The Changing Impact Analysis of Working Population

by Sari Lestari Zainal Ridho

The Changing Impact Analysis of Working Population toward Gross Domestic Product Per Capita in Indonesia

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Abstract
The conducive demographic condition in Indonesia will occur when there is a change in demographic structure caused by a decrease of population ratio of not working age and the working age population. It is an appropriate moment to take advantage of the conditions for development in Indonesia. But the possibility of the population contributing positively or negatively toward the economic growth is still being debated today, given empirically as there are demographic influences to the different economy in different countries, it is necessary that there is an analysis of the changing demography in Indonesia toward the economic growth, because of that, the purpose of the study was to analyze the demographic change impact, and in particular changes in the number of working population and some other variables, such as working population, human capital and savings, toward the economic growth as measured by GDP per capita. The results of this study concluded that the demography change in Indonesia, in the form of the birth rate reduction and number of working population increase, had a positive impact toward the economic growth, this conclusion was supported by the finding that over the last thirty years, the growing of working age population, which began with the decline of birth rates affected positively toward GDP per capita in Indonesia.

Keywords: Demography, Economic Growth, Human Capital and Working Population

1 INTRODUCTION

Demography as one of economic resources has two effects toward the economic growth which are mutually contradictory, that it is able to provide a positive impact in the form of a demographic bonus, and a negative impact in the form of a demographic trap. The change in the population age structure may give a positive impact to the economic growth. This is due to changes in population size and also accompanied by changes or additions to the working age population. However, the change in population size may also cause a burden increase, if the population number increase goes along with the increase in the working age population, but without an increase in the number of population absorbed in the labor market.

Demographic conditions in Indonesia during the period of the last third of a century, showed the opportunity to enjoy the beneficial effects of the demographic change in Indonesia. It was characterized by a decrease in measures of births and deaths in the population, and one consequence is a change in the form of a reduce of ratio of not working age population or dependency ratio and or increase of the working age population or support ratio.

Based on the data, in the period from 1970 to 2005 the number of not working age population was compared to the working age population continued to decline. In 1971 the dependency ratio was 81.49, in 1980 was 79.12, in 1990 was 67.83, in 2000 was 53.78 and in 2005 was 50.81, the numbers showed the significant declines of the dependent population numbers and or increased the number of working-age population.

Considering the possibility of positive and negative impacts of demography and demographic conditions of Indonesia today, the study aimed to analyze the impact of demographics/population changes, particularly the number of working population toward the economic growth in Indonesia, whether a demographic bonus or demographic burden and to analyze other variables which gave effects or influences toward the economic growth, and to know the other variables that affected dominantly among the variables studied.

2 LITERATURE REVIEW

Literature review is a frame that limits from which point a phenomenon can be seen and explained, as well as the phenomenon of demographic changes, including changes in the working age population and the economic growth in Indonesia. Various theories, concepts, viewpoints and approaches were used to explain how certain variables affected the economic growth. This study was conducted to analyze the phenomenon of the population number change and the impact on economic growth in Indonesia. Hence, we would discuss some theories and concepts that explained the relationship between several demographic variables and other variables that affected the economic growth.

2.1 Demography and Economic Growth

One of indicators of an economic development success in a country is the economic growth. Many factors influence many variables and one of them is demography. There are some thoughts explaining how demography affects the economic growth, and demography could affect positively or negatively toward the economic growth (Kuznets, 1967; Malthus, 1798). The gap of these thoughts got the pros and cons from other economists. Another opinion supporting the idea that demography have positive effect toward economic growth, expressed by Bloom and Williamson (1997), but according to them these effects occur not automatically or directly but through the mechanism of labor supply, human capital, savings.

An explanation of how the mechanism changes or population dynamics affecting the economic growth can be explained by several concepts or ideas. **The first thought**, using a theoretical approach of labor supply, confirms the demographic positive influence toward the economic growth. This thinking begins with the onset of the demographic transition, (the changing patterns of population growth which initially have high birth and death rates high then have low birth and death rates), it generally leads to a strong medium term positive impact on the growth of income per capita through labor supply, because the opposite condition, namely a high birth rate is generally associated with poverty as a result of reduced investment and capital. In addition, the declining of birth rate is also always associated with labor supply in general, and increasing of female labor participation rates in particular, which then can lead to increase the economic growth (Benister, Bloom, and Rosenberg, 2011). This thinking became the foundational reason the effect of labor supply toward the economic growth supported by the economic growth model proposed by Solow that to produce output, every economy requires capital, labor and knowledge (Romer, 2005), so that the change in the number of workers or the number of working population will affect economic growth. The thought is a theoretical approach of the labor supply (labor supply theory), as proposed by Bloom et al, (2009).

The second thought, using the human capital theory approach (human capital theory) which states the relation between investment in human capital and economic growth (Becker, 1993). This thinking is based on the relationship among human capital, fertility and economic growth (Becker, Murphy and Tamura, 1993) who found that the decrease of the birth rate will make the existence of nuclear families which are fewer in number causing parents can invest more for the education and the health of their children, thereby increasing their productivity in the future (Silipo, 2009). Similarly, parents can invest more in health and education of their own, which will increase their productivity.

Furthermore, the decline in the birth rate can increase life expectancy; then, it also results in aging populations with conditions that may affect positively or negatively. The aging population positively changes the population lifestyle, with high life expectancy, the parents will invest more in health and education of theirs and their children.

The third thought is a savings theoretical approach which the demographic transition leads to changes in the age structure that increase age and decrease age of not workforce, Besides, the increase in life expectancy causes longer periods of work so that more savings are deposited. This shows the positive impact of aging population toward the increase of savings (Guest and McDonald, 2001).

Based on Solow model, it shows that the savings rate is an important determinant of capital stock in steady state. If the saving rate is high, the economy will have a large capital stock and high output levels. Conversely, if the saving rate is low, the economy will have a small capital stock and low output levels. Furthermore, how many countries save and invest is an important determinant factor of living standards or welfare of the population. If a country, part of its income is used greater in saving and investing, the economy in the country will grow much more rapidly with the increasing of national production and eventually reaching a steady state with a greater consumption (Mankiw, 2007).

One thing that also affects the amount of savings is the age or life expectancy. Positively, the longer the person's life expectancy the longer time a person works and the amount of savings will add more. Negatively, the increase of life expectancy resulting in aging population leads to reduce employment and can weigh on public financing, because the growing number of seniors are charged to the state through government programs for the elderly and it causes a reduction in government spending for young generation. The reducing of government spending for the young generation leads to restriction in economic welfare, and limits the investment level which in turn it will affect the economic growth. However, based on a study conducted by Prettner (2009) that the aging population does not inhibit technological progress as well as do not hamper the economic welfare.

3 METHODOLOGY

3.1 Types, Data Sources and Data Collection Methods

The data used in this research were secondary data, in the form of time series data, which were obtained from various institutions that were competent and authorized to publish the data to the interests of various parties, including researchers, such as the data published by the Central Bureau of Statistics. The data collection method used in this research was the documentation method which the data used were the crude birth rate, the support ratio, investment, education budget, interest rates, the population work, education, life expectancy, savings and Gross Domestic Product per capita in Indonesia over the last 30 years during 1985-2014.

3.2 Variables and Measurements

In this study, the measurements made toward economic growth used Gross Domestic Product per capita in Indonesia, as a dependent variable. While the independent variables were data of birth rate (measured by the crude birth rate), the support ratio (measured by the ratio of the working population and the total population), invest (measured by domestic investment), the education budget, the interest rate (measured

by the interest rate of bank Indonesia, BI rate), the working population, education (measured by secondary school enrollment), life expectancy, and the variables that also affected the Gross domestic Product per capita in the form of domestic savings and gross domestic product per capita in previous years in Indonesia.

To analyze the data, two approaches were conducted, namely the qualitative and quantitative analysis techniques. The qualitative analysis technique was performed by analyzing and describing the discussion in this study based on theories on the literatures. While quantitative analysis analyzed data in the form of numbers of data collection results. The quantitative analysis technique used in this research was multiple regression analysis with the Ordinary Least Square technique to identify the effect of the crude birth rate, the support ratio, investment, education budget, interest rates, the working population, the secondary school enrollment rate, life expectancy, and domestic savings variable and gross domestic product per capita in the previous period toward the Gross domestic Product per capita in Indonesia.

3.3 Test Instruments

Based on the data collection methods, collecting data was done by using secondary data, then the validity and authenticity of a social research results was largely determined by measuring instruments used. If measuring instruments used are not valid or cannot be trusted, then the results of research conducted will not describe the actual reality. In accordance with the standard instrument design, that before the test instrument is used as a research tool, the classical assumption test have to be done beforehand. Therefore, the tests were conducted by using four kinds of testing, they were tests for normality, multicollinearity, and heteroscedacity test, and autocorrelation.

3.4 Model

Economic growth with national production indicators, as measured by GDP per capita, was influenced by many variables, such as the birth rate, the productive ratio, investment, the education budget, health budgets, interest rates, the working population, the secondary school enrollment, life expectancy, savings and national product in previous period. The model used in this study could be formulated as follows:

$$\log(GDP_{,t}) = \alpha_0 + \alpha_1 CBR_{,t} + \alpha_2 SR_{,t} + \alpha_3 INV_{,t} + \alpha_4 BDGT_{,t} + \alpha_5 INT_{,t} + \alpha_6 WORK_{,t} + \alpha_7 EDU_{,t} + \alpha_8 LE_{,t} + \alpha_9 SAV_{,t} + \alpha_{10} \log(GDP_{,t-1}) + e_{5,t} \tag{1}$$

4 ANALYSIS AND DISCUSSION

4.1 Statistical Analysis of Multiple Linear Regression Equation

Since the data used were time series autocorrelation data so there would be a need anticipation with the addition of Autoregresive model of order p = 1 or AR (1). Mathematically, the equation model formulation became:

$$\log(GDP_{,t}) = \alpha_0 + \alpha_1\,CBR_{,t} + \alpha_2\,SR_{,t} + \alpha_3 INV_{,t} + \alpha_4\,BDGT_{,t} + \alpha_5\,INT_{,t} + \alpha_6\,WORK_{,t} + \alpha_7\,EDU_{,t} + \alpha_8$$
$$LE_{,t} + \alpha_9\,SAV_{,t} + \alpha_{10}\log(GDP_{,t-1}) + e_{5,t}$$
$$e_{5,t} = \rho\,e_{5,t-1} + v_{5,t} \tag{2}$$

4.2 Classical Assumption Test

There were some classical assumptions that had to be met, OLS assumption test was done to get the best model and in accordance with the OLS assumptions was Best Linear Unbiased Estimation (BLUE). Terms in the classical assumption could be stated: (1) random variables and the normal distribution; (2) non multicolonierity; (3) non autocorrelation and homoscedasticity. In this study the test results of the classical assumption test on the OLS estimation concluded that the model had a Normal distribution residual, no multicolinearity, no heteroscedaticity, and no autocorrelation.

4.3 Estimated Model

For the validation process the coefficient of determination (R^2) and Root Mean Square Error (RMSE) were used. The coefficient of determination (R^2) (on the output of **R-Squared**) obtained was 0.998294, which meant that the diversity **z1** enabled to explain **CBR, SR, INV, BDGT, IR, WORK, EDU, LE,** and **SAV** simultaneously / together was 99, 82% with the remain 0.18% was explained by error or other variables not included in the regression model. In other words, the regression model goodness formed was 99.82%. To assess the model goodness RMSE size could be used, SSE value was obtained from the output value of **Sum squared resid**, and the value of n was the number of data observations and the p-value was the number of model coefficients. In this model to produce a good MSE value was 0.064923 (small value). From the results of the output Table 1, the tests gave conclusions that:

1. There was a significant effect of CBR (birth rate) toward GDP (GDP per capita). The regression coefficients for the variables x1 was obtained -0.066426 (negative effect); meaning that if there was an increase of 1 unit of CBR (Crude Birth Rate), the impairment log (GDP) would be 0.066426 (or the increase in GDP (GDP per capita) as exp (0.066426) = 1.068682); and vice versa in case of a decrease of 1 unit of CBR (Crude Birth Rate), the increase in the value of GDP (GDP per capita) would be 1.068682.

2. There was a significant effect of INV (Domestic Investment) tward GDP (GDP per capita). The regression coefficients for the variables INV (Domestic Investment) was -2,19E-06 or -2.19×10^{-6} (negative effect); meaning that if there was an increase of 1 unit of INV (Domestic Investment), the impairment log (GDP) was 2.19×10^{-6} (or increase in GDP (GDP per capita) as exp (2.19×10^{-6}) = 1.000002); and vice versa in case of a decrease of 1 unit of INV (Domestic Investment), the impairment GDP (GDP per capita) would be 1.000002.

3.   There was a significant effect of WORK (Working Population) toward GDP (GDP per capita). The regression coefficients for the variables WORK was

0.048909 (positive effect); meaning that if there was an increase of 1 unit of WORK (Working Population), the increase in the value of log (GDP) would be 0.048909 (or the increase in GDP (GDP per capita) as exp (0.048909) = 1.050125); and vice versa in case of a decrease of 1 unit of WORK (Working Population), the increase in the value of GDP (GDP per capita) was 1.050125.

4. There was no effect of partial / individual SR (Support Ratio), BDGT (Education Budget), IR (Interest Rate), EDU (Enrollment of Secondary School Rate), LE (Life Expectancy) and SAV (Domestic Saving) toward GDP (GDP per capita). In other words, if there was an increase / decrease of 1 unit of each individual SR (Support Ratio), BDGT (Education Budget), IR (Interest Rate), EDU (Secondary School Enrollment Rate), LE (Life Expectancy), and SAV (Domestic Savings), then the value of GDP (GDP per capita) would not be affected.

Table 1. Testing the significance of the regression coefficients and P-value of the equation by log response variables (z1) (log GDP per capita).

Predictor Variabels	Regression Coefficients	P-value
Constanta	7,869565	0,0002*
CBR (Birth Rate)	-0,066426	0,0000*
SR (Productive Age Ratio)	-0,036084	0,5341
INV (PMDN)	-2,19E-06	0,0044*
BDGT (Education Budget)	-7,77E-07	0,7899
IR (Interest rates)	0,001769	0,5683
WORK (Working population)	0,048909	0,0287*
EDU (Enrollment of Secondary School)	0,002053	0,8102
LE (Life Expectancy)	0,006766	0,8592
SAV (Savings)	3,94E-08	0,8089
log(GDP (-1))	0,375390	0,0072*
AR(1)	0,002512	0,9931

*Significance for significant level (α) was 5%.

Equations involving all variables were portrayed:
$$\log(GPD_{,t}) = 7{,}869565 - 0{,}066426\, CBR_{,t} - 0{,}036084\, SR_{,t} - 2{,}19 \times 10^{-6}\, INV_{,t}$$
$$-7{,}77 \times 10^{-7}\, BDGT_{,t} + 0{,}001769\, IR_{,t} + 0{,}048909\, WORK_{,t} + 0{,}002053\, EDU_{,t}$$
$$+ 0{,}006766\, LE_{,t} + 3{,}94 \times 10^{-9}\, SAV_{,t} + 0{,}375390\, \log(GDP_{,t-1}) + e_{5,t}$$
$$e_{5,t} = 0{,}002512\, e_{5,t-1} + v_{5,t} \tag{3}$$

Findings from this study indicated that demographic transition partially was represented by a decline in the crude birth rate which significantly affected GDP per capita, and the crude birth rate variable representing demographic variable were variables that had influence dominantly after the economic growth variable last period. This showed there was an effect of demographic change toward the economic

growth performance which supported the theory of demographic transition by Bloom and Williamson (1997).

However, productive ratio had no effect on GDP per capita, consistent with the findings that there was no influence of the working population and human capital toward GDP per capita. This phenomenon was caused by the low quality of working person in Indonesia. Based on the data discussed earlier, the percentage of the working population of the workforce in Indonesia over the last 30 years had decreased, and dominated by people with low education level (Table 4.9), in other words, only a few of them were highly educated (less than 10%), it certainly affected the competence and subsequently, labor productivity, as the results of research conducted Soebyakto & Sun (2012), which stated that the competence of the workforce was considered important, because it affected the quality of the worker's person.

The results of this study also showed no effect of public budget reduction toward the economic performance in the economy due to no effect of education budget to GDP per capita, it did not support the previous research done by Azwardi, (2007); Bloom and Williamson (1997). One reason for this phenomenon was the low amount of the education budget in Indonesia compared to the education budget in other countries in ASEAN (as described earlier).

Findings from this study also showed that partially independent variables in the model in the form of interest rates and the savings also did not affect the GDP per capita. This finding contradicted the Solow`s economic growth model. This proved that savings did not play an important role in contributing toward the economic growth. One reason was the amount of domestic savings had not been able to meet the required investment, in other words there was saving-investment gap (Chenery and Strout, 1965), the gap between the amount of domestic savings and investment requirements needed to achieve a certain economic growth rate so that external financing was required, it was supported by data showing the extent of use of other fund sources by the government, especially the external financing. In 2015, PMA investment realization for January-September period reached 66.7% with an investment was Rp 266.8 trillion. Earlier in 2014 the PMA proportion reached 74.1% out of the total investment plan into BKPM, while PMDN was 26.9% or Rp 335.7 trillion.

Other important finding, and became the main focus of this study was that there was a significant influence on number of working population variable towards the Gross Domestic Product per Capita. Although it was not a variable dominating in influencing the development of Gross Domestic Product per capita in Indonesia, but based on the results of this study it showed the positive effect of increasing the number of working population in Indonesia toward the increase of the Gross Domestic Product per Capita.

5 CONCLUSIONS AND RECOMMENDATIONS

The results of this study indicated that there was a positive effect of demographic variables toward economic variables, which was supported by the findings of the positive influence of declining crude birth rate together with the performance of working population number variable toward the development of Gross Domestic Product per capita. These results supported the theory previously proposed by Bloom and Williamson.

Based on these results, there was a recommendation for the government in order to be more serious to create a conducive environment and policies to the population growth and including the number of working population as part of efforts to sustain improvement of economic growth performance in order to utilize the window of opportunity to obtain a demographic bonus, so that Indonesia can achieve a sustainable economic development state.

Communities also need to raise awareness to start from themselves in achieving planned population condition both in quantity and quality, so the decline in birth rates as the demographic variable and the increase of working population can contribute positively to economic growth variable. Because we need to realize both by the government as an institution and the community in groups and individually, both plight the population condition and government policies that go with it, will have lasting impact for the development of the Gross Domestic Product per capita in Indonesia.

Furthermore, we also recommend to do further research using this type of research, the conceptual framework, including diverse variables and different methods, so you can find a number of new findings that are useful in expanding and developing the theory and knowledge that can be used as a tool in solving the existing problems through the application of appropriate policies.

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