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Wages, Life Expectancy and Working Population in Indonesia: The implications of demographic bonus

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Wages, Life Expectancy and Working Population in Indonesia:

The implications of demographic bonus

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Abstract—**Increased life expectancy and the large number of elderly population in Indonesia are condition that appears today as an implication of demographic phenomenon. This increase in life expectancy should be balanced with an increase in the number of people who work, hence the elderly population contributes positively to the country's economy instead of being a burden on the country. One of the factors driving the working population is the wages received from the industry. Industry or Businesses are labor markets that are expected to provide remuneration in the form of wages that can guarantee the longevity of society. Since, one of the ways community maintains their longevity is by working. Thus, the provision of decent wages that are able to maintain the longevity of society is a manifestation of the business or industry responsibility to the society. This phenomenon is a reason to investigate the effect of wages on the working population, as one of the economic variables, in Indonesia. Therefore, this study aims to examine the relationship between the working population and wages, as well as several other variables, that hypothetically thought to have influences, namely the birth rate, mortality rate, minimum wage, unemployment, and secondary school participation rates. This research is a quantitative research by estimating the equation with the Ordinary Least Square method and using time series data. The results of this study found that wages, education, unemployment and life expectancy significantly influence the increase in the number of people working in Indonesia. The implication of this study is the importance for the industry to provide a decent minimum wage so that more people with a longer life expectancy will work so that they contribute positively to the country's economy.**

Keywords—working population; life expectancy; minimum wage

I. INTRODUCTION

Increased life expectancy and the large number of elderly population in Indonesia, when compared to the elderly population in other ASEAN countries became a phenomenon which then raises the question [1,2]: Is it a problem or a gift for the Indonesian economy? If it becomes a burden (unproductive) it becomes a problem. If productive, it becomes a gift in the form of reduced amount of the insured's burden.

Based on the demographic transition approach, decreasing in birth rates and mortality rates can increase life expectancy, and subsequently result in aging populations with consequences that may have a positive or negative impact. Positive impact of population aging can change the lifestyle of the population, with high life expectancy, parents will invest more in the health and education of their children. Increased life expectancy is also the cause of a longer working period so that more money is saved and more number of working population. This shows the positive influence of population aging on increasing savings, it is what we so call one of the demographic bonus [3,4].

Conversely, negatively, the increased in life expectancy that results in aging of the population causes a reduction in the number of workers and can burden public financing, because the growth in the number of elderly population is charged to the state through government programs for elder people, which results in reduced government spending for the younger generation. Reduction in government spending for the younger generation causes restrictions on economic prosperity, and limits the level of investment which in turn affects economic growth, though and based on previous studies that population aging does not hamper technological progress nor does it hamper economic prosperity [5]. It is believed that demographic transitions explained the existence of comparative economics [6]. Based on the problems described, this study aims to examine the relationship between life expectancy and working population. Research on life expectancy has evolved, one of which relates to the point of view of the field of study. For example, the study of the problem of life expectancy in 1980 was emphasized more from a microeconomic point of view [7], then the assessment of life expectancy was more seen from a health perspective [8], furthermore looked at a macroeconomic perspective [9], but life expectancy is still believed to require further studies with different approaches, as was done in this study. This study uses analytical techniques that are different from previous studies, although they are equally assessing from a macroeconomic perspective. For instance, previous research examined life expectancy using the Markov model approach and multinomial logistic regression analysis techniques; this study examines using the

demographic transition approach and multiple regression analysis technique [9,10].

II. LITERATURE REVIEW

Based on the demographic transition theory approach, demographic variables may contribute positively to economic growth, this process begins with a demographic transition-changes in mortality rate and hence the reduction on fertility rate [11] that creates changes in the age structure so that there is an increase in the population of working age or productive age that can sustain a population of dependency or non-productive age) [12], thus more portions of the population work or are active economically [4], namely the number of people working in the population.

The occurrence of demographic transitions, declining birth rates and mortality rates, changes in the age structure, causes more people to be in working age, and affect the number of working population [13]. In addition to changes in age structure, it is stated that another factor that influences the number of people who work is the number of unemployed [14]. Unemployment allows fewer working people because there are fewer jobs available, but unemployment also allows one to participate in the labor market, because of the tendency to support the main economic families at risk of experiencing work termination. in addition to the birth rate, death rate and unemployment, the factors that also affect the working population are income and education. The income (wages) generated to improve welfare [15], education, where the higher the education the more the population works [8], and the increase in life expectancy that causes a longer period of work so that it affects the working population [4].

There are two main theoretical foundations of wage, namely the Philips Curve and the Wage Setting Curve; in some research it is believed that Phillips Curve is preferable to the Wage Setting curve [11]. The Phillips Curve indicates the effect of unemployment on the wage.

III. METHOD

This study uses secondary data, in the form of time series data, obtained from competent and accountable institutions to publish the data, namely the Central Statistics Bureau of Indonesia. The variables used in this research are: Wage (minimum wage), unemployment, secondary school participation rate, fertility rate, mortality rate, life expectancy, and working population. Life Expectancy is life expectancy at birth indicating the number of years a newborn baby will live if the death pattern that applies at the time of birth is to remain the same throughout his life. Whereas, the working population is the population aged 15 years and over who works. The data used in this study is data as long as period 1985-2014. Minimum wage data during the 1985-1989 period were proxies by using 1990 data due to data unavailability.

In order to test empirically, two technical approaches are used to analyze data, namely qualitative analysis techniques and quantitative analysis techniques, using multiple regression analysis techniques to identify the relationships between variables to be studied in this research.

This study estimates the equation with the OLS (Ordinary Least Square) method. The type of data used is secondary data, in the form of working population data, life expectancy, birth rate, mortality rate, minimum wage, unemployment, and junior high school junior high school participation/enrollment rates. Junior high school participation rates were chosen as the education variable used in this study with the reason of examining the benefits of government policies in the form of 9-year compulsory education, which requires society to have a minimum education until junior high school.

IV. RESULTS AND DISCUSSION

In this study, for the validation process, the coefficient of determination (R^2) and Root Mean Square Error (RMSE) are used. The coefficient of determination (R^2) (on the R-Squared output) is 0.994585 which means that the diversity of working population that is able to explain the birth rate, mortality rate, minimum wage, unemployment, life expectancy, and school enrollment rates simultaneously / together is 99.46% with the remaining 0.54% explained by errors or other variables not included in the regression model. In other words, the goodness of the regression model that is formed is 99.46%. To assess the goodness of the model, RMSE is used in this model, a good RMSE value is obtained, i.e.: 1.19773 (small value).

Furthermore, it will be explained and discussed the results of regression testing between the variables studied. The output results listed in table 2, show this test gives the conclusion that:

- There is a significant influence of the Minimum Wage on Working Populations. The regression coefficient for the Minimum Wage variable is 1.26E-05 (or 1.26 x 10-5) (positive influence); that means if there is an increase of 1 unit of the Minimum Wage, then it will be obtained an increase in the value of the Working Population of 1.26 x 10-5; and vice versa if there is a decrease of 1 unit from the Minimum Wage, then the value of the Working Population will be reduced by 1.26 x 10-5.

- There is a significant influence on unemployment on working populations. A regression coefficient for the Unemployment variable of -0.615200 (negative influence) is obtained; that means if there is an increase of 1 unit of Unemployment, then the value of the Working Population will be reduced by 0.615200; and vice versa if there is a decrease of 1 unit of Unemployment, then it will be obtained an increase in the value of WORK (Working Population) of 0.615200.

- There is a significant influence of the junior high school Participation Rate on the Working Population. Regression coefficients obtained for the variables of junior high school participation rate of 1.580559 (positive influence); that means if there is an increase of 1 unit of the junior high school Participation Rate, then it will be obtained an increase in the value of the Working Population of 1.580559; and vice versa if there is a decrease of 1 unit from the Participation Rate junior high School, it will be obtained a decrease in the value of the Working Population of 1,580559.

- There is a significant influence on Life Expectancy on Working Population. The regression coefficient for the variable Life Expectancy variable is 1,580559 (positive influence); that means if there is an increase of 1 unit of Life Expectancy Age, it will be obtained an increase in the value of the Working Population of 1.580559; and vice versa if there is a decrease of 1 unit from Life Expectancy Age, it will be obtained a decrease in Working Population value of 1,580559.

- There is no partial influence / individual Fertility Rate and Mortality Rate on Working Population. In other words, if there is an increase / decrease of 1 unit of each individual Birth Rate and Death Rate, then the value of the Working Population will not be affected.

Equations involving all variables are formulated, as the following:

$$WORK_t = -22,84842 + (-0,018859)\,FER_t + (-1,848723) \quad (1)$$
$$MOR_t + (1,26 \times 10^5)WAGE_t + (-0,615200)UNEMPL_t + 0,289290\,JPR_t + 1,580559LE_t + e_{1,t}$$

$$e_{1,t} = 0,276309\,e_{1,t-1} + v_{1,t} \quad (2)$$

Whereas:

WORK: Working Population

FER: Fertility Rate

MOR: Mortality Rate

WAGE: Minimum Wage

UNEMPL: Unemployment

JPR: Secondary (junior high school) participation rate

LE: Life Expectancy

Based on these findings, it can be said for the variable mortality rate, minimum wage, and life expectancy affect the supply of labor in accordance with previous research. There is a negative and significant influence between the mortality rate on the population that works in accordance with the results of research conducted by previous study [13].

The declining mortality rate of the Indonesian population, based on the crude mortality rate as described earlier, shows a trend that is opposite to the number of people who work. These data indicate that During the period 1970 to 2010 there was a decline in mortality, but then increased again in 2012. In contrast, the number of working population increased until 2000 and there was a decline in 2010.

TABLE I.   TESTING THE SIGNIFICANCE OF THE REGRESSION COEFFICIENTS AND P-VALUE OF THE EQUATION WITH WORKING POPULATION (WORK) AS THE RESPONSE VARIABLE

Predictor Variable	Regression Coefficient	P-value
Constanta	-22,84842	0,4540
Fertility rate (FER)	-0,018859	0,8775
Mortality Rate (MOR)	-1,848723	0,0564
Minimum Wage (Wage)	1,26E-05	0,0000*
Unemployment (UNEMPL)	-0,615200	0,0088*
Junior High School Participation Rate (JPR)	0,289290	0,0016*
Life Expectancy (LE)	1,580559	0,0005*
AR(1)	0,276309	0,2101

* Significant for a significant level (α) of 5%.

The existence of a positive influence on the minimum wage on the working population shows that the wage factor affects the population to work, this is consistent with the labor supply theory [15]. Although the results of this study found that the magnitude of the changes caused by the minimum wage to the working population, the value was too small that indicate the change in the minimum wage which was occurred did not significantly affect the working population. This shows that changes in wage levels only cause small changes in the working population, this condition is strengthened by the fact that there are still many people who do not work, so that the demand and supply of labor is not balanced, which causes the population to remain willing to work at low wages.

The existence of a positive and significant influence on life expectancy on the working population as expected, these results support demographic transition theory and these results are consistent with a decrease in mortality shows a better quality of life so that a longer life expectancy can be achieved [4,16]. As data on life expectancy and working population in Indonesia show the same trend, namely an increase over the past 30 years, the data and findings in this study indicate that the increasing life expectancy of the Indonesian population causes the population to work longer so that the population increases working younger, and still working older people (retirement age residents) causes more residents to work.

Furthermore, there is no influence between fertility rates, mortality rate and working population, stating that the decline in fertility rates does not cause an increase in the number of people working in Indonesia. this is contrary to the expectation expected in this study and contrary to the results of research conducted previously [17]. However, it is possible to do so given the declining in birth and date rate in Indonesia is accompanied by a slowdown in the number of working people.

The results of this study also indicate that there is relationship between unemployment and labor supply, negatively, in line with expectations expected in accordance with the research which is stated that the factors that affect the number of people who work are the number of unemployed [14]. The phenomenon that there is negative relationship between unemployment and labor supply contrary to one of the unemployment theory approaches, namely search and matching model, where unemployment remains as a result of the lack of conformity between workers and available jobs, not as a result of job unavailability [18]. One of examples is as happened in the Islamic banking industry, there are three conditions that

become problems that show the application of the search and matching model, which supports the condition of unemployment without influence on labor supply, namely: (1) there is a discrepancy between job seekers and labor desirable work, as a result of the lack of availability of competent, knowledgeable, skilled and professional human resources, (2) the labor market, especially universities have not been able to provide the number of graduates who have the knowledge and expertise needed, (3) compensation rates what is offered is not attractive to workers who have the required expertise [19].

Likewise, the presence of influence from education on the working population supported the findings of previous research [20]. The phenomenon that there was influence from education as measured by junior high school participation/enrollment rates, indicate the successfulness of the government policy regarding the 9 years' compulsory of education. The number of working population in Indonesia is still dominated by people with lower levels of education, and there are still a sizeable percentage of unemployed people with a higher level of education. Citizen with a higher level of education choose jobs with better positions and wage rates, so that they choose not to work until they get a job with the desired income, which is frictional unemployment [14], this finding is consistent with the findings that there is still no frictional unemployment.

Moreover, based on the data in Table 2 the number of people working in Indonesia in 2000, 2007 and 2014 was still dominated by people with low levels of education. In 2000, the number of working population with lower elementary school education was 62%, the number of working population with secondary school education was 33%, while the number of working population with a higher education level was 4.43%. Similar conditions occurred in 2007.

TABLE II.   COMPLETED EDUCATION AND NUMBER OF POPULATIONS WORKING IN INDONESIA IN 2000, 2007 AND 2014

Completed Education	2000	2007	2014
no / never attended school	7.099.954	5.394.670	5.187.494
no / not yet graduated from elementary school	14.429.846	13.013.110	15.815.487
Elementary School	34.290.316	37.961.150	32.952.556
Junior high school	13.995.118	18.830.204	20.350.838
High School (General)	11.842.154	12.747.029	18.579.737
High School (Vocational)	4.202.420	5.788.656	10.520.757
Diploma I / II / III / Academy	1.959.299	2.597.593	2.956.780
University	2.018.623	3.597.805	8.264.377
Total	89.837.730	99.930.217	114.628.026

Source: Indonesia Centre of Statistic Bureau

In 2007, the number of working population with elementary school education and below add up to 56.41%, the number of working population with secondary school education was 37.39%, while the number of people working with high school education. higher education by 6.20%. Then in 2014, the number of working population with elementary school education downward was 47.07%, the number of working population with secondary school education was 43.14%, while the number of working population with higher education was 9.79%.

Compared to the three groups of population education levels that worked during the period 2000-2014, it was seen that the largest number of people working in Indonesia had elementary school education and below, followed by secondary education, then the smallest number was working population with higher education, vocational education and university. Despite the change of number, the percentage with low education level decreases, the percentage with a higher education level increased, but still through 2014 the dominance of the number of working population is dominated with lower levels of education.

V. CONCLUSION

The purpose of this research was to examine the relationship between, wage, life expectancy and some other variables to working population. Based on the findings of this research it can be concluded that: wages, education, unemployment and life expectancy affect the increase in the number of working population. The higher the wage, the more amounts of people who go to work. The longer the life expectancy, the more amount of people who go to work.

This research supports the findings from previous research or theory related to the relationship between these investigated variables. Increased minimum wages affect the willingness of individuals to work to help reduce the burden on the government in the obligation to provide subsidies to dependent populations, since the population does not work in non-productive age. In other words, increasing in life expectancy in Indonesia along with the elderly population and working population, provides information that there is an increase in the number of retirement age people who are still working, which contributes to the reduction of the demographic burden on the economy.

Hence it becomes a task for the business world and / or the industry and the government, to maintain this supportive condition through wages ethically and realistically, and through the establishment of policies that support the implementation of these conditions, as part of the expansion of employment opportunities. Because through this program, the population is able to age productively without reducing employment opportunities for the younger population groups.

In term of further research, it become an opportunity to other researcher to carry out a new model, add new theory, and/or to use new method in order to implement further research that related to this research, since some limitation was conducted by this research. Hence the further research will contribute more to the body of knowledge.

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