DETERMINANTS OF THE FEMALE LABOR FORCE PARTICIPATION RATE AND TESTING THE U-CURVE HYPOTHESIS IN INDONESIA

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A B S T R A C T

This research aims to determine the influence and test the validity of the U-curve hypothesis on the level of education and economic growth on the female labour force participation rate in Indonesia. The type of data used is secondary data in the form of panel data, with time series data from 2006 to 2022, while cross-section data was taken from 34 provinces in Indonesia. The regression model uses the Fixed Effect Model (FEM). The results of this study show that labor force participation is influenced by educational levels that have not/did not graduate from elementary school, elementary school, and diploma/graduate/university level. In contrast, the level of education at junior high school and high school and economic growth have no effect. The hypothetical phenomenon of the U-curve in Indonesia's female labour force participation rate is illustrated by the relationship between primary school and junior high school education levels.

1. INTRODUCTION

Gender problems among women are a global problem that occurs in various countries. The social order still considers that women have a lower position than men, so there are still many cases of gender discrimination against women in the economic, social, and political realms (Monk-Turner & Turner 1994; Kim et al., 2012; Kim et al., 2019). According to Blackburn (2004) and Setyaningrum et al. (2023), the responsibilities and roles of women in Indonesia continue to grow. Women are not only active in the domestic realm of the family as housewives but also play a role in general society as workers. Increasing women's labour participation is the main goal for achieving development and equality. Purnamaningsih (2011) states that the factors influencing women's work are education, wages, involvement of married women workers, unemployment rates, and economic growth.

Increasing education means that women today want to be housewives and participate in the labour market. The achievements of Indonesian women are no longer measured by their success in taking care of their families but also by their success in obtaining education and pursuing a career in the world of work (Schaner & Das 2016). Education is a critical need to increase work productivity; without education, someone cannot learn new things easily (Lutchenko et al., 2019). However, in reality, the high level of women's educational participation is not always in line with their level of work participation. Female labour force participation in developing countries tends to have a U-shaped relationship with their completed education (Verick, 2014).

Apart from education level, women's work participation is also influenced by labour supply and demand. One of the factors that influences the demand and supply of labor is economic growth. High economic growth will indirectly be followed by an increase in employment opportunities (Romhadhoni et al., 2019). Economic growth is defined as the process of increasing or decreasing production capacity in the economy which

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forms national income. Indicators of the success of economic development and the success of the ruling government regime can be seen in economic growth in the region. Gross Domestic Product (GDP) is one way to measure economic growth (Green, 2007), while macro measurements in a region/region of a country can be reflected in the growth rate of Gross Regional Domestic Product (GRDP) based on constant prices (Todaro & Smith, 2020).
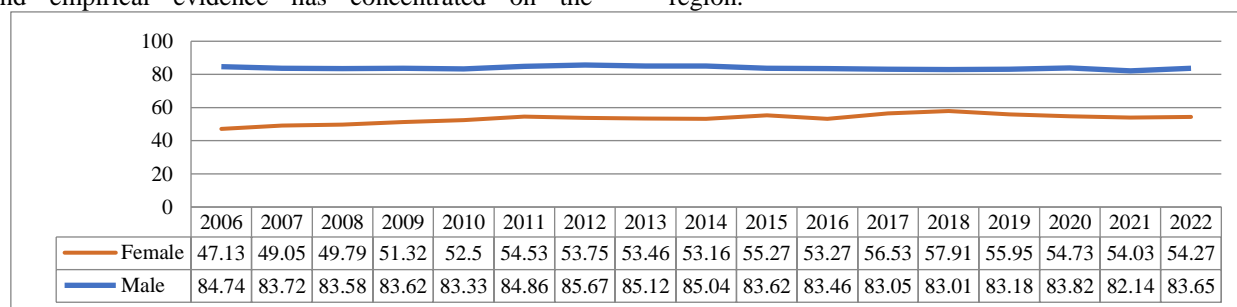
Several theoretical and empirical studies in the literature have found that female labor force participation influences increasing economic growth (Ani & Hidayah, 2023). There is a relatively stable relationship between women's participation in the labor market and the phase of economic growth. According to Lechman and Kaur (2015), women's participation in the labor force is on a downward trend in the first phase of economic growth, whereas an increase occurs after output per capita reaches a certain level and women's participation in the labor force market will increase.

Sinha (1965) stated that the increase in the number of women in the workforce and the level of economic growth can be determined by a long-term U-shaped relationship. This condition occurs because economic growth will first increase female labour force participation but then reduce female labour force participation. Since then, a large amount of theoretical and empirical evidence has concentrated on the

mentioned relationship. Dogan and Akyűz (2017) show evidence of an inverted U-curve between economic growth and female employment in Türkiye. The relationship between female labour force participation and economic growth rates is relatively stable and correlated with time, so research results for various countries and groups of countries vary (Lechman & Kaur, 2015).

There is strong evidence of a U-shaped relationship between female labor force participation educational attainment and economic growth. This relationship is known as the U-shaped female participation curve or U-curve hypothesis. This is reinforced by the U-shaped phenomenon in Becker (1965) theory which explains the relationship between economic status and the level of women's work participation. According to Verme (2015) to form a U-curve in the economic development process with female labor force participation requires quite a long period because the country is thought to have completed the development process. The U-curve phenomenon will appear in several countries, especially in developing countries (Djirimu et al., 2023).

In 2006 the Indonesian Central Statistics Agency provided statistical data disaggregated by gender, this aims to identify developments in women's empowerment. With this data, various gender problems can be identified across development sectors in each region.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Female	47.13	49.05	49.79	51.32	52.5	54.53	53.75	53.46	53.16	55.27	53.27	56.53	57.91	55.95	54.73	54.03	54.27
Male	84.74	83.72	83.58	83.62	83.33	84.86	85.67	85.12	85.04	83.62	83.46	83.05	83.01	83.18	83.82	82.14	83.65

Figure 1. Labor Force Participation Levels According to Gender in Indonesia 2006-2022 (Percent)
***Source:** Indonesian Central Statistics Agency 2006-2022, processed by the author*

Figure 1 shows that the percentage of female labor force participation rate from 2006 to 2022 tends to be slow and stagnant in the range of 40 to 50 percent. Meanwhile, from 2006 to 2022, the male labor force participation rate always reach more than 80 percent. Based on these conditions, research into the relationship and testing of the U-curve hypothesis of Indonesian women's labor force participation rate with education level and economic growth is interesting to carry out. The research results can be representative and research views for writers or other academics who want to analyze the influence and test the U-curve hypothesis on female labor force participation rate, education level, and economic growth.

2. LITERATURE REVIEW

Becker (1965) time allocation theory is the main theory on the topic of female labor absorption. There are two

factors influencing women's work, namely individual factors and regional factors. The discussion of the main theory is supported by other theories to strengthen the use of research variables.

Increasing the roles and responsibilities of women in economic development is an effort to achieve development and gender equality. The term "gender" was first introduced by Robert Stoller, who separated human details based on socio-cultural and biological physical characteristics (Nugroho, 2008). Regarding gender roles, the structural-functional theory or approach is an approach that is applied looking at the family institution, where men have the responsibility of being outside the home to look for food, and women have a role within the home in terms of carrying, nurturing and breastfeeding children. Based on gender issues, equality drives are carried out to find justice. According to Srisawasdi (2015), gender equality means that women and men enjoy equal status and places to obtain full human rights.

Both have the same potential to contribute to economic development such as workers.

According to Becker (1965) time allocation theory, female labour absorption is influenced by two factors, namely individual factors and regional factors. Becker (1965) explained that individual women choose to work based on time conditions and personal needs. Family members allocate time in the labour market based on the choice between leisure and earning wages for satisfaction. Women work not based on personal and family needs because the head of the family is considered capable of providing for the family's needs. However, if women work for wages, this is based on helping the head of the family meet life's needs, fulfil secondary needs, fulfil lifestyle desires, etc. According to human capital theory, education and labour have a highly correlated relationship (Ismail & Sulaiman, 2014). Siphambe and Motswapong (2010) note that education can increase female labour force participation, with higher levels of education having a higher propensity to participate in the labour market even when they already have children.

Meanwhile, regarding regional factors, Becker (1965) theory explains the conditions of a phenomenon known as the U-shaped phenomenon. This applies to the relationship between economic status and the level of women's participation in the labour market. Women with household conditions in a depressed economy tend to work to earn high wages. Meanwhile, for women in middle-income households, the tendency to work is decreasing because the needs and desires of family members have been met. In addition, women from households in high economic conditions tend to work. This is because women try to fulfil their lifestyles, such as luxury goods, prestigious events, etc.

Conditions for female labour participation are closely related to economic growth. According to Kuznet's theory, economic growth will demonstrate the ability to increase production capacity in the long term, increasing the number of workers if balanced with advances in technology, institutions and ideological adjustments (Indrayana, 2021). This condition is reinforced by Fatria et al. (2020) statement that economic growth is one of the conditions for achieving economic development; an increase in the workforce will be in line with the extent of employment opportunities if the economic growth rate becomes faster. In other words, an increase in work participation will be in line with the extent of employment opportunities if the economic growth rate is high.

3. METHODOLOGY

The data model used is panel data consisting of cross-section data covering 34 provinces in Indonesia and time series data covering 2006 to 2022. Data was obtained secondarily from the Indonesian Central Statistics Agency (BPS). This research uses a data analysis method with two stages. The first stage estimates the influence of the relationship between the independent and dependent variables. It analyses the existence of the U-curve, and the second stage estimates the turning point for the U-curve using mathematical calculations. The regression equation model is as follows:

$$FLFP_{it} = \beta_0 + \beta_1 EDU1_{it} + \beta_2 EDU2_{it} + \beta_3 EDU3_{it} + \beta_4 EDU4_{it} + \beta_5 EDU5_{it} + \beta_6 EG_{it} + \varepsilon_{it} \quad (1)$$

The U-curve hypothesis was tested using quadratic panel data regression, as applied by Lechman and Kaur (2015). The existence of the U-curve hypothesis can be known from the slope of the quadratic equation. The quadratic regression equation model is as follows:

$$FLFP_{it} = \beta_0 + \beta_1 EDU1_{it} + \beta_2 (EDU1_{it})^2 + \beta_3 EDU2_{it} + \beta_4 (EDU2_{it})^2 + \beta_5 EDU3_{it} + \beta_6 (EDU3_{it})^2 + \beta_7 EDU4_{it} + \beta_8 (EDU4_{it})^2 + +\beta_9 EDU5_{it} + \beta_{10} (EDU5_{it})^2 + \beta_{11} EG_{it} + \beta_{12} (EG)^2 + \varepsilon_{it} \quad (2)$$

information,

β_0	=	intercept
$\beta_{1,2,.....,12}$	=	slope
εit	=	Error
FLFP	=	female labour force participation rate
EDU1	=	have not/did not graduate from elementary school
EDU2	=	elementary school
EDU3	=	junior high school
EDU4	=	senior high school/similar
EDU5	=	diploma/graduate/university
EG	=	economic growth
i	=	unit *cross-section* (1, 2, 3, ..., n).
t	=	unit *time series* (1, 2, 3, ...,T)

The following are the criteria for the existence of the U-curve hypothesis:

$\beta^2 > 0$, meaning that a U-shaped relationship occurs when the slope value of the quadratic equation is greater than 0.

$\beta^2 < 0$, meaning that an inverted U-shaped relationship occurs when the slope value of the quadratic equation is smaller than 0.

After knowing the existence of the U-curve, the second stage is to calculate the turning point using the following model:

$$TP = \frac{-\beta}{2\beta^2}$$

information,
TP = turning point
β^2 = slope/squared coefficient

4. RESULTS–WORLDWIDE PERSPECTIVE

Based on the best model estimation test, the Fixed Effect Model (FEM) is more suitable for use in analysis. The results of quadratic panel data regression show that simultaneously, the increase in female labour force participation is influenced by the level of education and economic growth with evidence of an f-statistic value of

56.5 (more significant than the f-table value of 2.11596) with a probability value of 0.000000. Meanwhile, the partial influence can be seen by comparing the t-table value (1.96421) with t-statistics and from the probability value of less than 0.05. (Ghozali, 2016). The following are the results of the quadratic panel data regression test.

Variable	Coefficient	t-Statistics	Prob.
PRA_SD	0,4268	3,06	0,0024
PRA_SD^2	-0,0004	-0,22	0,8234
SD	-0,696	-3,63	0,0003
SD^2	0,012	4,6	0,0000
SMP	-0,092	-0,2	0,8406
SMP^2	0,01	0,78	0,4362
SMA_K	0,315	1,92	0,0558
SMA_K^2	-0,003	-0,96	0,3377
UNIV	0,541	2,81	0,0051
UNIV^2	-0,001	-1,05	0,2936
PE	0,053	0,91	0,3620
PE^2	-0,006	-1,85	0,0645

Table 1. Quadratic Panel Data Regression Test Results
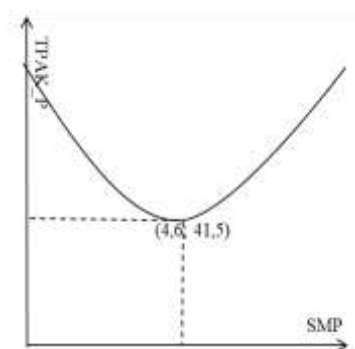*Source: processed by the author*

Table 1 shows differences in the results of the influence of education level and economic growth on female labour force participation in Indonesia. Meanwhile, the slope values in Table 1 can be used to find the existence of the U-curve hypothesis. The education level of primary school and junior high school has a value of β2 greater than 0, meaning that there is a U-shaped curve relationship. Meanwhile, the level of education that has not/did not graduate from primary school, high school/similar, diploma/graduate/university, and economic growth shows a relationship inverted U-shaped curve. The slope obtained from the results of the U-curve existence test is used to calculate the existence of turning points. The following illustrates the U-curve at the elementary and junior high education levels.
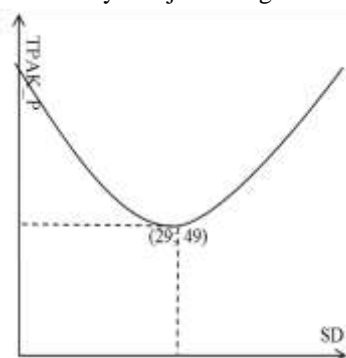
Source: processed by the author
Figure 1. Curve of Primary School Education Level Against Female Labor Force Participation Level

Figure 1 shows that the primary school education level experiences a U-curve phenomenon with a turning point for the percentage of primary school education level of 29 and female labor force participation rate of 49.

Figure 2. Curve of Junior High School Education Level Against Female Labor Force Participation Level
Source: processed by the author

Figure 2 shows that the junior high school education level experiences a U-curve phenomenon with a turning point for the percentage of junior high school education level of 4.6 and female labour force participation rate of 41.5. The regression results regarding the influence and testing of the U-curve hypothesis on the relationship between female labour force participation rate, education level, and economic growth in Indonesia from 2006 to 2022 are explained as follows.

4.1 The Influence of Educational Level on Female Labor Force Participation Levels

Individual education for women is an initial investment that can impact improving personal quality. The study results show that the level of junior high school and high school/similar education does not affect women's labour force participation. The increase in female labour force participation is influenced by the level of education that has not/did not graduate from primary school and diploma/graduate/university level. In contrast, the primary school education level influences the decrease in female labour force participation. This condition is slightly different from the human capital theory (Ismail & Sulaiman, 2014), which states that an increase of one year of completed education can increase the chances of getting a job. The condition is inversely proportional to someone with low education who has little opportunity in the job market.

The research results are supported by Nur Asrofi et al. (2023), which states that women with deficient education tend to work because their family's economic conditions are classified as poor, while women with moderate education have a decreased tendency to work because they cannot compete in sectors that require them. high ability and women with higher education will tend to work because wages and the number of available jobs follow their abilities. This condition is reinforced by Becker (1965) theory, which states that women's work is not based on personal and family needs because the head of the family is considered capable of meeting the family's needs. However, if women work for wages, this is to help the head of the family meet life's needs, fulfil secondary needs, or desire a high lifestyle.

4.2 The Effect of Economic Growth on Female Labor Force Participation Levels

Economic growth is the process of continuously changing the economic conditions of a country towards a better condition than the previous period. According to Wulandaria et al. (2021), economic growth is one of the conditions for achieving economic development, which will trigger an increase in the workforce. This basis is different from the findings, which show that economic growth in Indonesia does not influence increasing or decreasing female labour force participation. Djirimu et al. (2023) stated that economic growth does not affect the participation of women in the labour force on the island of Java. According to Kumari (2018)., the high participation of the female workforce in economic activities is caused by awareness of the need to participate in development, the desire to be independent in the economic sector, the need to increase family income, and broad employment opportunities (Sasongko et al., 2020).

Data from the Indonesian Central Bureau of Statistics shows that the high economic growth of West Papua Province in 2010 did not increase female labour force participation in that province, while the low economic growth in Papua Province in 2006 did not guarantee low female labour force participation. Other evidence 2018 Bali Province, the high female labour force participation in the province did not indicate high enough economic growth, while the high economic growth in Bali Province in 2012 did not increase female labour force participation. This means other factors other than economic growth make women want to participate consistently in the labour market. According to Resosudarmo et al. (2014), economic growth does not favour the poor, as happened in West Papua Province, with the highest average economic growth nationally at 11.27 per cent per year. However, the percentage of poor people in the province is second place after the province. Papua. Saefullah et al. (2023) explained that high economic growth will affect many poor people in Indonesia. So basically, the increase in female labour force participation is more due to the desire to support the family's needs and economy; women do not care about the conditions of economic growth in Indonesia (Harijadi, 2020).

4.3 The Relationship and Existence of the U-Curve Hypothesis on Determinants of Women's Labor Force Participation Levels

Female labour force participation in Indonesia shows an inverted U-shaped curve with levels of educational completion that have not/did not graduate from primary school, high school / similar, and diploma / graduate / university. The results of the analysis state that an increase will follow the high number of women in the workforce with this education in female labour force participation. These results are inversely proportional to the completion of primary school and junior high school education, which shows a U-curve shape. According to Nur Asrofi et al. (2023), women with secondary education have a decreasing tendency to participate in the job market due to the large number of women in the workforce who are still studying at a higher level or unable to compete in sectors that require high skills.

The U-shaped curve phenomenon in women's education levels and labour force participation occurs because of the family's economic conditions. Ahmed and McGillivray (2015) stated that the labour force participation of women with low levels of education in developing countries has a high level of work participation due to competition in the labour market and low family socio-economic conditions. This statement is reinforced by Becker (1965) theory, which states that the relationship between economic status and women's participation in work is shaped like the letter U. When the household level is depressed, women tend to work to earn additional wages. Meanwhile, women in middle-class households tend to work less because their living needs are met. Apart from that, for women in high-income households, the tendency for women to work increases due to their high lifestyle.

Indonesia is one country categorised as developing, with the average population being lower middle class. Improving education is a problem due to the significant cost factor. This condition makes Indonesian women from lower economic backgrounds not continue their education and choose to work. Cholifah and Sutrisno (2024) explains that female workers with less than primary school education are likelier to become workers in primary sectors such as agriculture, animal husbandry, forestry and fisheries. This is because the primary sector generally does not require educational qualifications. In addition, according to Siphambe and Motswapong (2010), education can increase women's labour force participation, where higher levels of education have a higher tendency to participate in the labour market even when they already have children.

The results of the analysis of the economic growth curve with female labor force participation in Indonesia show an inverted U-shaped relationship, meaning that high economic growth will be followed by an increase in female labor force participation. However, under certain conditions, high economic growth is followed by a decline in female labor force participation. According to Kuznet's theory, economic growth will demonstrate the ability to increase production capacity in the long term to increase the number of workers if it is balanced with advances in technology, institutions and ideological adjustments (Arsyad, 2010). This theory is proven by the findings of Sunarya et al. (2024) which states that the increase in the labor market in Indonesia is influenced by information and communication technology. The shift occurred when economic development changed to a labour-intensive sector, so there was more demand for male labour than for females. Women are considered weak creatures and do not have as much strength as men, such as lifting or delivering goods (Sampurno, 2024). Based on this, the female workforce will prefer to continue their education or become housewives and this raises gender issues. According to the structural-

functional gender theory, men will be breadwinners and women will focus on the household and children. The findings differ from Verme (2015) findings, which state that developing countries will show a U-curve phenomenon because the role of women in economic activities has grown (Harijadi, 2020).

5. CONCLUSIONS

Based on the results of the analysis and discussion that have been explained, the following conclusions were obtained:

1. The level of education that has not/did not graduate from primary school and diploma/graduate/university affects increasing women's work participation. In contrast, the elementary school education level affects decreasing women's work participation. women's workforce participation by education level is influenced by the family economy and the availability of jobs that match their abilities. women

with a moderate level of education have a low tendency to work because they cannot compete in the labour market and the family economy, which is considered capable of meeting their needs.

2. Economic growth does not affect participation in the female labor force. the high participation of the female workforce in economic activities is not due to economic growth but from the awareness of individual workers who want to participate in development, be independent in the economy, family economic conditions, and broad employment opportunities.

The phenomenon of the u-curve hypothesis appears in the relationship between elementary school and junior high school education levels. The increase in the number of women with school education will affect the decline in female labor force participation. This condition is due to the large number of women still studying at a higher level or their inability to compete in sectors requiring high skills.

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