

The impact of population growth and employment rate on economic growth in North Sumatera

Thomson Sitompul

Universitas Pelita Harapan

Abstract

This research aims to determine the influence of population growth and employment rate on the economic growth in North Sumatera from 2004 to 2022. The type of data used in this research is secondary data obtained from the Central Provincial Statistics Agency of North Sumatera from 2004 to 2022 (time series data). The results of this research show that partially the population growth has a significant positive effect on the economic growth of North Sumatera from 2004 to 2022. Partially the employment rate has a significant positive effect on the economic growth of North Sumatera from 2004 to 2022. Simultaneously, population growth and employment rate have a significant effect on economic growth.

Key words: Population growth; employment rate; economic growth

INTRODUCTION

Todaro (2003) stated that economic growth refers to increasing the long-term ability of a country to provide various economic goods to its population. From this research, it can be concluded that a close relationship exists between population growth and economic growth in a country. High population growth can have a positive impact on economic growth, which is reflected in high GDP in the region. However, on the other hand, increasing population growth can also be an obstacle to economic growth.

Population growth not only drives economic growth, but can also be an obstacle to economic development. In developed countries, population growth can support economic growth because it is supported by large investments, advanced technology and other factors. However, the situation is different in developing countries, where the impact of population growth on economic development is not always positive. This is caused by different economic conditions, including a lack of capital, the use of rudimentary technology, and a shortage of skilled labor. Therefore, population growth is often considered an obstacle to economic development in developing countries. Rapid population growth can increase pressure on land resources, cause unemployment, and increase the burden of dependency.

The role of labor as a production factor has a significant impact on national income. The quality of the workforce is an important factor, not just the quantity. Improving the quality of labor can increase production. Workers have diverse characteristics, including age, gender, ability, health, education, expertise, and so on. Therefore, workforce planning is needed to support economic growth.

As the main province on the island of Sumatra, North Sumatra is the main destination for residents looking to improve their economic conditions. This causes an increase in the workforce every year. The large number of workers in North Sumatra has two impacts. First, the labor market has become more dynamic, allowing employers to seek workers at more competitive wages. However, this condition can also increase the level of open unemployment if productive economic sectors are unable to absorb workers looking for work.

The Central Statistics Agency (2014) defines residents as all individuals who have lived in the geographical area of the Republic of Indonesia for at least 6 months or more, or those who have lived for less than 6 months but with the intention to stay. Demographic analysis aims to provide basic information about population distribution, their characteristics and changes. It also attempts to explain the factors influencing such changes and analyzes the potential future consequences as a result of such changes. Population growth is the change in the number of individuals in a population over a certain period of time, measured in units "per time".

The term population growth is often used informally to refer to the growth of human population worldwide. The population growth of a country is influenced by three main factors: birth (fertility), death (mortality), and population movement (migration). Birth (Fertility): Fertility is the rate of increase in population through the birth of babies in an area in a certain period. Death (Mortality): Mortality is the reduction of population through death in an area within a certain period. Population Movement (Migration): Migration is the movement of people from one place to another, not limited by territorial boundaries. Migration can be permanent or non-permanent.

According to Simon Kuznets (in Todaro, 2011), economic growth is an increase in a country's long-term ability to provide various types of economic goods to its population. Population growth is influenced by fertility, mortality and migration. High fertility levels can trigger rapid population growth, and in the long term, can create a workforce that supports economic growth, especially if this workforce receives good education and skills. On the other hand, low fertility can result in limited productive labor which has a negative impact on economic growth. Labor force growth is traditionally considered a positive factor that drives economic growth because more labor can increase productivity and, in turn, economic growth. However, imbalances in population distribution between regions can hinder economic growth because there is no proportional utilization of labor in various sectors and regions.

METHOD

This research uses a quantitative type of research, which focuses on collecting and analyzing data based on numbers and statistics. The variables used in this research are economic growth, population growth, and employment rate. Economic growth measures an indicator of achievements in

the economic development of a country or region. Economic growth data is obtained from the Gross Regional Domestic Product (GRDP) value of North Sumatra in the period 2004 to 2022. GRDP is used as the main indicator to measure the economic activity of a region. Population growth variable reflects the increase in population in an area from year to year. Data on the population growth rate of North Sumatra during the period 2004 to 2022 is used to analyze population growth trends. Population growth is an important factor that can influence the economic development of a region. Labor force variable refers to the number of people aged 10 years or older who are actively working, looking for work, or involved in other activities such as education or household work, and also includes their income receipts. The data used is the total workforce of North Sumatra from 2004 to 2022. Labor is an important element in the economic development process, because they play a role in economic production and consumption.

In quantitative research, data analysis will be used to identify relationships and trends between these variables. This research will likely involve the use of statistical techniques such as regression to measure the relationship between economic growth, population growth, and employment. The results of data analysis can provide a better understanding of the economic and population dynamics in North Sumatra during the period studied.

Before carrying out data analysis, the data is tested according to classical assumptions. If there is a deviation from the classical assumptions, non-parametric statistical testing is used, whereas classical assumptions are fulfilled if parametric statistics are used to get a good regression model.

must be free from multicollinearity, and heteroscedasticity and the resulting data must be normally distributed. The tests used in multicollinearity are the VIF test and tolerance value. According to Sumodiningrat (2013), if the correlation coefficient is smaller than 0.8, then multicollinearity does not occur and vice versa, if it is greater than 0.8 then there are symptoms of multicollinearity. In the heteroscedasticity test, if the significance value is greater than 0.05 then heteroscedasticity does not occur. To test whether there is heteroscedasticity or not, the Glejser test can be used. Decision making in the autocorrelation test is if the Asymp value. Sig. (2-tailed) is greater than 0.05, it is certain that there is no autocorrelation in the research model.

Kolmogorov Smirnov is to compare the data distribution with the standard normal distribution. If the significance is above 5%, it can be concluded that the data is normally distributed. On the other hand, if the significance is below 5%, then there is a suspicion that the data is not normally distributed. The analytical model used in this research is a multiple linear regression model for time series data from 2004 to 2022. The analytical method used in this research is inferential and descriptive analysis. In the first part, descriptive analysis will be shown to present a general picture of the condition of population growth and employment rate in North Sumatra. In the next stage, Ordinary Least Square (OLS) as an inferential research method will be used in this research along with the SPSS version 26 analysis tool to process the data. Inferential analysis will be used to explain the influence of population growth and employment rate on economic growth in North Sumatra.

In this case, the regression model can be formulated as shown below:

$$\text{Ln } Y = a + b_1X_1 + b_2X_2 + e$$

Y = Economic Growth
X1 = Population Growth
X2 = Labor
a = Constant
b1- b2 = Parameters
e = confounding factor or standard error

The t test is carried out to test whether separately the independent variable t is able to explain the dependent variable well. This test was carried out with a level of $\alpha = 5\%$. The criteria for testing the hypothesis with the t test are: a). Prob < 0.05 means the independent variable has a significant influence on the dependent variable. B). Prob >

0.05 means variable independent does not have a significant influence on the dependent variable. Hypothesis testing using the F distribution. With $\alpha = 5\%$, the testing criteria with the F Test are: a). If the probability value of the prob ≤ 0.05 = means there is a simultaneous influence of the independent variable on the dependent variable, this means the model can be used. b). If the probability value of the prob ≥ 0.05 = means it has no effect, there is no simultaneous influence of the independent variable on the dependent variable. A small R2 value means that the ability of the independent variable to explain the dependent variable is very limited. A value close to one means that

the independent variables provide almost all the information needed to predict variations in the dependent variable.

RESULT AND DISCUSSION

Multiple linear regression model to see the influence of population growth and employment rate and economic growth in North Sumatra.

Table 1.
Multiple Linear Regression Model Calculation Results

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	37.655	3.350		37.217	.000
	X1_POPUL	.460	.221	-.959	-28.949	.000
	X2_LABOR	.811	.448	-.057	-1.636	.013

a. Dependent Variable: y_ECGROW

So, we obtain model: $Y = 37.655 + 0.460 X_1 + 0.811 X_2$

If all independent variables are considered constants, then the value economic growth is 37,655, meaning that if population growth (X1) and the number of workers (X2) have a value of 0 or are constant then economic growth (Y) has a value of 37,655. Based on the multiple linear regression equation, the regression coefficient value for the population growth variable has a positive sign of 0.460, which means that if population growth (X1) increases by 1% then the economic growth variable (Y) will increase by

0.460. The positive increase in population in North Sumatera brings development to the economy, because the increase in population also increases the role of human resources involved in production process activities thereby increasing production capacity and growing the economy so that it will improve the welfare of the community. This founding is line with research conducted by Obere, Thuku & Gachanja (2013) which stated that population growth and economic growths are both positively correlated and that an increase in population will impact positively to the economic growth in the country.

Based on the regression test equation that has been carried out, the regression coefficient value for the variable number of workers (X2) has a positive sign, namely 0.811, which means that if the number of workers increases by 1% it will increase economic growth (Y) by 0.811. According to Todaro (2003) population growth and labor force growth are traditionally considered as one of the positive factors that spur economic growth. A larger workforce means increasing production levels, while greater population growth means the size of the domestic market is larger. However, it is still questionable whether the rapid rate of population growth will actually have a positive or negative impact on economic development. This founding is line with research conducted by Maestas and Mullen (2016) on title The impact of population change on economic growth in Kenya which stated that number of workers and economic growths are both positively correlated and that an increase in number of workers will impact positively to the economic growth.

Table 2.
Multicollinearity Test Calculation Results

Coefficients ^a							
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics
		B	Std. Error	Beta			
1	(Constant)	124.669	3.350		37.217	.000	
	X1_POPUL	-6.410	.221	-.959	-28.949	.000	.930
	X2_LABOR	-.732	.448	-.057	-1.636	.113	.837

a. Dependent Variable: y_ECGROW

The findings from Table 2 above reveal the results of VIF statistical calculations. The VIF statistical value for the independent variable "population growth" is 1.075, which falls below the threshold of 10. This suggests that there is no significant linear relationship between population

growth and labor. Similarly, the VIF statistical value for the independent variable labor is 1.195, also below the threshold of 10. Therefore, it can be concluded that there is no significant linear relationship between population growth and labor.

Table 3.
Glejser Test Calculation Results

Coefficients ^a						
Model		Unstandardized Coefficients	Standardized Coefficients			
		B	Std. Error	Beta	t	Sig.
1	(Constant)	6.073	2.146		1.297	.009
	X1_POPUL	-.286	.142	-.355	-.2.013	.054
	X2_LABOR	.403	.287	.262	1.407	.170
a. Dependent Variable: Abs_RES						

Table 3 displays the Glejser test results for each independent variable, with significance values exceeding 0.05%. Specifically, the independent variable "population growth" has a significance level of 0.054, and the independent variable "labor" has a significance level of 0.170. Therefore, based on these results, it can be concluded that there is no evidence of heteroscedasticity in this study.

Table 4.
Autocorrelation Test Calculation Results

	Unstandardized Residual
Test Value ^a	.10439
Cases < Test Value	16
Cases >= Test Value	16
Total Cases	32
Number of Runs	12
Z	-1.617
Asymp. Sig. (2-tailed)	.106
a. Median	

The results of the run test, as presented in Table 4, indicate that the Asymp.Sig. (2- tailed) value is 0.106, which is greater than 5% (0.05). Based on these test results, it can be concluded that the data used exhibits a sufficient degree of randomness, and there is no evidence of autocorrelation problem.

Table 5.
Normality Test Calculation Results

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		32
Normal Parameters ^{a,b}	Mean	.0000000
	Std. Deviation	1.48946701
Most Extreme Differences	Absolute	.155
	Positive	.155
	Negative	-.143
Test Statistic		.155
Asymp. Sig. (2-tailed)		.099 ^c
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		

Table 5 shows that the Asymp. Sig. (2-tailed) value is 0.099, which is greater than the 5% significance level (0.05). Therefore, based on these results, it can be concluded that the processed data follows a normal distribution and does not exhibit any issues related to normality.

Table 6.
Coefficient of Determination Test Results

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.986 ^a	.971	.968	1.56723
a. Predictors: (Constant), X1_POPUL, X2_LABOR				
b. Dependent Variable: y_ECGROW				

The calculation results presented in Table 6 indicate that the Adjusted R- squared (Adjusted R²) value is 0.968. This implies that the regression model developed is capable of explaining approximately 96.8% of the variations in economic growth, while the remaining 3.2% is attributed to other variables outside the scope of the regression model.

Table 7.
F Statistical Test Results
ANOVA^a

Model		Sum Squares	df	Mean Square	F	Sig.
1	Regression	2338.522	3	779.507	317.362	.000 ^b
	Residual	68.774	28	2.456		
	Total	2407.296	31			

Dependent Variable: y_ECGROW

Predictors: (Constant), X1_POPUL, X2_LABOR

According to the data in Table 7, the calculated F value from the regression estimation results is 317.362, and it has a significance level of 0.000, which is below the 5% significance threshold (0.05). Consequently, it can be concluded that there is a significant collective influence of the independent variables (population growth and labor) on the dependent variable (economic growth). In other words, the obtained regression model is highly suitable for estimating the relationship between these variables, making it a valuable tool for predicting economic growth based on population growth and labor.

Tabel 8.
Statistical Test Results t
Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6.073	2.146		1.297	.000
	X1_POPUL	-6.410	.142	-.355	-28.949	.000
	X2_LABOR	-.732	.287	.262	-1.636	.013

As shown in Table 8, the t-statistic value for the "population growth" variable is $t = -28.949$, and it has a significance level of 0.000, indicating that the "population growth" variable has a significant and negative influence on economic growth in North Sumatra when considered individually. However, for the "labor size" variable, the t-statistic value is $t = -1.636$, and its significance level is 0.013. Because the significance value (0.013) is greater than 5% (0.05), it is concluded that, when considered separately, there is no significant relationship between "labor size" and economic growth. In summary, the "population growth" variable has a significant individual impact on economic growth, while the "labor size" variable does not have a significant individual impact on economic growth in North Sumatra, based on the provided statistical analysis.

CONCLUSION

Based on the results of the partial test (t) and simultaneous test (F) which was carried out using SPSS, the partial population growth variable (X1) has a positive and significant effect on economic growth in North Sumatra from 2004 to 2022.

North Sumatera Provincial Government needs to prioritize stable population growth rates so that economic growth can run in a sustainable balance. In this context, there are several actions that can be

taken: 1). Controlling Population Growth: The government can implement policies and programs that encourage controlling population growth. This

could involve awareness campaigns about family planning, better access to contraception, and adequate reproductive health services. 2). Development of Job Opportunities: The government should focus on creating wider job opportunities for the workforce. This can include support for economic sectors that have great potential for creating jobs, such as agriculture, tourism, industry, and so on. 3). Skills Training and Education: Improving the quality of the workforce through skills training and education is very important. The government can provide job training programs that are relevant to labor market demand, so that the workforce has skills that match industry needs.

REFERENCES

- Bloom, D. E., Canning, D., & Fink, G. (2010). Implications of population ageing for economic growth. *Oxford review of economic policy*, 26(4), 583-612.
- Cai, F., Wang, D., & Du, Y. (2002). Regional disparity and economic growth in China: The impact of labor market distortions. *China Economic Review*, 13(2-3), 197-212.
- Cantrell, R. S., & Clark, R. L. (1982). Individual mobility, population growth and labor force participation. *Demography*, 19(2), 147-159.
- Headey, D. D., & Hodge, A. (2009). The effect of population growth on economic growth: A meta-regression analysis of the macroeconomic literature. *Population and development review*, 35(2), 221-248.
- Kelley, A. C. (1988). Economic consequences of population change in the Third World. *Journal of economic literature*, 26(4), 1685-1728.
- Kelley, A. C., & Schmidt, R. M. (1995). Aggregate population and economic growth correlations: the role of the components of demographic change. *Demography*, 32, 543- 555.
- Maestas, N., Mullen, K. J., & Powell, D. (2016). The effect of population aging on economic growth, the labor force and productivity (No. w22452). National Bureau of Economic Research.
- National Research Council. (1986). Population growth and economic development: Policy questions.
- Obere, A., Thuku, G. K., & Gachanja, P. (2013). The impact of population change on economic growth in Kenya.
- Shahid, M. (2014). Impact of labour force participation on economic growth in Pakistan. *Journal of Economics and Sustainable Development*, 5(11), 89-93.
- Wijaya, A., Kasuma, J., & Darma, D. C. (2021). Labor force and economic growth based on demographic pressures, happiness, and human development: Empirical from Romania. *Journal of Eastern European and Central Asian Research (JEECAR)*, 8(1), 40- 50.