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

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ABSTRACT

The positive demographic condition in Indonesia will occur when there is a change in demographic structure caused by a decrease of population ratio of non-working and working age population. It is appropriate moment to take advantage of this condition for Indonesian development. Nevertheless, the possibility of whether populations contribute positively or negatively to the economic growth is still being debated today. Empirically, there are demographic influences to the economy in other countries. It is necessary that there is an analysis of the changing demography in Indonesia to the economic growth. This study was aimed to analyze the demographic change impact, and in particular the changes in the number of working population and some other variables, such as working population, human capital and savings to the economic growth as measured by GDP per capita. The results of this study showed demography change in Indonesia was in the form of the birth rate reduction and the increasing number of working population. Demographic change in Indonesia positively impacted to the economic growth. This conclusion was supported by the finding that over the last thirty years, the growing of working age population initiated by 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 to the economic growth which are mutually contradictory, that it is able to provide a positive impact in the form of demographic bonus, and negative impact in the form of demographic trap. The change in the population age structure may give positive impact to the economic growth. This is due to changes in population size and changes in working age

population. However, the change in population size may also cause increasing burden, if it is followed by the increase in the working age population but not well absorbed in labor market.

Demographic conditions in Indonesia during the period of the last three centuries showed the possibility to enjoy the benefit of demographic change in Indonesia. It was characterized by the decrease in birth and death rate. One of the impacts was the decreasing of working age population (dependency ratio) and/or the increasing of the working age population (support ratio).

Based on the data, in the period from 1970 to 2005 the number of non-working age population comparing to working age population continued to decline. In 1971 the dependency ratio was 81.49, in 1980 were 79.12, in 1990 were 67.83, in 2000 were 53.78 and in 2005 were 50.81. The numbers showed significant declines of dependent population numbers and/or increase in the number of working-age population.

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

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 has 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, and 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 idea** is theoretical approach of labor supply. It confirms that demographic positively influence economic growth. This idea 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 causes a strong medium term positive impact on the growth of income per capita by labor supply. The opposite condition likes high birth rate is generally associated with poverty as the result of the decrease of investment and capital. In addition, the declining of birth rate is also always associated with labor supply in general and the increasing of female labor participation rate in particular that leads to the increase of economic growth (Benister, Bloom, and Rosenberg, 2011). This idea is the fundamental reason for labor supply to affect economic growth as proposed by Solow that is in order to produce output; every economy requires capital, labor and knowledge (Romer, 2005). It means that the change in the number of workers or the number of working population will affect economic growth. This idea is a theoretical approach of the labor supply (labor supply theory), as proposed by Bloom et al, (2009).

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

Furthermore, the decline in the birth rate can increase life expectancy; then, it also results in aging populations that may five positive or negative effects. The aging population positively changes the population lifestyle, with high life expectancy; the parents will invest more in health and education for themselves and their children.

The third idea is the savings approach where demographic transition leads to changes in age structure that increase the age of workforce and decrease the age of non-workforce. Besides that, the increase in life expectancy causes longer period of work so that more savings are deposited. This shows positive impact of aging population to the increase of savings (Guest and McDonald, 2001).

Based on Solow model savings rate is the important determinant of capital stock in steady state. If savings rate is high, the economy will have large capital stock and high output level. In contrary, if saving rate is low, the economy will have a small capital stock and low output level. Furthermore, the number of countries that save and invest is the important determinant factor of living standard or welfare of the population. In a country, if part of its income is used greater in savings and investing, the economy of the country will grow much more rapidly by the increasing of national production and eventually reach a steady state with 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 more the amount of savings will be. Negatively, the increase of life expectancy resulting in aging population leads to reduce employment and become burden for public financing since the growing number of seniors are charged to the state through government programs for the elderly and causes reduction in government spend 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 affects the economic growth. However, based on a study conducted by Prettner (2009)

the aging population did not inhibit technological progress as well as did 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 for 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. The data were the crude birth rate, the support ratio, investment, education budget, interest rates, the work population, 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 to 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 social research results was largely determined by measuring instruments. 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, which before the test instrument is used as a research tool, the classical assumption test has to be done beforehand. Therefore, the tests were conducted by using four kinds of testing, they were tests for normality, multicollinearity, and heteroscedasticity 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 was 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 were time series autocorrelation data so there would be need anticipation with the addition of autoregressive model of order p = 1 or AR (1). Mathematically, the equation model formulation was:

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

$$e_{5,t} = \rho \, e_{5,t-1} + v_{5,t} \tag{2}$$

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 were: (1) random variables and the normal distribution; (2) non multicollinearity; (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 multicollinearity, no heteroscedasticity, 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 obtained coefficient of determination (R^2) (on the output of **R-Squared**) was 0.998294 meaning that the diversity **z1** enabled to explain **CBR, SR, INV, BDGT, IR, WORK, EDU, LE,** and **SAV** simultaneously 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 formed regression model goodness was 99.82%. To assess the model goodness RMSE size could be used, SSE value was obtained from the output value of **Sum squared residual**, 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 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 -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) to GDP (GDP per capita). The regression coefficients for the variables INV (Domestic Investment) was -2,19E-

06 or -2.19 x 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 x 10-6 (or increase in GDP (GDP per capita) as exp (2.19 x 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 Variables	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 that 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. Soebyakto & Ming (2012) 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 that there was no effect of public budget reduction to the economic performance in the economy due to no effect of education budget to GDP per capita. This 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. This 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 266.8 trillion IDR. Earlier in 2014 the PMA proportion reached 74.1% out of the total investment plan into BKPM, while PMDN was 26.9% or 335.7 trillion IDR.

Other important finding, and became the main focus of this study was that there was a significant influence on number of working population variable to 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 positive effect of increasing number of working population in Indonesia to 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 to economic variables. This was supported by the findings of the positive influence of declining crude birth rate together with the performance of working population number variable to the development of Gross Domestic Product per capita. These results supported the theory previously proposed by Bloom and Williamson.

Based on these results, government was recommended 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 sustainable economic development state.

Communities also need to raise awareness in achieving planned population condition both in quantity and quality so that the decline in birth rates as the demographic variable and the increase of working population can contribute positively to economic growth variable. Government as an institution and the community in groups and individually must realize that the population condition and government policies will have long term impact on the development of the Gross Domestic Product per capita in Indonesia.

Furthermore, it is recommended to do further research using this type of research, the conceptual framework, including diverse variables and different methods, so that there will be 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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