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Study of Causality of Demographic Bonus and Economic Welfare in Indonesia

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ABSTRACT: This study integrates the variables of the quantity of its own population, the level of school participation and government expenditure on the health sector to see its effect on GDP per capita. In addition, other objectives are also to see the relationship between variables used in the study. The analytical method used is according to the purpose of using the OLS method and granger causality. The results of the analysis show that the population quantity variable (birth ratio, population number, workforce number), school participation rate and government expenditure on health have a significant and positive impact on the increase in GDP per capita, and the mortality ratio has a significant negative effect on GDP per capita. Meanwhile, the results of granger causality, birth ratio variables, mortality ratio, LFPR, and school participation rates have a direct relationship to GDP per capita. While the population and expenditure government on the health sector have a two-way relationship with GDP per capita. So that the condition implies that the importance of policies related to population and fiscal policies to improve human quality so that it can improve welfare.

KEY WORDS: Demographic Bonuses, Government Expenditures on Health, GDP per capita, OLS, Granger Causality

I.INTRODUCTION

The population component that contributes to development is called the bonus demographic consisting of productive age population between 15-65 years. This demographic component also experiences a demographic transition as a result of dynamics or changes in age structure. This demographic transition occurs when the initial population growth rate increases followed by an increase in economic growth, then decreases due to a decrease in the rate of death and birth (fertility). This demographic transition will also affect changes in the age structure of the population as indicated by an increase in the working age population, meaning an increase in the productive age population which will have a positive impact on development (Baerlocher, et al., 2019). The dominance of the population in the productive age structure will have an impact on the increase in per capita income which brings changes to the improvement of people's welfare.

In an empirical study conducted by Baerlocher, et al., (2019) using panel data with the GMM method found that changes in age structure have a pure effect on controlling human capital in Brazil so that the essence of this age structure is directed at increasing human capital through education. Meanwhile, in the empirical study of Barros, et al (2015) conducted in Brazil highlighting problems that are more directed towards demographic components with poverty. The results of the analysis by Baroos et al (2015) found a decrease in poverty due to demographic changes that were dominated by working-age population which had an impact on increasing per capita income which affected welfare and decreased poverty. In a broader context, this demographic transition does not only increase per capita income, but also can have an impact on poverty reduction if it is balanced with a balance in the labor market.

Efforts to optimize the demographic role must also be supported by the government's contribution in maintaining the quantity and quality of the population. Demographic transitions that can provide a demographic bonus to development need to be focused more on the quality of the population. Reflections on the quality of the population can be seen from education and health. In the long term, the quality of this population can have an impact on development and human capital, which in turn will make a positive contribution to the development and welfare of the community. One form of government contribution in improving the quality of the population is manifested in infrastructure development, government spending on education and health and so forth. In Indonesia, with a population profile that has undergone a transition for several decades and is projected in 2030 to have the opportunity for a demographic bonus (Bappenas, 2017), the government also makes various efforts to capture these opportunities.

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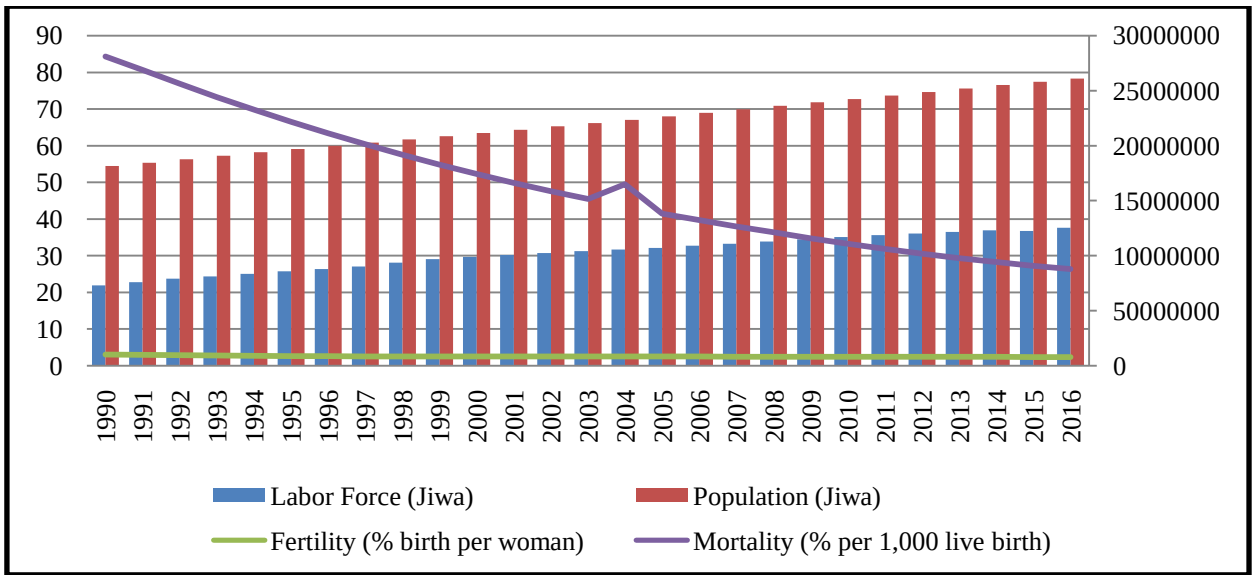

Figure 1.1 Demographic Components in Indonesia
Source: World Bank, 2019

In Figure 1.1 this shows the demographic phenomena in Indonesia which consist of labor force, population, birth rate (fertility) and mortality rate (mortality). Over the past 25 years, there has been a striking change in demographic structure at the death rate, population and workforce. The population and labor force component in Figure 1.1 shows a trend that tends to increase every year. This condition confirms that every year there is an increase in the population in Indonesia, but also accompanied by changes in the age structure as indicated by an increase in the number of the workforce. The increasing trend in the working age group as indicated by the increase in labor force data is a reflection of the opportunity for demographic bonuses where the population of productive age dominates the population component so that it can provide opportunities for development. In addition, Indonesia's demographic component also shows a decrease in the mortality rate (mortality) during 1990 to 2002 even though in 2003 there was an increase in mortality. Then in 2004 to 2016 showed a trend of decreasing mortality rates. This condition is also one indication of the increasing quality of the population in terms of health, which has an impact on the reduction in mortality. Meanwhile, the birth rate is still under control with a fairly stable increase every year.

Indonesia's demographic conditions are reflected in Figure 1.1. This indicates an indication of the opportunity for demographic bonuses as projected by several population and national development institutions. This phenomenon is also supported by the government's efforts, one of which is through government spending directed at improving the quality of the population through the education and health sectors which in the long run will affect human development.

Departing from the series of empirical, theoretical and phenomena that have been described, this study wants to focus research related to the opportunity for bonus demographics, which requires the attention that is dominant in terms of human quantity and quality so that positive development can be achieved. Human quantity is reflected in population, number of births, number of deaths and number of labor force. Meanwhile, in terms of human quality combined with the conceptual framework of government spending on the education and health sectors as a reflection of human quality. So that in this study, it is intended to see how the influence of human quantity and quality (education and health sector government expenditure) in influencing GDP per capita in the long term will contribute to increasing per capita income as a manifestation of public welfare.

II. LITERATURE REVIEW

The demographic transition model arises due to the difference between birth and death. The first literature that discusses is related to the demographic transition model, namely Warren Thompson in 1929. In the study of Warren Thompson in 1929 determined three types of countries with different population growth rates. First (Group A) are those who face a potential population decline, even though the mortality rate in these countries is low, the birth rate declines rapidly. Included in this category are Western European countries and foreign countries that have been settled by

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immigrants from Europe. Group B consists of countries where birth and death rates have dropped, but where the mortality rate has declined earlier and faster than the birth rate. In group B, according to Warren Thompson the population grew very rapidly, until a significant decline in birth rates, and then a declining population. Included in this group are Eastern and Southern European countries. Countries in Group C where birth and death rates are out of control.

Explanation of a decrease in death rates is certainly easier than birth, despite what proportion to determine the main contributing factors (medical discovery, improved water control and waste disposal, health, hygiene and public administration, higher standards of living, better housing and conditions diet, etc.) far from being unanimously agreed upon. For the development of birth, which demands the most attention among these writers (birth is seen as a condition of survival), the factors appear more numerous and complex. However, our two major pioneers (Landry and Notestein) share the view that births decline primarily in response, and adjustments to the structural changes in the economy and society. Greater socio-economic influences of development, which are considered the core of transition theory, have often been questioned, and the main ones of the economy are sometimes highly contested. Because traditional socio-economic indicators have failed to explain the diversity of demographic experiences recorded in European social theory based on culture (language barriers), socio-politics (lines of conservative versus progressive thinking) or anthropological reasoning (family structure, ethnic heritage) have been put forward in contrast.

In the first phase of the transition, when mortality begins to decline while births remain high, the mortality rate decreases the most at the youngest age, causing an increase in the proportion of children in the population and increasing the dependency ratio of children. Thus, contrary to intuition, a reduction in the initial mortality rate makes the population younger than the older in a phase that can last decades and here lasts 70 years. Furthermore, when birth declines, the ratio of child dependence decreases and immediately falls below this level of transition. The working age population grows faster than the population as a whole, so the total dependency ratio decreases. This second phase may be the last 40 or 50 years. Some analysts worry that labor is growing rapidly in this phase can lead to increased unemployment and a decrease in the ratio of working capital (Coale and Hoover, 1958).

Another case is the economic advantage of having a relatively large share of the population in his working years, calling it a gift or demographic bonus (Williamson and Higgins, 2001; Bloom, Canning and Malaney, 2000). There is a lot of controversy about whether this demographic bonus really affects economic development, ongoing debate from the 1980s (National Research Council, 1986; Kelley, 1988; Birdsall, Kelley and Sinding, 2003). In the third phase, increasing longevity causes a rapid increase in the elderly population while low births slow the growth of the working age population. The old age dependency ratio increases rapidly, so does the total dependency ratio.

III. METHODOLOGY

Data Sources used in this study are secondary data in the form of annual time series data from 1985 to 2017 in Indonesia. Determination of the beginning of the study year was based on data availability and a shift in population structure that began in the 1980s, which in the 1980s the number of working-age population began to increase and continue to increase each year (World Bank, 2011). The variables used in this study are population, birth ratio, and mortality ratio, number of labor force, labor force participation rate, government expenditure on health, school participation rates, and GDP per capita.

The research model used in this study was adopted from the research conducted by Bearlocher *et al.* (2019). Bearlocher *et al.* (2019) examines the economic impact of demographic bonuses in the territory of the State of Brazil. In order to answer these empirical questions Bearlocher *et al.* (2019) using the GMM System method. From the study, Bearlocher *et al.* (2019) found that the demographic bonus or change in age structure only had an economic impact after the control of human capital, therefore, in the case of a demographic bonus in Brazil it was divided into two parts namely the economic impact and the impact of education, from the study showing that the impact of education in bonus demographics have a greater economic effect.

$yt= 0+1st+2pt+3wt+4cbrt+5cdrt+6Popt+7Ht+it$

Where Y_t is the GDP per capita as a proxy of income per capita. Then S_t is the level of education participation, P_t is the level of labor force participation while W_t is the number of labor force. Furthermore, CBR_t is the birth ratio while CDR_t is the ratio of death and POP_t is the number of population and H_t is a health variable that is proxied by government expenditure on health.

The method used in this study is Ordinary Least Square(OLS) and granger causality. Ordinary Least Square(OLS) is the least squares method used to achieve the smallest error (minimum) (Nachrowi and Usman, 2006). In regression line analysis, this method has a considerable influence. In creating a good sample regression line, it takes

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the results of predictive values that are likely to be closest to actual data (Widarjono, 2013). Granger Causality Testis used to see the direction of the relationship between each of the variables used in the study, whether these variables have a relationship one-way or two-way. The concept of granger causality test is known as the true concept of causality, where the lag of π can affect current or future.

IV. RESULTS AND DISCUSSION

Based on the estimation results using *Ordinary Least Square* (OLS), the demographic bonus has a significant influence on per capita income which is proxy from GDP / Cap in Indonesia. This result can be seen from the probability value of each variable smaller than the alpha value (α = 1%, 5% and 10%). The results of the study using *Ordinary Least Square* (OLS) can be seen in Table 4.1

Table 4.1. Results of OLS Analysis

Variables	Coefficient	T-Statistic	Prob.
School Participation Rates	0.431 ***	2.043	0.005
Participation Force Labor	***0713	2034	0072
Total Labor Force	3686***	3053	0057
Birth Ratios	0851 **	5651	0019
Death Ratio	**-0474	-2174	0037
Total Population	0175 *	6438	0000
Public Expenditure on Health	0337 *	3100	0004
C	-0158	-0.475	0.638
Adj R-Square	0.930		

* Significant α = 1%, ** significant α = 5%, *** significant α = 10%

The probability value of the school enrollment rate variable which shows is 0.005 which is smaller than the alpha value (α = 10%). On the other hand, the coefficient value is 0.431 with a positive direction. This condition shows that the school enrollment rate is positively significant towards economic growth in Indonesia. So, when the level of school participation increases because it provides an increase in economic growth. The increasing level of school participation will provide an increase in the quality of the community, so that it will affect economic growth (Chang, et al., 2016; Khairunnisa, et al., 2014).

The same results are also addressed to the labor force participation variable with a probability value of 0.072 smaller than the alpha value (α = 5%) accompanied by a positive showing coefficient. This shows that labor force participation positively influences economic growth. Thus, when labor force participation increases it will affect economic growth through good quality workforce (Kargi, 2014; Shahid, 2014). At the birth ratio with a probability value of 0.057 smaller than the alpha value (α = 5%) shows that the birth ratio has an influence on economic growth. Thus, when the increased birth ratio will encourage good economic growth through good quality of resources (Mahumud, et al, 2013; Ngangue & Manfred, 2016). Different results are shown in the mortality ratio which is significantly negative in influencing economic growth. Probability value of death ratio is 0.037 smaller than alpha value (α = 5%), this condition shows when the ratio of death mortality will increase economic growth et al., 2011).

Total increase also has an influence on economic growth. This can be seen from the probability value of 0,000 smaller than the alpha value (α = 5%). When increasing population growth accompanied by high productivity will encourage more advanced economic growth. However, when a high population in non-productive age will cause inequality (Chang et al., 2016; Dao, 2017; Denton & G.Spencer, 1997; Peterson, 2017). The role of the government also has an influence on economic growth. This can be seen from government expenditures in the health sector that affect economic growth in Indonesia. This can be seen from the probability value of 0.004 smaller than the alpha value (α = 5%). Thus, when the government increases spending in the health sector it will improve the quality of life of the people. Thus, improving the quality of life will have an effect on economic growth (Aboubacar & Xu, 2017; Kurt, 2015).

Granger causality testing is used to see the causality relationship between variables. The causality relationship between variables can occur if the probability value is smaller than the alpha value (α = 1%, 5% and 10%). However, if a significant relationship is only one direction, there is no causality relationship.

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Table 4.2 Granger Causality Analysis

Relations between variables	Probability
GDP and School Participation Rate School Participation	0.289
Rate with GDP	0.077 ***
Labor Force Amount with GDP	0.058 ***
GDP with Labor Force Number Labor	0.516Force
Participation with GDP	0.089 ***
GDP with Labor Force Participation	0.923
Government Expenditures in Health with a GDP of	0.010 **
GDP with Government Health Expenditures	0.015 **
Total Population with GDP	0.003 *
GDP with Total Population	0,000 *
Death Ratio with	0.011**
GDPGDP with Death	0.448
Birth Ratio to GDP	0.024 **
GDP with a Birth Ratio of	0.471

* significant α = 1%, ** significant α = 5%, *** significant α = 10%

Table 4.2 is the result of granger causality analysis in this study. In the relationship of GDP with school enrollment rates there is no causality relationship. This condition can be seen from the probability value in the relationship of GDP with the school enrollment rate of 0.289 greater than the alpha value. On the other hand, the relationship of participation rates with significant GDP with a probability value of 0.077 is smaller than the alpha value (α = 5%). The same results are also shown in the relationship between the number of labor force and GDP that do not have a causal relationship. This can be seen from the probability value of the relationship between the number of labor force and GDP of 0.058 smaller than the alpha value (α = 10%). However, the relationship of GDP with the number of labor force is not significant because the probability value of 0.516 is greater than the alpha value.

Based on the results of the causality analysis on the labor force participation relationship with GDP also does not have a causality relationship. This condition can be seen from only labor force participation that has a relationship with GDP, but in the GDP relationship with labor force participation there is no relationship. Different results on the relationship of government spending in health with GDP which has a causality relationship. This can be seen in the value of the probability of government spending in health with a GDP of 0.010 smaller than the alpha value (α = 5%). The same results also in the relationship of GDP to government expenditure in health which has a probability value of 0.015 smaller than the alpha value (α = 5%). The relationship between population and GDP also has a causality relationship. This can be seen from the probability value of the population with a GDP of 0.003 smaller than the alpha value (α = 1%). While the relationship between the population and GDP also has a significant probability value that is 0.003 smaller than the alpha value (α = 1%). The relationship between the mortality ratio and the ratio of birth to GDP does not have a causality relationship. This can be seen from only the ratio of death and birth which has a relationship with GDP. But GDP does not have a relationship with the ratio of death and birth.

Based on the explanation from Bloom et al. 2003 and Gribble and Bremner 2012, there are policy adjustments made in order to be able to take advantage of the demographic bonus, namely as follows:

1. In the labor market, policies must be flexible regarding employment conditions, minimum wages, and working hours to be able to absorb many people in productive age and at same to protect employee rights.
2. Regarding household savings, maker policy need to consider incentives to encourage people to save and build assets to protect their lives when they retire.
3. Health and prosperity depend on the health of the population. Therefore policy makers plan health services that are truly needed by the community so that health inequality does not occur.
4. Quality workforce education by developing development skills and innovations by empowering existing resources in Indonesia.

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V. CONCLUSION

Based on the results of the analysis and discussion, Population components such as birth ratio, LFPR, number of labor force and population have a significant positive effect on increasing per capita GDP. In addition, the quality of the population reflected in the level of school participation and policy government in the expenditure budget for the health sector also has a significant positive effect on the increase in Indonesia's per capita GDP in the long run. Meanwhile, the mortality ratio has a negative influence on the increase in GDP per capita in Indonesia. Based on the granger causality test to see the relationship between variables shows that there are 2 variables that have a positive relationship with GDP per capita, namely government spending on health and population (population). Meanwhile, other variables have a relationship in line with the increase in Indonesia's GDP per capita.

Based on the above conclusions, suggestions that can be recommended to improve population problems in Indonesia include:

1. Focusing on controlling age structures needs to be done more deeply, especially with regard to fertility and mortality.
2. Increasing the quality of the population of productive age needs to be done from various aspects both in terms of health and education which in the medium term can also create a productivity that is able to compete amid the current economic liberalization.
3. Government expenditure budgets, especially for education and health need to be increased such as Malaysia and Singapore which have more government spending on health and education for GDP. high compared to Indonesia. Because in terms of quantity, the population of Indonesia is larger so that it requires a larger budget.

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