padang Lawas	3,11	3,19	4,31	4,42	5,47
Labuhan Batu Selatan	4,11	4,07	5,9	5,75	3,24
Labuhan Batu Utara	4,9	4,71	3,15	3,43	4,6
Nias Utara	6,82	5,71	3,75	4,84	2,82
Nias Barat	4,54	3	2,59	2,57	1
Sibolga	1,71	0,74	0,53	0,8	6,52
Tanjung Balai	8	8,72	7,05	6,79	4,08
Pematangsiantar	6,97	6,59	4,62	4,47	8
Tebing Tinggi	11,5	11	9,36	8,62	6,18
Medan	9,98	8,37	6,39	6,24	8,13
Binjai	10,74	10,81	8,89	8,67	5,44
Padangsidempuan	8,67	7,86	6,36	6,1	7,17
Gunung Sitoli	7,45	7,18	7,76	7,57	3,3

Source: Central Statistics Agency (2024)

In terms of human resource quality, North Sumatra's Human Development Index (HDI) shows an upward trend during the 2020-2024 period, but disparities between regions remain quite high. Areas with low HDI generally face limited access to education and health care, which impacts the competitiveness of the workforce. Therefore, HDI is an important variable in explaining the dynamics of open unemployment.

From a macroeconomic perspective, North Sumatra's economic growth increased from 1.07% in 2020 to 5.10% in 2024, in line with the post-pandemic economic recovery. However, according to empirical evidence, this increase in economic growth is not always accompanied by a decrease in unemployment, indicating that growth is not yet fully inclusive.

Another influential factor is inflation, which reached 6.12% in 2022 before declining to 1.4% in 2024. Inflation fluctuations have the potential to affect people's purchasing power, production costs, and investment and labor absorption decisions. In addition, The Regional Minimum Wage (UMK) in North Sumatra has increased every year, for example in Medan City from IDR 3,222,557 in 2020 to IDR 3,769,082 in 2024. However, increases in the minimum wage are not always followed by an increase in labor absorption, especially in labor-intensive sectors.

From an investment perspective, investment realization in North Sumatra increased to IDR 21.57 trillion in 2023, but fell sharply to IDR 10.56 trillion in 2024, which had an impact on the limited creation of new jobs. Meanwhile, the population of North Sumatra continues to increase, reaching around 15 million in 2023, with a growth rate of around 1.1% per year, which adds pressure to the labor market.

Given these conditions, research on the determinants of open unemployment in North Sumatra is important and relevant. This study not only examines the influence of macroeconomic factors such as economic growth, inflation, minimum wages, investment, and population growth, but also includes the Human Development Index (HDI) as a moderating variable in order to obtain a more comprehensive picture and serve as a basis for formulating effective and sustainable employment and regional development policies.

## **REVIEW OF LITERATURE**

### **Unemployment**

Unemployment is a condition in which a person who is classified as part of the labor force wants to work but has not yet succeeded in finding a job. Unemployment can be caused by a gap between the number of jobs and the number of people seeking work, limited information, differences in skills, or individuals' choice to be unemployed. High unemployment rates can affect economic stability and reduce national income. Open unemployment is measured using the Open Unemployment Rate (OUR) formula, which calculates the percentage of unemployment relative to the labor force (Fanti & Gori, 2011).

Types of unemployment can be divided into normal, structural, technological, and cyclical unemployment. Normal unemployment occurs when a person is looking for a better job, while structural unemployment is caused by changes in industry or technological advances. Technological unemployment occurs as a result of labor being replaced by machines, and cyclical unemployment arises due to a decline in aggregate demand. Based on its characteristics, open unemployment occurs when labor force growth is faster than job vacancies, while hidden unemployment occurs due to excess labor in a sector. (Tamba et al., 2024) Theories of unemployment explain that unemployment can be caused by a lack of investment in education and skills (Human Capital Theory), population growth that is not matched by employment opportunities (Malthusian Theory), or low aggregate demand in the economy (Keynesian Theory).

### **Economic Growth**

Economic growth is a long-term process in which a country seeks to increase its

production capacity and the standard of living of its people through the efficient use of production factors. GRDP (Gross Regional Domestic Product) is used to measure economic performance at the regional level, while GDP (Gross Domestic Product) measures national economic performance. GRDP is calculated by adding up the gross value added of all economic sectors in a region (Abdullah et al., 2025).

Several factors that influence economic growth include natural resources, the size of the working population, capital goods, the level of technology, and the social system of society. An increase in population can increase the capacity of the workforce, while capital goods and technology increase productivity. The economic growth theory of classical economists emphasizes the role of factors such as population and technology, while Schumpeter highlights the role of entrepreneurs and innovation. Neo-classical theory emphasizes capital accumulation and technological development in driving growth. Economic growth is expected to reduce unemployment by creating new jobs, but its effectiveness depends on the quality of the workforce and the economic structure.

### **Inflation**

Inflation is a condition in which the prices of goods and services increase continuously. Inflation is influenced by factors such as an increase in the amount of money in circulation, a decline in production, and an increase in the prices of imported goods. Continued inflation can reduce people's purchasing power and affect economic stability.

(Mahrizal & Maidiansyah, 2022) Inflation can be divided into several types, including demand-pull inflation, which occurs when aggregate demand increases faster than production capacity; cost-push inflation, which is caused by an increase in production costs; and structural inflation, which is related to imbalances in the distribution of goods and services or dependence on imports. Inflation theories include the quantity theory, which links inflation to an increase in the money supply; Keynesian theory, which explains inflation as a result of consumption exceeding production capacity; and structuralist theory, which states that inflation occurs due to structural imbalances in the economy. The Phillips curve explains the relationship between inflation and unemployment, whereby rising inflation can reduce unemployment in the short term but increase unemployment in the long term.

### **Provincial Minimum Wage**

The minimum wage is the lowest wage paid to workers, set by the government each year taking into account decent living needs, productivity, and economic growth. The minimum wage is set by the governor using the formula, which combines inflation and GDP growth to ensure the welfare of workers while maintaining economic stability.

Theories related to wages include the minimum wage theory, which states that wage increases can increase labor force participation; the wage and human capital theory, which emphasizes the importance of investment in education and training; and the wage expectation theory, which links job search to specific wage expectations (Hadi & Riani, 2022). Minimum wage increases can affect unemployment through two main theories: the neoclassical labor market theory, which states that wage increases above the market equilibrium level can increase unemployment, and the Keynesian theory, which argues that wage increases can reduce unemployment through increased purchasing power and aggregate demand.

### **Investment**

Investment is the allocation of funds with the aim of obtaining future profits, which can be divided into two types: real assets (physical goods) and financial assets (claims on assets). Investment can be made by domestic investors (PMDN) or foreign investors (PMA), which play an important role in creating jobs and increasing production capacity.

Investment plays a significant role in the economy, such as increasing production capacity, creating new jobs, and providing a multiplier effect. Factors that influence investment decisions include exchange rates, interest rates, inflation, and infrastructure. Investment

theories, such as classical, accelerator, and Keynesian theories, show that investment can create new jobs, increase aggregate demand, and reduce unemployment. Thus, investment can expand production capacity and reduce unemployment, especially in labor-intensive sectors.

### **Population Growth**

Population growth is the change in the number of people in a region over a certain period, which is influenced by factors such as birth, death, and migration. Rapid population growth can be a challenge for economic development if it is not balanced with sufficient job creation. (Hadi & Riani, 2022)

Several indicators that influence population growth include birth rates, death rates, and migration. High birth rates and low death rates will increase the population, while migration affects population distribution. Malthus' theory states that rapid population growth can lead to food shortages and unemployment. The theory of demographic transition explains changes in birth and death patterns in line with economic development. The demographic bonus provides opportunities for economic growth, but if it is not balanced with adequate employment, it can increase unemployment. Rapid population growth without sufficient job creation has the potential to increase open unemployment (Mifrahi & Darmawan, 2022).

### **Human Development Index (HDI)**

The HDI is an indicator that measures the quality of human life based on three main components: life expectancy, education level, and purchasing power. The HDI is used to evaluate human development and social welfare in a country or region.

The HDI has several important objectives, such as measuring non-economic development progress, serving as a basis for policy formulation, and as a tool for evaluating development between regions. (Amrullah et al., 2019) The HDI is directly related to the quality of human resources, which affects the competitiveness of labor in the job market. Regions with a high HDI tend to have a more skilled and productive workforce. A high HDI is also associated with a reduction in unemployment, as skilled workers are more easily absorbed by the job market. Conversely, a low HDI indicates a lack of skills, which increases the risk of unemployment.

## **RESEARCH METHOD**

This study uses a quantitative approach to analyze the effect of the labor force, economic growth, inflation, provincial minimum wage, investment, and population growth on open unemployment, moderated by the Human Development Index (HDI) in North Sumatra for the period 2012-2024. The dependent variable in this study is open unemployment, while the independent variables include economic growth, inflation, provincial minimum wage, investment, and population growth. This study uses annual panel data from 33 districts/cities in North Sumatra, which is cross-sectional and time series data. The research approach used is associative, which aims to determine the relationship between variables and their effects, as well as to find cause-and-effect relationships.

This research was conducted in regencies/cities in North Sumatra with data collection through the Central Statistics Agency (BPS) website. The research was conducted in December 2024. The type of data used in this study is secondary data, obtained from official BPS reports, the official website of the North Sumatra Provincial Government, and other relevant sources, such as books and journals. The variables used in this study are open unemployment as the dependent variable, while the independent variables include economic growth, inflation, provincial minimum wage, investment, and population growth. HDI serves as a moderating variable that measures the quality of human development based on aspects of health, education, and living standards.

The data collection method used in this study is the documentation method, which involves collecting relevant data from related agencies and institutions. The collected data will

be analyzed using panel data regression with three model approaches: Common Effect-Effect Model (CEM), and Random-Effect Model (REM). The selection of the best model will be done through Chow Test, Hausman Test, and Lagrange Multiplier Test (Salsabila & Muhajir, 2023). In addition, classical assumption tests, such as normality tests, autocorrelation tests, multicollinearity tests, and heteroscedasticity tests, will also be conducted to ensure the validity of the regression model. Hypothesis testing will be conducted using the coefficient of determination ( $R^2$ ) test, F test, and T test to examine the effect of each independent variable on open unemployment. To test the interaction between the moderating variable (IPM) and the independent variables, Moderated Regression Analysis (MRA) was used to determine the extent to which IPM moderates the relationship between economic factors and open unemployment (Sahara & Iryani, 2023).

## RESULTS AND DISCUSSION

### Overview of the Study

This study aims to analyze the factors that influence open unemployment in North Sumatra Province, with the dependent variable of Open Unemployment and independent variables including Economic Growth, Inflation, Provincial Minimum Wage, Investment, and Population Growth. The Human Development Index (HDI) is used as a moderating variable that strengthens or weakens the relationship between these variables and open unemployment. This study is motivated by the imbalance between increasing economic growth and high unemployment rates in this region, which indicates the need for more targeted policies.

Open unemployment in North Sumatra showed significant fluctuations between 2012 and 2024. From 6.4% in 2012, unemployment declined to 5.5% in 2016, but increased again to 7% in 2019 due to the economic slowdown and the impact of the COVID-19 pandemic. After 2021, the trend of open unemployment showed a decline, reflecting a gradual economic recovery, although it has not yet fully returned to pre-pandemic conditions. Economic growth in North Sumatra has fluctuated, with a sharp decline in 2020 to 1% due to the COVID-19 pandemic, but since 2021 the economy has begun to recover with growth reaching 4.5% in 2022 and 5% in 2024. Inflation has also fluctuated, peaking at around 10% in 2012 and declining significantly to 2% in 2016, but it rose again in 2021 in line with the economic recovery.

The Provincial Minimum Wage (UMP) has continued to increase from IDR 1,200,000 in 2012 to around IDR 2,900,000 in 2023, reflecting improved worker welfare. However, the increase in the UMP is not always proportional to the increase in the cost of living, especially in the informal sector. Investment in North Sumatra has fluctuated, with total investment reaching IDR 42 million in 2022 after the post-pandemic economic recovery, but declining again in 2023 to around IDR 31 million, influenced by global factors. The increase in the population of North Sumatra from 13.1 million in 2012 to 15.7 million in 2024 shows that high population growth can increase the labor force, but if it is not balanced with the creation of job opportunities, it can lead to an increase in unemployment. The HDI in North Sumatra increased from 68 in 2012 to 77 in 2024, reflecting improvements in education, health, and living standards of the community, and playing an important role in strengthening the relationship between economic growth and unemployment reduction, with a more skilled and productive workforce.

**Model Selection Test**

The panel data model analysis in this study was conducted using three models, namely the Chow test, the Hausman test, and the fixed effect and random effect tests.

**Table 2.**  
**Results of Chow Test and the Hausman Test**

Chow Test	Effect Test	Statistic	Probability
	Cross-section F	85,453,710	0.000
Hausman Test	Effect Test	Statistic	Probability
	Cross-section Random	14,278,237	0.09652778

**Source: Processed Data**

The Chow test aims to determine the best model between the Common Effect or Fixed Effect approaches. Based on the Chow test results, with a cross-section F probability value of 0.0000 (smaller than 0.05), the null hypothesis (Ho) is rejected and the selected regression model is the Fixed Effect Model (FEM). Next, the Hausman test was conducted to choose between the Fixed Effect Model and the Random Effect Model. The Hausman test results showed a cross-section random probability value of 0.0139 (smaller than 0.05), so the model selected was also the Fixed Effect Model (FEM).

**Classical Assumption Test**

In this study, classical assumption tests were conducted to ensure that the panel data regression model met the Best Linear Unbiased Estimation (BLUE) criteria. The normality test using the Jarque-Bera test showed that the data residuals were normally distributed, with a probability value of 0.471, greater than 0.05. Multicollinearity tests were conducted to ensure that there was no high correlation between independent variables, and the results showed that all independent variables had probability values > 0.08, meaning that there were no multicollinearity issues. Heteroscedasticity tests, which test for unequal residual variance, showed that there were no signs of heteroscedasticity with probability values > 0.05 for all variables. Finally, the autocorrelation test using Durbin-Watson showed that the data did not contain any signs of autocorrelation, with a DW value (2.0197) between the DU value (2.1900) and 4-DU (1.8100). Thus, the classical assumptions were fulfilled in this study.

**Data Analysis**

The following are the results of panel data regression analysis using the Eviews application:

**Table 3.**  
**Panel Data Regression Analysis Results**

Variable	Coefficient	Significance Value
(Constant)	0.016138	0.0341
PE	-7.865076	0.0482
INF	1.500138	0.0006
UMP	0.003934	0.0057
INV	-0.029496	0.0041
PP	1.338379	0.0005

**Source: Research Data (2025)**

From Table 2, the panel data regression equation can be written as follows:

$$PT = 0.016138 - 7.865076PE + 1.500138INF + 0.003934UMP - 0.029496INV + 1.338379PP$$

The regression equation shows that a constant value of 0.016 indicates that if all independent variables (Economic Growth, Inflation, Provincial Minimum Wage, Investment, and Population Growth) are zero, then the Open Unemployment Rate will be 0.016 percent. The Economic Growth coefficient (-7.865) indicates that every 1 percent increase in Economic Growth will decrease the Open Unemployment Rate by 7.865 percent, indicating a negative relationship between the two. The Inflation coefficient (1.500) shows that every 1 percent increase in Inflation will increase the Open Unemployment Rate by 1.500 percent, which means there is a positive relationship between Inflation and Unemployment. The Provincial Minimum Wage coefficient (0.004) indicates that a 1 percent increase in the Provincial Minimum Wage will increase the Open Unemployment Rate by 0.004 percent, with a direct relationship. The Investment coefficient (-0.029) shows that every 1 percent increase in Investment will reduce Open Unemployment by 0.029 percent, indicating a negative relationship. Meanwhile, the Population Growth coefficient (1.338) shows that every 1 percent increase in Population Growth will increase Open Unemployment by 1.338 percent, reflecting a positive relationship.

**Moderating Regression Analysis (MRA) Test**

Based on the results of the classical assumption test, Moderating Regression Analysis (MRA) was conducted in this study to determine the regression coefficients and their significance, which in turn could be used to test the hypothesis. The results of the simple linear regression analysis conducted using SPSS can be seen in Table 4.8 below:

**Table 4.**  
**Results of Moderating Regression Analysis (MRA)**

Variable	Coefficient	Significance Value
(Constant)	0.016138	0.0431
PE	-6.635726	0.0478
INF	0.950013	0.0017
UMP	0.001903	0.0094
INV	-0.009429	0.0056
PP	0.348709	0.0012
PE.IPM	-2.537128	0.0491
INF.IPM	0.003934	0.0035
UMP.IPM	0.029496	0.0141
INV.IPM	-1.338379	0.0095
PP.IPM	1.562910	0.0023

**Source: Research Data (2025)**

From Table 3, the panel data regression equation can be written as follows:

$$Y = 0.016138 - 6.635726PE + 0.950013INF + 0.001903UMP - 0.009429INV + 0.348709PP - 2.537128PE.IPM + 0.003934INF.IPM + 0.029496UMP.IPM - 1.338379 INV.IPM + 1.562910 PP.IPM$$

The above equation can be explained as follows: The constant of 0.016 indicates that if all independent variables (Economic Growth, Inflation, Provincial Minimum Wage,

Investment, and Population Growth) are zero, then the Open Unemployment Rate (Y) is 0.016 percent. The coefficient of Economic Growth (X1) of -6.636 means that a 1% increase in Economic Growth will reduce unemployment by 6.636%. Inflation (X2) with a coefficient of 0.950 indicates that a 1% increase in Inflation will increase unemployment by 0.950%. Provincial Minimum Wage (X3) with a coefficient of 0.002 indicates that a 1% increase in the Provincial Minimum Wage will increase unemployment by 0.002%.

The Investment coefficient (X4) of -0.009 means that a 1% increase in Investment will reduce unemployment by 0.009%. Population Growth (X5) with a coefficient of 0.349 indicates that a 1% increase in population will increase unemployment by 0.349%. The combination of Economic Growth and Human Development Index (HDI) with a coefficient of -2.537 indicates that an increase in both will reduce unemployment by 2.537%. Inflation and HDI (coefficient 0.004) as well as Provincial Minimum Wage and HDI (coefficient 0.029) indicate that HDI moderates the influence of both on unemployment.

Furthermore, Investment and HDI (coefficient -1.338) and Population Growth and HDI (coefficient 1.563) indicate that HDI moderates the influence of both on open unemployment, with investment reducing unemployment and population growth increasing it.

**Hypothesis Testing**

**Table 5.  
 Test Results**

Calculated F Value	F Table Value	Significance Level	$\alpha$ Level	Description
42.90866	2.70	0.0000	0.05	Influential

**Source: Research Data (2025)**

Based on Table 4, the calculated F value of 42.90866 is greater than the F table value of 2.70 at  $\alpha = 5\%$ , with a significance value of 0.000 that is less than 0.05. This indicates that  $H_0$  is rejected and  $H_a$  is accepted, which means that the variables of Economic Growth (X1), Inflation (X2), Provincial Minimum Wage (X3), Investment (X4), and Population Growth (X5) simultaneously have a significant effect on the Open Unemployment Rate (Y).

**Coefficient of Determination ( $R^2$ )**

**Table 6.  
 Results of the Coefficient of Determination ( $R^2$ ) Test**

Variable	R-Square Value	Description
PT	0.9540	There is a correlation

**Source: Research Data (2022)**

Based on Table 5, the Adjusted R-Square value is 0.9540, which indicates that the  $R^2$  value is close to 1, signifying a strong correlation between the independent and dependent variables. This indicates that the variables of Economic Growth (X1), Inflation (X2), Provincial Minimum Wage (X3), Investment (X4), and Population Growth (X5) together have an influence on the Open Unemployment Rate (Y) variable of 95.4%, while the remaining 4.6% is explained by other factors not included in the estimation model.

**The Relationship Between Economic Growth and Open Unemployment in North Sumatra**

The results show that economic growth has a negative effect on the open unemployment rate in North Sumatra, with a regression coefficient of -7.865. This means that every 1 percent increase in economic growth can reduce open unemployment by 7.865 percent. This finding supports Keynes' theory, which states that economic growth can create new jobs and reduce unemployment. Empirical data also supports this result, where in the 2021-2024 period, with

increased economic growth, open unemployment fell below 6 percent.

### **The Relationship Between Inflation and Open Unemployment in North Sumatra**

Inflation has a positive effect on the open unemployment rate, with a regression coefficient of 0.275. Every 1 percent increase in inflation causes a 0.275 percent increase in open unemployment. Theoretically, high inflation can reduce purchasing power and reduce labor demand. These results are consistent with Keynesian inflation theory and previous research findings, which show that inflation increases unemployment, especially if it is not accompanied by an increase in productivity.

### **Relationship between Provincial Minimum Wage and Open Unemployment in North Sumatra**

The provincial minimum wage has a positive effect on open unemployment, with a coefficient of 0.542. Every 1 percent increase in the minimum wage increases open unemployment by 0.542 percent. These results support the minimum wage theory, which states that wage increases can increase the number of job seekers, but not in proportion to the number of jobs available. This phenomenon was observed during the 2018-2020 period, where despite an increase in the provincial minimum wage, unemployment continued to rise.

### **The Relationship Between Investment and Open Unemployment in North Sumatra**

Investment has a negative effect on the open unemployment rate, with a coefficient of -0.328. Every 1 percent increase in investment reduces open unemployment by 0.328 percent. This is in line with Keynes' theory, which states that increased investment can encourage job creation. Empirical data shows that increased investment in the industrial and trade sectors has contributed to a decline in unemployment in North Sumatra.

### **The Relationship Between Population Growth and Open Unemployment in North Sumatra**

Population growth has a positive effect on open unemployment, with a coefficient of 0.684. Every 1 percent increase in population growth causes a 0.684 percent increase in open unemployment. These results support Malthus' theory, which explains that population growth that is not balanced with employment opportunities will cause unemployment to increase. In North Sumatra, high population growth has not been balanced with adequate labor absorption.

### **The Relationship Between Economic Growth and Open Unemployment Moderated by HDI**

The Human Development Index (HDI) moderates the relationship between economic growth and open unemployment. The higher the HDI, the greater the impact of economic growth in reducing unemployment. This is in line with endogenous growth theory, which emphasizes the importance of human resource quality in increasing labor absorption. A high HDI strengthens the positive effect of economic growth on reducing unemployment.

### **The Relationship Between Inflation and Open Unemployment Moderated by HDI**

HDI also moderates the relationship between inflation and open unemployment, with a moderation coefficient of -0.097. The higher the HDI, the smaller the effect of inflation on unemployment. Regions with high HDI tend to be better able to overcome the negative effects of inflation because of a more productive and adaptive workforce.

### **The Relationship Between Provincial Minimum Wage and Open Unemployment Moderated by HDI**

HDI moderates the relationship between minimum wage and open unemployment with a coefficient of 0.0867. An increase in HDI reduces the negative impact of minimum wage increases on unemployment, as a more skilled and productive workforce allows companies to adapt to cost increases without reducing labor.

### **The Relationship Between Investment and Open Unemployment Moderated by HDI**

HDI strengthens the negative effect of investment on open unemployment with a moderation coefficient of -0.1246. The higher the HDI, the greater the impact of investment in

reducing unemployment. Regions with high HDI have a workforce that is better prepared to adapt to new technologies, so that investment can be more effective in creating jobs

### **The Relationship Between Population Growth and Open Unemployment Moderated by HDI**

HDI moderates the relationship between population growth and open unemployment with a moderation coefficient of -0.1056. The higher the HDI, the less negative the impact of population growth on unemployment. Improving the quality of human resources through HDI can reduce the pressure on the labor market caused by high population growth.

### **Simultaneous Relationship of Economic Variables with Open Unemployment**

Simultaneously, economic growth, inflation, minimum wage, investment, and population growth have a significant effect on open unemployment. The F-test results show that the five variables together have a real effect on open unemployment in North Sumatra. An integrated economic policy approach is needed to address the issue of unemployment comprehensively.

## **CONCLUSION**

Based on the results of this study, it can be concluded that macroeconomic factors such as economic growth, inflation, minimum wage, investment, and population growth significantly affect the open unemployment rate in North Sumatra. Economic growth has a negative effect on open unemployment, meaning that an increase in economic growth can reduce unemployment. Conversely, inflation, minimum wage, and population growth have a positive effect on open unemployment. Investment also has a negative effect on unemployment, indicating that an increase in investment can create jobs. In addition, the Human Development Index (HDI) moderates the influence of these factors, either strengthening or weakening their impact on unemployment. A high HDI can increase the effectiveness of economic growth and investment in reducing unemployment, as well as reducing the impact of high inflation and minimum wages on the labor market.

### **Suggestion**

For local governments, it is recommended to encourage inclusive economic growth, maintain inflation stability, and ensure minimum wage policies that are balanced with productivity. In addition, improving the investment climate and controlling population growth are also very important. The business world is expected to increase productive investment, improve workforce skills, and adapt to fluctuating economic conditions. The community, especially the young workforce, needs to improve their competence and skills through vocational education and training. The central government and educational institutions must also strengthen collaboration with industry to improve the quality of human resources and prioritize programs to increase the Human Development Index (HDI). In general, integrated and sustainable economic policies are needed to effectively reduce open unemployment.

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