Determinants of Labor Force Participation Ratein West Sumatra

Asrul[1]; Yolanda[2]; Heru Subiyantoro[2]; Donna Rahmiyanti*[2]
[1] Postgraduate Students of University Borobudur Jakarta Indonesia.
[2] Lecture University of Borobudur, Jakarta, Indonesia
*Corresponding Author: Donna Rahmiyanti

Abstract: This study looks at the relationship between economic growth, education, minimum wage, industrial growth, investment, and labor force participation rates from 2006 to 2020 for 12 districts in West Sumatra using panel data. The analysis technique employs Ordinary Least Squares regression (OLS), with the optimal model chosen using the Chow and Hausman tests. The fixed effect model, which is based on the Classical Assumption test, is the best and is already a good and valid model to examine. According to the chosen model, economic growth, education, minimum wage, industrial growth, and investment, all had a significant and positive influenceintermsof labor-force participation rates, either simultaneously or partially. The variable that has the greatest influence on labor force participation rates is Education. This government must firmly encourage its people about the importance of education. Without such encouragement, Indonesia may find it difficult to achieve the MDG goals.

Keywords: Labor Force Participation Rate, Economic Growth, Education,Wage Rate, Industrial Growth, Investment

I.   Introduction

The development of technology and globalization causes problems in employment increasingly complex, especially how to improve the quality of labor and create as many jobs as possible. In Indonesia, to increase job creation, one of them is expected from the Job Creation Law. And it is hoped that the Job Creation Law can unravel increasingly complex labor problems. The Job Creation Law is expected to provide certainty and speed of investment licensing, as well as legal certainty for investors. In addition, the law can overcome the risk of employment will move to other more competitive countries, the competitiveness of job seekers is relatively low compared to other countries, and the population that is not / has not worked will be higher.

In Indonesia, laboris regulated in Law Number: 13 of 2003, article 1 number (2), and from the Law it is explained that the so-called labor is: everyone who can do work to produce goodsand/or services both to meet their own needs and for the community, so in this case it can be said that the workforce is an economically active population and is directly involved in the production process. Thus, labor is one of the driving factors of a country's economy. One of the employment indicators is the Labor Force Participation Rate, where the Labor Force Participation Rate is the comparison between the labor force and the population aged ten years and over. This indicates a large percentage of the economically active working-age population in a country/region. Here is an overview of the Labor Force Participation Rate in West Sumatra and Indonesia:

Table1
Average Indonesian Labor Force Participation Rate,
West Sumatra and Sumatra
The year 2016-2020 (Persentase)

No.	Region	Year				
		2016	2017	2018	2019	2020
1	Indonesian Average	73,34	75,23	75,35	76,53	77,13
2	Sumatran Average	67,60	68,33	69,35	70,66	60,45
3	West Sumtera	77,94	78,93	56,94	75,85	68,57

Source: BPS Indonesia 2021

Table 1 above explains that Indonesia's average Labor Force Participation Rate in 2018, 2019, and 2020 is higher than the average of Sumatra and West Sumatra. This reflects that over the past three years, the working-age population has been larger, and the Indonesian and West Sumatra averages have been higher than the

Sumatra averages. A high level of labor force will encourage economic growth and a greater supply of labor to generate prosperity in an economy.

According to BPS data, the Labor Force Participation Rate (TPAK) has reached 68.63% by the end of 2022, this figure increased by 0.83% compared to the previous period, which was only 67.8% in 2021. While The Labor Force Participation Rate according to the last education completed in 2022 is Higher Education graduate 82.28, High School (SMA) numbered 68.48, Number of Junior High Schools (SMP) 56.82, and Elementary School (SD) amounted to 68.88. This reflects that education level can affect the Labor Force Participation Rate (TPAK).

Other factors that can influence the increase in the Labor Force Participation Rate (TPAK) can be known from research by Selcen Öztürk (2018) stating the difference in the region can determine the value Labor Force Participation Rate in Turkey. (Rehkopf, Adler, &; Rowe, 2017) states that the Labor Force Participation Rate can be influenced by government spending on education and health in Syria. (Cabegin & Gaddi, 2019) Participating in the labor force is influenced by location, gender, age, marital status, and education level in the Philippines.

Based on the above, the author is interested in studying the phenomena that affect The Labour Force Participation Rate (TPAK) in West Sumatra, particularly the existing 12 districts, by hypothesizing that the factor (Economic Growth, Education, Wage Levels, Industrial Growth, Investment) affects the Labour Force Participation Rate (TPAK) in West Sumatra specifically for the existing 12 districts. To answer this hypothesis, the author made several steps, including making literature related to influencing factors and methodology.

II.   Literature Review

The labour force participation rates It is useful to know the large percentage of the working-age population that has the potential to actively become a workforce. A high TPAK value illustrates the high contribution of the working-age population who are working or unemployed. According to (Liu, 2012), The ratio of the labor force to the total population is known as the labor force participation rate. (Simanjuntak, 1998), states that the Rate of Labor Force Participation (TPAK) is a specific population group that can be computed by comparing the labor force and working-age population in the same group. And also (Simanjuntak, 1998)said the greater the number of people classified as non-labor force, the smaller the number of the labor force which resulted in smaller TPAK. The decline in the value of TPAK indicates that the availability of working-age people who can be actively involved in economic activities (labor supply) is getting smaller. The Labor Force Participation Rate is part of the workforce and is one of the success indices of economic development. Factors affecting the Labor Force Participation Rate are discussed by (Naudé &; Serumaga-Zake, 2001), (Nor Amna A'liah Mohd Nor. Rusmawati Said, 2014), (Lizares &; Bautista, 2020)inthe Philippines. (Man, Abdul Rahman, &; Arsad, 2021)in Malaysia and (Lari, Awadalla, Al-Ansari, &; Elmaghraby, 2022)in Qatar.

Economic Growth isthe process of increasing per capita output in the long run., where the process is influenced by economic factors (natural resources, human resources, capital, and technology) and noneconomic factors (social institutions, cultural attitudes, moral values, political conditions, institutions). While Lincoln Arsyad defines economic growth as a rise in gross domestic product (GDP) or gross national product (GNP), independent of whether the rise is larger or lower than the rate of population growth or if there are any changes to the economic structure. Economic growth is often used as an indicator of a country's economic development and such high economic growth is expected by a country. The form of high economic growth is economic growth followed by stability, economic justice, and income equality (Harjanto, Ratnasih, &; Yolanda, 2021). Meanwhile tEori-theory of economic growth was put forward by (Todaro. Michael P., 2011), (Sukirno, 2011), Keynes in Jhingan (2014), and Mankiw (2007) and more. Solow's growth theory states that economic growth has an impact on labor force participation in the economy. The effect of economic growth on labor force participation rates is put forward by (Sarsi, Putro, &; Sari, 2014) in Riau, (Siregar Lusy Lestari, 2017) in North Sumatra, (Lechman & Kaur, 2015) in 162 Countries and (Mumekh, Rotinsulu, &; Siwu, 2023) in North Sumatra Province.

Education according to (Laplagne, Glover, & Shomos, 2011) Quoted from the 2005 Productivity Commission that higher education is associated with better wages, more enjoyable work, and with tasks that involve a lower risk of acquiring a disability. While (Lattimore, 2011)Stating educational attainment does not necessarily increase an individual's employment prospects for participation, as employer hiring decisions are based on the qualifications of the candidate's relatives, not absolute qualifications. Research that addresses the relationship of education with labor force participation rates is (Karmel and Wood, 2004) in Australia, (Ejaz, 2007)education level has a positive and significant impact on women's labor force participation (FLFP) in Pakistan Basuti, T. (2012) in South Africa, Tshegofatso, Basuti and Narain Sinha, 2017)in Botswana.

Wage Rate, Its policy in Indonesia is contained in the Regulation of the Minister of Manpower Number: per 01 / Men / 1999, where the minimum wage is the lowest monthly wage consisting of basic wages including fixed allowances. And Manpower Law No. 13 of 2003 states that all workers, both permanent and

non-permanent status and those who are still on probation, must be paid properly based on the Regional Minimum Wage (UMR). (Simanjuntak, 1998)states that wage increases on the one hand will increase income (income effect) which tends to increase the Labor Force Participation Rate. Researchers who discuss the wage level with the Labor Force Participation Rate include: (Wahyuningtias, 2019) in Java Island and the form of the relationship is negative.(Wasono, Erfit, &; Achmad, 2020)in Jambi Province, (Aini, Wijimulawiani, &; Satarudin, 2022) in West Nusa Tenggara district/city, (Sardar Naeem Hakimzai,2022) in Afghanistan.

Industry is Law Number 3 of 2014 article 1 number 2 Concerning industry are all economic activities that process raw materials and/or use industrial resources to generate items with added value or better advantages, including industrial services. And PP-RI Number 28 of 2021 article 1 paragraph 1 concerning Implementation of the industrial sector article 1, the term "industry" refers to all types of economic activity that process raw materials and/or use industrial resources to create items with added value or higher benefits, including the services industry. While the Central Statistics Agency (BPS), an industry is a unit or unit of production located in a certain place that carries out activities to convert raw materials into new products or convert goods that lack value into goods of value to bring the product closer to the final consumer. The industry is one of the efforts to improve the welfare of the population. Through development efforts in the industrial sector, it can increase employment opportunities and community welfare. Industrial growth can be measured from an increase in the number of industries or an increase in gross domestic product from the industrial sector. In addition, the growth of the industrial sector is one indicator of the success of a country's economy. Thus the growth of the industry will increase the Labor Force Participation Rate.

Investment according to Dumairy (1996) is a net positive addition of capital goods. (Hartono, 2017) Investment states are the postponement of present consumption to be used in efficient production over some time. While   (Eduardus, 2001) Stated investment is a commitment to a certain amount of funds made at the moment, to obtain a certain amount of profit in the future. Investment activities can increase the absorption of labor in a country. This will certainly improve people's welfare and automatically increase the labor force participation rate. In line with the linkage of Investment to the Labor Force Participation Rate, according to (Wara, 2016)depending on the category of investment orientation.

III.   Methodology

1.   Data Used in the Study:

The data used in this study is panel data which is a combination of time series (2006-2020) and cross-section (12 districts), originating from the central statistics agency. The analytical tool in this study is an econometric model. The purpose of using this model is to be able to provide more information and also control individual heterogeneity. The variables used in this study are Labor Force Participation Rate (Y1), Economic Growth (X1), Education (X2), Wage Rate (X3), Industrial Growth (X4), and Investment (X5).

2.   Pre-estimation Diagnostics:

Correlation and descriptive statistics are often used as pre-estimation diagnostic tools whose purpose is to find out the data used. In this study the description of the data used is as follows:

Table 2. Correlation

	PERT_EKONOMI	EDUCATION	WAGES	INDUSTRY	INVESTMENT
PERT_EKONOMI	1.000000				
EDUCATION	-0.221453	1.000000			
WAGES	-0.560775	0.679392	1.000000		
INDUSTRY	-0.035721	0.164706	0.096827	1.000000	
INVESTMENT	0.017629	0.235954	0.065173	-0.483820	1.000000

Source: E-Views data tests

Based on the table above, there is no multicollinearity problem in the dataset because the correlation size is between 0.017 – 0.6794. The measure is still below the provisions (<0.8). This is reinforced by (Ghozali, 2016). This means that in this case there is no multicollinearity between variables.

Descriptive statistics provide an overview of the characteristics of a set of data without drawing general conclusions. The gratuitous or descriptiveshown is the **mean value, standard deviation, variance, maximum, minimum, kurtosis, and** *skewness* of the research variables so that it is easier to understand. The general description conveyed is:

Table 3. Descriptive Statistics

	Y	X1	X2	X3	X4	X5
Mean	67.78626	5.342291	97.92309	1423705.	2079.572	555.4246
Median	67.58000	5.610000	98.24000	1350000.	1874.000	572.0000
Maximum	83.10000	6.640000	100.0000	2484041.	22356.00	967.0000
Minimum	56.56000	0.870000	91.17000	650000.0	2.320000	81.00000
Std. Dev.	4.665527	1.243204	1.951719	580430.7	1843.164	190.9543
Skewness	0.332807	-2.373631	-1.431460	0.352446	7.572244	-0.497092
Kurtosis	3.576118	8.327585	5.048332	1.822564	82.97454	2.541039
Jarque-Bera	5.779860	379.7759	92.42350	14.04575	49413.56	8.942889
Probability	0.055580	0.000000	0.000000	0.000891	0.000000	0.011431

Source: eviews data test

Based on Table 3 above, skewness values are in the range of -2 and 2 (Ghozali, 2016). This explains that the data is normal. The variation of data by standard deviation value is smaller than the mean value and it is said to be low. Data are not normally distributed as shown by a probability value smaller than $\alpha = 5\%$.

Classical assumption testsare used to ensure that the regression equations used are accurate in estimates, consistent, and unbiased. The estimated regression equation must produce a BLUE (Best Linear Unbiased Estimator) estimator and for that, it is necessary to carry out classical assumption tests including the Normality test, multicollinearity, heteroscedasticity test, and Autocorrelation test.

Table 4. Classic Assumption Test

No.	Test Classical Assumptions	Result	Information
1	Normalization test	Probability 0.2624 > $\alpha = 0.05$ (greater than 0.05)	Normalized distributed data
3	Heteroskedasity Test	Prob. Chi-Square(4) = 0.1640 > $\alpha = 0.05$	There is no problem of heteroskedasticity.
4	Autocorrelation Test	Prob. Chi-Square(2)= 0.4605 > $\alpha = 0.05$.	No autocorrelation problems occur.

Source: eviews data test

Based on Table 4 above, it can be seen that the regression equation that is formed later has accuracy in estimating and is not biased because the data has been distributed normally and there is no problem withheteroscedasticity and autocorrelation.

3. **Model data panel and best model determination:**

Panel data regression modelconsists of: Common Effect Model (CEM) using an approach Ordinary Least Square (OLS) Fixed Effect Model (FEM) and Random Effect Model (REM). The determination of the best model is carried out by testingChow (Fixed Effect Model VS Common Effect Model), then continued with the test Hausman (Fixed Effect Model VS Random Effect Model and Testing test Breusch Pagan – Lagrange Multiplier (Common Effect Model VS Random Effect Model (Gujarati & Porther, 2015). The Breusch Pagan – Lagrange Multiplier test is carried out if the results of the Chow test and the Hausman test aredifferent.

4. **General Model Description:**

To assess the impact of the independent variable on the dependent variable is shown in the form of the following econometric specification:

$$Y_{it} = \alpha + \beta X_{it} + \varepsilon_{it}$$

Where:

Y = Labor Force Participation Rate.

X = Independent variables (Economic Growth, Education, Wage Level, Industrial Growth, Investment)

i = Regency in Province West Sumatra.

t = Periode

α = constant,

β = vector coefficient,

εit = error term vector.

The linear regression analysis above is used to determine the direction and how much influence the independent variable has on the dependent variable (Ghozali, 2018).

5.   Test Hypothesis:

The hypothesis test consists of simultaneous tests and partial tests. This test is useful to know the independent influence either jointly (simultaneously) or individually (partially) on Dependent variables. According to (Gujarati & Porther, 2015) if the *p-value* compared to a significance level (α) of 5%. If the p-value < α = 5% meaning that the independent variable has a significant effect on the dependentvariable and vice versa.

6.   Coefficient of determination (R2):

The coefficient is to measure how far the model can explain the variation of the dependent variable with the value of the coefficient of determination $0 < R^{2<1}$ (Ghozali &; Ratmono, 2018).

IV.   Result

West Sumatra, the population of West Sumatra in 2010 reached 4,846,909 people, with a population density of 110 people / km2, and in 2020 the population increased to 5,534 million. The increase in population occurred during the 10 years by 14.17% or an average per year of 1.4%.

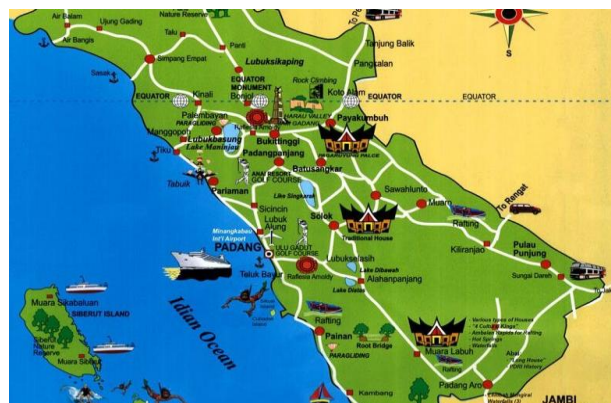The location map of West Sumatra province is as follows:

Figure 1: Map of Kabupten City of West Sumatra Province

Based on Figure 1 above West Sumatra consists of seven municipalities (Bukit Tinggi, Padang, Padang Panjang, Pariaman, Payakumbuh, Sawah Lunto, Solok) and twelve districts (Agam, Dharmasraya, Mentawai, Fifty Cities, Padang Pariaman, Pasaman, West Pasaman, South Coast, Sijunjung, Solok, South Solok, Tanah Datar). Of all that, the object of research is 12 districts in West Sumatra Province.

The panel regression results obtained using the Eviews version 10 program tool are Common Effects Model, Fixed Effects Model, and Random Effects Model as follows

Table 5.
Common Effect Models, Fixed Effect Models,
Random Effect Models Period 2006-2020

Variable	Common Effects Model			Fixed Effects Model			Random Effects Model		
	Coeff	ONE	Prob.	Coeff	ONE	Prob.	Coeff	ONE	Prob.
Log Y									
C				2.39499	1.17053	0.0424	4.585608	0.23090	0.0000
Log X_1	0.01052	0.00500	0.0368	0.00809	0.003365	**0.0183**	0.008078	0.00335	0.0171
Log X_2	0.95367	0.05780	0.0000	1.14069	0.302817	**0.0002**	0.965247	0.29824	0.0014
Log X_3	0.05059	0.01324	0.0002	0.04272	0.015192	**0.0055**	0.449161	0.12067	0.0003
X4 Logs	0.13061	0.03423	0.0002	0.19501	0.033302	**0.0000**	0.117368	0.02325	0.0000
X5 Logs	0.93833	0.36321	0.0112	0.08338	0.032990	**0.0124**	0.064229	0.01974	0.0014
R-squared			0.661557			0.830053			0.775101
Adjusted R-squared			0.640107			**0.793739**			0.754271
Prob(F-statistic)						**0.000000**			0.000000
Dw Stat			0.020775			1.720621			1.715947

Source: eviews data test

Based on Table 5 above, it is partially illustrated that all independent variables have a significant effect on their dependent variables, both the common effect model, fixed effect model, and random effect model. To get the best model from the three models above, the model selection was carried out with the Chow test and the Hausman test. The results of the two model tests are:

Table 6. Election Results Panel Data Regression Model

Selection Test Method	Model Result Testing	Model Used
Chow test, selection :	Common Effect vs Fixed Effect, F Prob = 0.000 < α 0.05	Fixed Effect Model (FEM)
Hausman test, selection:	Fixed Effect vs Random Effect, where Prob. **0.0007** > α 0.05	Fixed Effect Model (FEM)

Source: eviews data test

Based on the test results in Table 6, it can be known that the best model for predicting is the fixed effect model.

Multiple linear regression equations in research with selected models through tests Chow *test* and test *Hausman* be *Fixed Effects* The model is:

$$\text{Log } Y = 2{,}395 + 0.008 \text{Log } X_1 + 1{,}141 \text{ Log } X_2 + 0.043 \text{Log } X_3 + 0.195 \text{Log } X_4 + 0.083 \text{Log } X_5$$

From the multiple regression equation above, it can be explained:
a. A constantof 2.395 means that if the independent variable (X_1, X_2, X_3, X_4, X_5) is 0 then the magnitude of Y is 2.395 with the form of a positive relationship.
b. Assuming that the other independent variables remain constant and the relationships that emerge are substantial and positive, the regression coefficient of variable X1 of 0.008 predicts that for every unit increase in X1, Y will increase by 0.008 units.
c. If another independent variable stays constant and the link between the two variables is positive and significant, the regression coefficient of variable X2 is 1.141, meaning that for every unit increase in X2, there will be a 1.141 unit reduction in Y.
d. If another independent variable is held constant, the regression coefficient of variable X3 of 0.043 means that every unit increase in X 3 increases Y by 0.043 units, showing a strong and positive correlation.
e. The regression coefficient of the variable X4 of 0.195 suggests that for every unit rise in X 4 there will be a 0.195 unit decrease in Y, provided that another independent variable has a strong and positive association.
f. With the exception of variable X2, which has an elastic relationship, the amount of the independent variable's influence on the dependent is often inelastic. Despite the fact that the inelastic relationship suggests that the change in the dependent variable as a result of the dependent variable is very small, it is still less than 20%.

The results of partial or simultaneous hypothesis tests for all independent variables (Economic Growth, Education, Wage Rate, Industrial Growth, Investment) on the Labor Force Participation Rate are significant and positive as shown by the probability values in Table 5 for fixed effect models both partial hypothesis test and simultaneous hypothesis test.

The coefficient of determination for the regression model between Economic Growth, Education, Wage Rate, Industrial Growth, and Investment to Labor Force Participation Rate was **0.793739.** This explains that Economic Growth, Education, Wage Rate, Industrial Growth, and Investmentcan explain the Labor Force Participation Rate of 79.37%. While the remaining 20.63% of economic growth is influenced by other variables that are not included in this research model.

Predictions of potential regions for the Labor Force Participation Rate are shown in the table below:

**Table 7. Potential Labor Force Participation Rate
in 12 Districts in West Sumatra**

Regency	Intercept	Constant	TPAK Potential
_MENTAWAI--C	0.273669	2.394986	2,66866
_PESISIRSLTN--C	-0.025207	2.394986	2,36978
_SOLOK--C	-0.063554	2.394986	2,33143
_SIJUNJUNG--C	-0.094916	2.394986	2,30007
_TANAHDATAR--C	-0.089659	2.394986	2,30533
_PADANGPRMN--C	0.006659	2.394986	2,40165
_AGAM--C	-0.099845	2.394986	2,29514
_50KOTA--C	-0.039310	2.394986	2,35568
_PASAMAN--C	0.024365	2.394986	2,41935
_SOLOKSLTN--C	-0.015673	2.394986	2,37931
_DHARMASRAYA--C	0.134542	2.394986	2,52953
PASAMANBRT--C	-0.011070	2.394986	2,38392

Source:eviews data test

The table above illustrates that the area predicted to potentially have the highest labor force participation is the Mentawai islands and followed by Dhamasraya District. Looking at these two regions, are predicted to have the potential to have a high labor force participation rate because these areas are just developing and are among the outermost areas of concern to the government by sustainable economic development programs.

V.   Conclusion

Based on the results of the discussion above regarding the effect of Economic Growth, Education, Wage Rate, and Industrial Growth, on the Labor Force Participation Rate in 12 Districts in West Sumatra Province, it was concluded that all variables have a positive and significant effect both partially and simultaneously. The biggest factor is the level of education. The amount of variation in variables Economic Growth, Education, Wage Rate, and Industrial Growth, to the Labor Force Participation Rate of 79.37%. And the district that is predicted to have a Labor Force Participation Rate is the Mentawai Islands.

The government is expected to: (1) formulate an equitable minimum wage for business actors (companies) and workers. What is meant by meridian in this case is to consider the welfare and purchasing power of labor. (2) In the field of education, it is hoped that the education system will be simplified and accessible to all Indonesian residents and later have sufficient provisions or abilities regarding the world of work. (3) Investment is directed at labor-intensive industries as a consideration to encourage economic growth that creates jobs.

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