http://ejournal.seaninstitute.or.id/index.php/Ekonomi
Jurnal Ekonomi, Volume 11, No 02 September 2022
ISSN: 2301-6280 (print) ISSN: 2721-9879 (online)

THE EFFECT OF DEMOGRAPHIC BONUS, HEALTH AND PHYSICAL CAPITAL ON ECONOMIC GROWTH IN INDONESIA

Arsyaf Tampubolon, Suwandy Purba

Faculty of Social Sciences, Mahkota Tricom Unggul University

ARTICLE INFO

Keywords:
Human Capital
Investment
Health
Panel Data Regression.

E-mail:
arsyaf.e@gmail.com

ABSTRACT

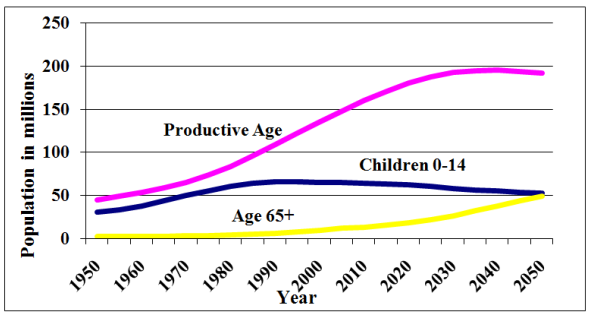
This study aims to analyze the effect of demographic bonuses, health and physical capital on economic growth in several provinces of Indonesia. Using panel data for the period 2010 to 2019. The study uses panel data regression analysis of fixed effect models. The results showed that the level of health had a positive effect on economic growth in the provinces located on the islands of Sumatra and Sulawesi, Indonesia. Meanwhile, other factors from the demographic bonus and physical capital have not had an effect on economic growth in the provinces of Sumatra Island and Sulawesi Island, Indonesia.

1. INTRODUCTION

The demographic bonus is the acceleration of economic growth that can be achieved by a country as a result of a shift in the age structure of the population whose the majority of the population are young workforces [1]; [2].

The implications of these demographic changes can be a bonus to increase a country's economic growth [3]. The demographic bonus can be an opportunity for the formation of unlimited availability of human capital. Success in taking advantage of opportunities from the demographic bonus is expected to encourage economic growth [4].

Indonesia is an archipelagic country with various cultural characteristics and has the fourth largest populationin the world after China, India and America. Indonesia's dependency ratio in 2010 was 50.5. In 2015 the dependency ratio was 48.6. This dependency ratio will be smaller in 2020 to 2030. The dependency ratio is the ratio of the non-productive age population to the productive age population. The decreasing dependency ratio shows that the productive age population aged 15 to 64 years is greater than the non-productive age population aged under 15 years and above 64 years.



Source : BPS

Figure 1. Population of Productive Age in Indonesia

Figure 1 shows the condition of the development of the productive age population (working age) in Indonesia. In 2000 the population of children decreased in number, on the contrary, the working age population increased. Likewise, the elderly non-productive age population continues to grow. It is

estimated that Indonesia will experience the window of opportunity in 2020-2030. The window of opportunity is a condition where the dependency ratio is the lowest. This condition is called the Demographic Bonus which can be used as an opportunity to achieve high economic growth and potential market sources.[5].

Achievement indicator standard of the success of human development in each region can be seen through the Human Development Index. Indonesia's HDI achievement nationally has increased from 1990 to 2018 from 0.525 to 0.7 according to data from UNDP. But on the other hand, the problem that arises is that the majority of open unemployment is still dominated by SMK graduates who are a source of skilled labor.

Many economists have conducted research on the contribution of human capital that affects economic growth for the case in several countries through the level of education, as has been done by [6], [7], [8], [9], [10], [11], as well as other economists. Institutional channels also have a role in influencing human capital [12]. The factor of trade openness both at the international and inter-provincial levels shows the level of human capital innovation that can contribute to economic growth [13] and [14]. For the case in Indonesia, research on the contribution of human capital has also been carried out by [15], [16] and [17] through various channels, namely education level, quality of education, knowledge transfer between regions, household consumption, age, and health factors.

But there are other opinions which say that human capital has no correlation or has a weak correlation with productivity as stated by [18], [19] and [20] and [21].

It seems that this gap arises due to differences in funding capabilities, population and regional characteristics in each country, so increasing the stock of quality human capital still requires hard work, especially for developing countries. The stock of quality human capital is higher in developed countries than in developing countries [22]. According to data from the world bank in 2018, the allocation of Indonesia's R&D funds was only 0.23 percent of GDP. When compared with countries that are included in the middle income category, the allocation of R&D to Indonesia's GDP is still relatively small, where the average allocation of R&D funds to GDP is 1.57 percent.

This is the reason for researchers to analyze how the relationship between human capital and the level of economic growth in several selected provinces in Indonesia is measured by the level of productivity.

According to Adam Smith and Veblen, human capital is very important in production. Adam Smith emphasized on the capital stock of the country where the acquired capabilities of the entire population are beneficial. According to Veblen, technological knowledge and skills are immaterial equipment or people's intangible assets, without human capital, physical capital is not productively useful [23]. The Solow-Swan model has made the first contribution to theory in analyzing the problem of economic growth through the level of productivity using the Cobb-Dauglas production function. Physical capital and human capital are considered as factors of production which are exogenous factors [24], [25]. Other researchers who say human capital as an exogenous factor are [26].

The formation of human capital is related to investment in people and their development as a creative and productive resource [23]. Similar empirical results are also shown by [27], [6] and [7] which analyzes human capital on economic growth, empirical results show that secondary school participation or higher education has a positive and significant impact on economic growth. [11] said that a qualified population through increased education can produce a more productive workforce and make a significant contribution to economic growth. Contrary to empirical results [12] which examines the relationship between human capital, public spending on health and education, infrastructure expansion, institutions and economic growth, shows that institutions are the only variables that significantly affect human capital in the short term and, therefore, the pursuit of good practices governance with the aim of strengthening institutions can be used to increase human capital in Africa.

Health factors are also a necessary input for the formation of human capital quality [28]. There is a potential link between the conditions in which people live and their lifespan and health status, as well as the relationship between health status and economic productivity and well-being [29], Health effects on human capital can be seen from the empirical results of research [30] which suggests that the labor productivity effect, which is claimed to accompany the demographic bonus, can be explained by changes in educational attainment that go hand in hand with declining fertility. The effects of demographic

dividends need to be understood in the context of the expansion of education that accompanies the observed changes in the age structure. Human capital is not only based on formal education and labor force participation but also on skills, cognitive function, and health.

2. METHOD

2.1 Type and Data Source

This research was conducted in 16 provinces in Sumatra and Sulawesi in Indonesia. The data is taken from 2010 to 2019. The data source used is secondary data by taking data from the Indonesian Central Statistics Agency. The criteria for selecting this sample are based on the characteristics of the projected population outside Java, where the island of Sumatra is ranked second and the island of Sulawesi is ranked third based on data from the Indonesian Central Statistics Agency. In addition, the island of Sumatra, which is located in the western region, is the second pillar of economic growth after Java, but there are still provinces that have GRDP growth below 5%. While the island of Sulawesi, which ranks fourth and is located in the East, there are no provinces that have GRDP growth below 5%.

2.2 Analysis Method

The data used in the form of panel data is a combination of time series data and cross section data. The advantage of panel data is that it can identify specific parameters or questions, without the need to make limited assumptions, because an individual unit behaves differently at different time periods, for example due to different pasts.

3. RESULT AND DISCUSSION

3.1 Chow Test Results

The Chow test is a test used to select the best approach between the Common Effect Model (CEM) and Fixed Effect Model (FEM) approaches in estimating panel data.

Table 1. Chow Test Results

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistics	df	Prob.
Cross-section F	382.164483	(15,141)	0.0000
Cross-section Chi-square	596,710483	15	0.0000

Source: Eviews 9 Data Processing (2022)

The results of the Chow test show that the cross section probability value obtained is 0.0000, which is smaller than the significant value of 0.05 so it can be concluded that the most appropriate model to use is FEM (Fixed Effect Model).

3.2 Hausman Test Results

Hausman test is a test used to choose the best approach between the Random Effect Model (REM) and Fixed Effect Model (FEM) approaches in estimating panel data.

Table 2. Hausman Test Results

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

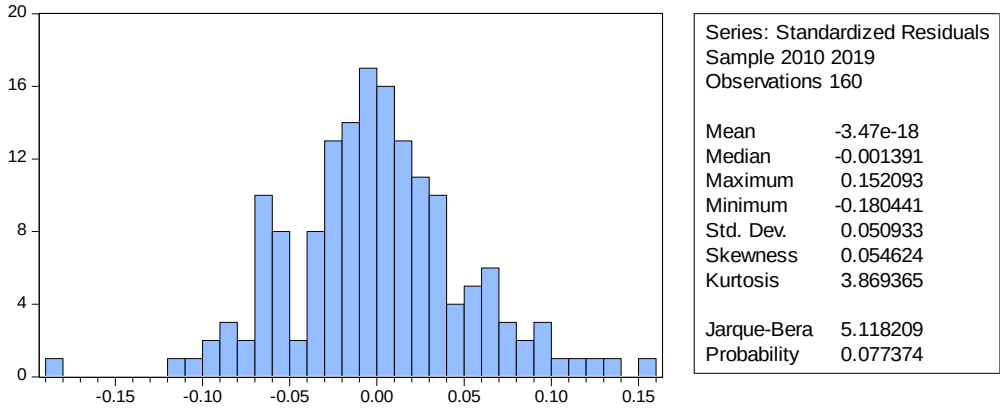
Test Summary	Chi-Sq. Statistics	Chi-Sq. df	Prob.
Random cross-section	13.396636	3	0.0039

Source: Eviews 9 Data Processing

The results of the Hausman test show that the Cross Section Random Probability value is 0.0039 which is smaller than the significant value of 0.5 so it can be concluded that the most appropriate model to use is FEM (Fixed Effect Model).

3.3 Normality Test Results

The residual normality assumption test was carried out using the Jarque-Bera test with the following results:



Source: Eviews 9 Data Processing (2022)

Figure 2. Normality Test Results

From the normality test, the probability value is 0.0774, which is greater than alpha 0.05, so the residuals are normally distributed.

3.4 Multicollinearity Test Results

The multicollinearity test aims to test whether in the regression model there is a high or perfect correlation between the independent variables.

Table 3. Multicollinearity Test Results

	HC	HEALTH	INVD
HC	1	0.342018	0.534168
HEALTH	0.342018	1	0.305812
INVD	0.534168	0.305812	1

Source: Eviews 9 (2022) Data Processing

In the results of the Multicollinearity Test, the correlation value between the independent variables is less than 0.8, so there is no multicollinearity.

3.5 Heteroscedasticity Test Results

From the results of the heteroscedasticity test, the probability value of each variable is greater than 0.05, this meaning that there is no heteroscedasticity.

Table 4. Heteroscedasticity Test Results

Dependent Variable: RESABS
Method: Least Squares Panel
Date: 07/03/22 Time: 14:03
Sample: 2010 2019
Periods included: 10

Cross-sections included: 16
Total panels (balanced) observations: 160

Variable	Coefficient	Std. Error	t-Statistics	Prob.
C	0.041220	0.109228	0.377374	0.7064
HC	-0.005687	0.004327	-1.314268	0.1907
HEALTH	0.000986	0.001595	0.618057	0.5374
INVD	0.001496	0.001696	0.881765	0.3793

Source: Eviews 9 (2022) Data Processing

3.6 Panel Data Regression Model and Hypothesis Testing

Panel data regression equation where the variables HC (X1), HEALTH (X2) and INVD (X3) as the independent variable that affects the variable ECONOMIC GROWTH (Y) as the dependent variable. The results of panel data regression are presented as follows:

Table 5. Panel Data Regression Results

Dependent Variable: Y
Method: Least Squares Panel
Date: 07/03/22 Time: 14:06
Sample: 2010 2019
Periods included: 10
Cross-sections included: 16
Total panels (balanced) observations: 160

Variable	Coefficient	Std. Error	t-Statistics	Prob.
C	-6.885216	1.077739	-6.388574	0.0000
HC	0.074750	0.109043	0.685506	0.4942
HEALTH	0.233356	0.017268	13.51368	0.0000
INVD	0.006332	0.003641	1.738875	0.0842

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.984274	Mean dependent var	10.30389
Adjusted R-squared	0.982266	SD dependent var	0.406155
SE of regression	0.054087	Akaike info criterion	-2.885367
Sum squared resid	0.412479	Schwarz criterion	-2.520190
Likelihood logs	249.8293	Hannan-Quinn Criter.	-2.737081
F-statistics	490.2764	Durbin-Watson stat	0.378879
Prob(F-statistic)	0.000000		

Source: Eviews 9 Data Processing (2022)

The results obtained from the coefficient of determination test with an adjusted R-squared value of 0.9823, meaning that 98.23% of the independent variable (X) used can explain the dependent variable (Y). The remaining 1.77% is influenced by other factors not included in this study.

Based on the regression results above, it can be obtained an equation of the regression line as follows:

$$\mathbf{Y_{it} = -6.8852 + 0.0748HC_{it} + 0.2334Health_{it} + 0.0063InvD_{it} + \varepsilon_{it}}$$

From these results obtained a constant value (C) of -6.8852. This means that if the variable X is constant, then the variable Y is -6.8852. The regression coefficient of HC is 0.0748, it can be interpreted that every 1% increase in HC will increase the value of Y by 0.0748 assuming the other independent variables are constant. With a probability value of 0.4942 (greater than 0.05), it means that the direction of the effect is positive but not significant on the dependent variable. The regression coefficient of health is 0.2334, so it can be interpreted that every 1% increase in health will increase the Y value of 0.2334 with the assumption that the other independent variables are constant. With a probability value of 0.0000 (less than 0.05), it means that the direction of the influence is positive and significant on the dependent variable. The regression coefficient of InvD is 0.0063, which means that every 1% increase in InvD will increase the Y value of 0.0063 with the assumption that the other independent variables are constant. With a probability value of 0.0842 (greater than 0.05), it means that the direction of the effect is positive but not significant on the dependent variable. These results indicate that health factors are very important in influencing productivity (economic growth). These results are in line with research from [29]. Finally we can say that health factor is an important factor in increasing productivity in the provinces in Sumatra Island and Sulawesi Island.

4. CONCLUSION

In the end, this study provides a comprehensive conclusion that, the demographic bonus that is being experienced by Indonesia has not provided benefits for increasing the productivity of the provinces in Sumatra and Sulawesi, Indonesia, but the health factor is the main factor in encouraging economic growth. However, we do not claim that the indicators used can represent the variables studied in the study. Suggestions for policy makers to be able to further develop human resources today to remote villages. If the development of human resources has been improved, it is hoped that the development goals can be achieved, namely increasing the welfare of the Indonesian people. Human resource development is not enough just from education alone, but must be accompanied by skills and good moral development. Researchers are aware of the shortcomings of the results of this study due to the limited number of samples, time and analysis. The dynamics of demographic changes on productivity will be more clearly seen if a sample with a longer period of time and more locations is used. It is hoped that in the future, other researchers can cover the shortcomings of this study.

REFERENCES

[1] D. E. Bloom and J. G. Williamson, "Demographic transitions and economic miracles in Emerging Asia," *World Bank Econ. Rev.*, vol. 12, no. 3, pp. 419–455, 1998.
[2] D. E. Bloom, D. Canning, and J. Sevilla, *The Demographic Revolution*, vol. 7, no. 2. 2003.
[3] M. Tienda, "Economic implications of demographic change: diversity dividend or deficit?," *Bus. Econ.*, pp. 11–17, 2016, doi: https://doi.org/10.1057/be.2016.1.
[4] Y. Yuan, X., & Gao, "Demographic transition and economic miracles in China: an analysis based on demographic perspective.," *Int. J. Econ. Policy Stud.*, vol. 14, pp. 25–45, 2020, doi: 10.1007/s42495-019-00030-0.
[5] BPS, *Analisis Statistik Sosial : Bonus Demografi dan Pertumbuhan Ekonomi*. Jakarta: Badan Pusat Statistik, 2012.
[6] R. Horii, A. Kitagawa, and K. Futagami, "Availability of higher education and long-term economic growth," *Japanese Econ. Rev.*, vol. 59, no. 2, pp. 156–177, 2008, doi: 10.1111/j.1468-5876.2007.00403.x.
[7] E. A. Hanushek, "Economic growth in developing countries : The role of human capital," *Econ. Educ. Rev.*, vol. 37, pp. 204–212, 2013, doi: http://dx.doi.org/10.1016/j.econedurev.2013.04.005.
[8] O. Kanayo, "The impact of human capital formation on economic growth in Nigeria," *J. Econ.*, vol. 4, no. 2, pp. 121–132, 2013, doi: 10.1080/09765239.2013.11884972.
[9] S. Day, C., & Dowrick, "Endogenous growth with R&D and human capital : the role of returns to scale," *Oxf. Econ. Pap.*, vol. 65, pp. 312–322, 2013, doi: 10.1093/oep/gps032.
[10] M. Rehmana, H. U., Kamrana, M., Basra, S., Afzala, I., & Farooq, "Influence of seed priming on

performance and water productivity of direct-seeded rice in alternating wetting and drying," *Rice Sci.*, vol. 22, no. 4, pp. 189–196, 2015, doi: 10.1016/j.rsci.2015.03.001.
[11] W. Han, S., & Lee, "Demographic change, human capital and economic growth in Korea," *Japan World Econ.*, vol. 54, 2020, doi: https://doi.org/10.1016/j.japwor.2019.100984.
[12] P. T. Shuaibu, M., & Oladayo, "Determinants of human capital development in Africa: A panel data analysis," *Q. J. Oeconomia Copernicana*, vol. 7, no. 4, 2016, doi: http://dx.doi.org/10.12775/OeC.2016.030.
[13] H. Ma, S., Dai , J., & Wen, "The influence of trade openness on the level of human capital in China: on the basis of environmental regulation," *J. Clean. Prod.*, vol. 225, pp. 340–349, 2019, doi: 10.1016/j.jclepro.2019.03.238.
[14] A. Xu, Y., & Li, "The relationship between innovative human capital and interprovincial economic growth based on panel data model and spatial econometrics," *J. Comput. Appl.*, p. 365, 2020, doi: https://doi.org/10.1016/j.cam.2019.112381.
[15] F. Liu , Y., & Yamauchi, "Population density, migration, and the returns to human capital and land: Insights from Indonesia," *Food Policy*, vol. 48, pp. 182–193, 2014, doi: 10.1016/j.foodpol.2014.05.003.
[16] P. Affandi, Y., Anugrah, D. F., & Bary, "Human capital and economic growth across regions: a case study in Indonesia," *Eurasian Econ. Rev.*, vol. 9, pp. 331–347, 2018, doi: 10.1007/s40822-018-0114-4.
[17] I. F. Nurmalia, Hartono, D., & Muzayanah, "The roles of entrepreneurship on regional economic growth in Indonesia," vol. 11, pp. 28–41, 2020, doi: 10.1007/s13132-018-0557-6.
[18] D. Levine, R., & Renelt, "A sensitivity analysis of cross-country growth regressions," *Am. Econ. Rev.*, vol. 82, no. 4, pp. 942–963, 1992.
[19] M. M. Benhabib, J., & Spiegel, "The role of human capital in economic development evidence from aggregate cross-country data," *J. Monet. Econ.*, vol. 34, no. 2, pp. 143–173, 1994.
[20] H. F. Devarajan, S., Swaroop , V., & Zou, "The composition of public expenditure and economic growth," *J. Monet. Econ.*, vol. 37, no. 2, pp. 313–344, 1996, doi: 10.1016/S0304-3932(96)90039-2.
[21] J. Quiggin, "Human capital theory and education policy in Australia," *Aust. Econ. Rev.*, vol. 32, no. 2, pp. 130–144, 1999, doi: 10.1111/1467-8462.00100.
[22] & et al. Amiruddin, R., "Human versus physical capital: issues of accumulation," *Econ Chang. Restruct*, vol. 52, pp. 351–382, 2019.
[23] M. Jhingan, *Ekonomi Pembangunan dan Perencanaan (Terjemahan 16 ed.)*. Depok: PT. RajaGrafindo Persada, 2018.
[24] X. S. Barro, J. R., & Martin, *Economic Growth (Second ed.).* Cambridge, Massachussetts: MIT Press, 2004.
[25] F. D. Barbosa, *Macroeconomic Theory*. Switzerland: Springer Nature, 2018.
[26] D. N. Mankiw, G. N., Romer, D., & Weil, "A contribution to the empirics of economic," *Q. J Econ*, vol. 107, no. 2, pp. 407–437, 1992.
[27] Q. Abbas, "Endogenous growth and human capital : A comparative study of Pakistan and Sri Lanka," *Pak. Dev. Rev.*, vol. 40, no. 4, pp. 987–1007, 2001.
[28] M. Grossman, "The human capital model. In A. J. Culyer, & J. P. Newhouse, handbook of health economics," *Elsevier Sci.*, vol. 1, pp. 347–408, 2020, doi: 10.1016/S1574-0064(00)80166-3.
[29] T. P. Schultz, "Health human capital and economic development," *J. Afr. Econ.*, vol. 19(suppl_3, pp. 12–80, 2010, doi: 10.1093/jae/ejq015.
[30] W. Cuaresma, J. C., Lutz, W., & Sanderson, "Is the demographic dividend an education dividend?," *Demography*, vol. 51, pp. 299–315, 2014, doi: 10.1007/s13524-013-0245-x.