

Contribution of Demographic Factors to Indonesia's Economic Growth

Alfa Farah¹, F. X. Sugiyanto²

^{1,2}Faculty of Economics and Business, Diponegoro University

Corresponding Author: alfafarah@live.undip.ac.id

Received: June 2024 | Revised: September 2024 | Accepted: November 2024

Abstract

Most empirical studies on the dynamics of Indonesia's economic growth predominantly adopt a Neoclassical framework. As the framework generally regards population growth as an impediment to economic growth, very few studies discuss the effect of demographic factors. Contributing to this limited literature, this study estimates the contribution of demographic factors to Indonesia's economic growth. We employed a descriptive accounting framework to decompose the growth of GDP per capita into pure labor effect and productivity effect. The decomposition analysis shows that the contribution of demographic factors to GDP per capita growth generally declined during 1971–2020. From 1971 to 2000, the pure labor effect contributed more than the productivity effect. This was due to demographic transition and productivity enhancing labor reallocation. However, from 2000 to 2020, the pure labor effect's contribution fell below that of the productivity effect. The benefits of the growing dominance of working population been largely offset by reallocation of labor from high to low productivity sector and the decreasing rate in the labor force participation, leading to the decline in the relative contribution of pure labor effect.

Keywords: demographic change, labor force, economic growth

JEL classification: J10, O40

How to Cite: Farah A., Sugiyanto F. X. (2024). Contribution of Demographic Factors to Indonesia's Economic Growth, 25(2), 171-181. doi:<https://doi.org/10.23917/jep.v25i2.23816>

DOI: <https://doi.org/10.23917/jep.v25i2.23816>

1. INTRODUCTION

Indonesian economy has expanded since the late 1960s. During the 1960s, per capita income was still below 100 US\$. By 2000, it was almost 2,000 US\$; by 2020 it reached 3,803.3 US\$. The average annual growth rate between 1971 and 2020 was 3.6 percent, with the highest rate of 7.4 percent in 1980 and the lowest of -14.5 percent during the 1998 economic crisis. In addition, the structure of Indonesian economy has gradual shifted from agriculturally based to industrial based economy. Industrialization, which was partly a respond to the external shock in the 1980s, not only succeeded in reversing the economy but also accelerated structural change. Table 1 shows that the contribution of industrial and service sectors have expanded, gradually replacing the domination of agricultural sector.

Table 1. GDP of Indonesia (1980-2020)

	1980	1990	2000	2010	2020
GDP (constant 2015 billion US\$)	158.2	270.3	395.1	657.9	1027.7
GDP per capita (constant 2015 US\$)	1077.4	1507.8	1962.9	2768.2	3803.3
GDP per capita (% annual growth)	4.4	3.1	2.4	3.2	2.9
Agriculture (% GDP)	27.6	21.8	15.6	13.2	13.3
Industry (% GDP)	43.3	46.1	45.9	41.1	40.6
Service (% GDP)	29.1	32.1	38.5	45.7	46.1

Source: GDP is from the World Bank (1980, 1990, 2000, 2010, 2020), population and sectoral share of GDP are from BPS-Statistics Indonesia (1980, 1990, 2000, 2010, 2020).

Empirical studies that discuss the dynamics of Indonesia's economic growth mostly follow Neoclassical theoretical framework (e.g. Cass, 1965; Grossman & Helpman, 1991; Koopmans, 1965; Romer, 1990; Solow, 1956). Consequently, those studies mostly attribute the expansion of income per capita to factor accumulation and total factor productivity (e.g. Dutu, 2016; Musyawwiri & Üngör, 2019; Parjiono et al., 2013; van der Eng, 2010). Only a few studies investigate the effect of population and demographic factors in Indonesia. Notable examples include Ananta et al. (1992) and Furuoka (2013). It is generally not surprising that empirical literature on the effects of demographic factors is relatively limited because the Neoclassical growth theory implies an adverse effect of population growth on economic growth.

Table 2. Demographic Indicators (1971-2020)

	1971	1980	1990	2000	2010	2020
Population (million people)	118.4	146.8	179.2	201.2	237.6	270.2
Population Growth (% annual growth)		2.2	1.8	1.1	1.5	1.2
0 - 14 years old (% population)	44	40.9	36.6	30.4	28.9	24.6
15 - 64 years old (% population)	53.3	55.8	59.6	65	66.1	69.3
65+ years old (% population)	2.5	3.3	3.8	4.5	5	6.2

Source: BPS-Statistics Indonesia (Population Census 1971, 1980, 1990, 2000, 2010, 2020).

Notes: The annual growth and population shares are the authors' calculations.

In this study, we add to the limited literature that address how demographic factors might affect Indonesia's economic growth by estimating the contribution of demographic factors during the period of 1971 to 2020. We argue that studies that discuss the dynamic of Indonesia's economic growth cannot simply overlook the effect of demographic factors. The main reason is that Indonesia is the fourth-most populous country in the world in which demographic indicators have evolved substantially along with economic expansion. Table 2 shows that the population has increased more than double between 1970 and 2020, namely from 120 to 270 million. Nevertheless, its annual growth rate has been slowing, from 2.2 percent between 1971 and 1980 to 1.2 percent between 2010 and 2020. The age pyramids depicted in Figure 1 have also displayed a gradual shift from the young toward the older population. The bulge has moved gradually from the bottom to the middle part of the pyramids, suggesting the growing dominance of the working-age population. In 1971, the

working-age population was only 53.5 percent. By 2020, it accounted for almost 70 percent of the total population.

In addressing the contribution of demographic factors, we draw on literature that challenges the Neoclassical view on the effect of population on economic growth. In contrast to the Neoclassical view which sees population growth as a strain on resources, the competing literature does not only look at population growth but also scrutinize the demographic composition of the population. Bloom et al., (1999); Bloom & Williamson, (1998); Kelley & Schmidt, (2005) suggests possible positive effects of population growth through various mechanisms. First, population growth might foster economic development by expanding the labor force (Sánchez-Romero et al., 2018; Tamura, 2006). When the working-age population grows more rapidly than the total population, implying labor supply increases, it might foster economic growth because there are more people available to work, save and contribute to productive activities. This leads to improved productivity, higher savings and investment. Second, higher population growth encourages economies of scale and specialization (Gobin, 1992; Sánchez-Romero et al., 2018; Becker et al., 1999). A larger population can enhance economies of scale in public services by justifying investment in public goods, such as transportation and education infrastructures. A larger population also means a more diverse workforce, allowing for greater specialization in skills. Greater labor specialization leads to increased productivity and efficiency. Lastly, a larger population stimulates technological progress and innovation (Boserup, 1965; Jones, 2002; Kremer, 1993; Simon, 1996). A larger population implies a bigger pool of creative individuals who can generate more ideas and technological advancements.

In order to estimate the contribution of demographic factors, we applied a descriptive tool developed by Bloom and Williamson (1998) to decompose output per capita into two broad components; namely, the productivity effect and pure labor effect. Our main finding shows that between 1971 and 2000 the contribution of pure labor effect outweighed that of the productivity effect. During these decades, the growing of the working-age population ran parallel to productive-enhancing labor reallocation and a higher labor force participation rate. Nevertheless, between 2000 and 2020 the positive effects of changes in the age structure have been largely offset by the reallocation of labor from high to low productivity sector and the decline in the labor force participation rate. This led to the decline in the relative significance of the pure labor effect.

The rest of the paper is as follows. Following the introduction, the second section details the decomposition analysis that we employed and the data source. The third section presents and discusses the results. The fourth section provides concluding remarks.

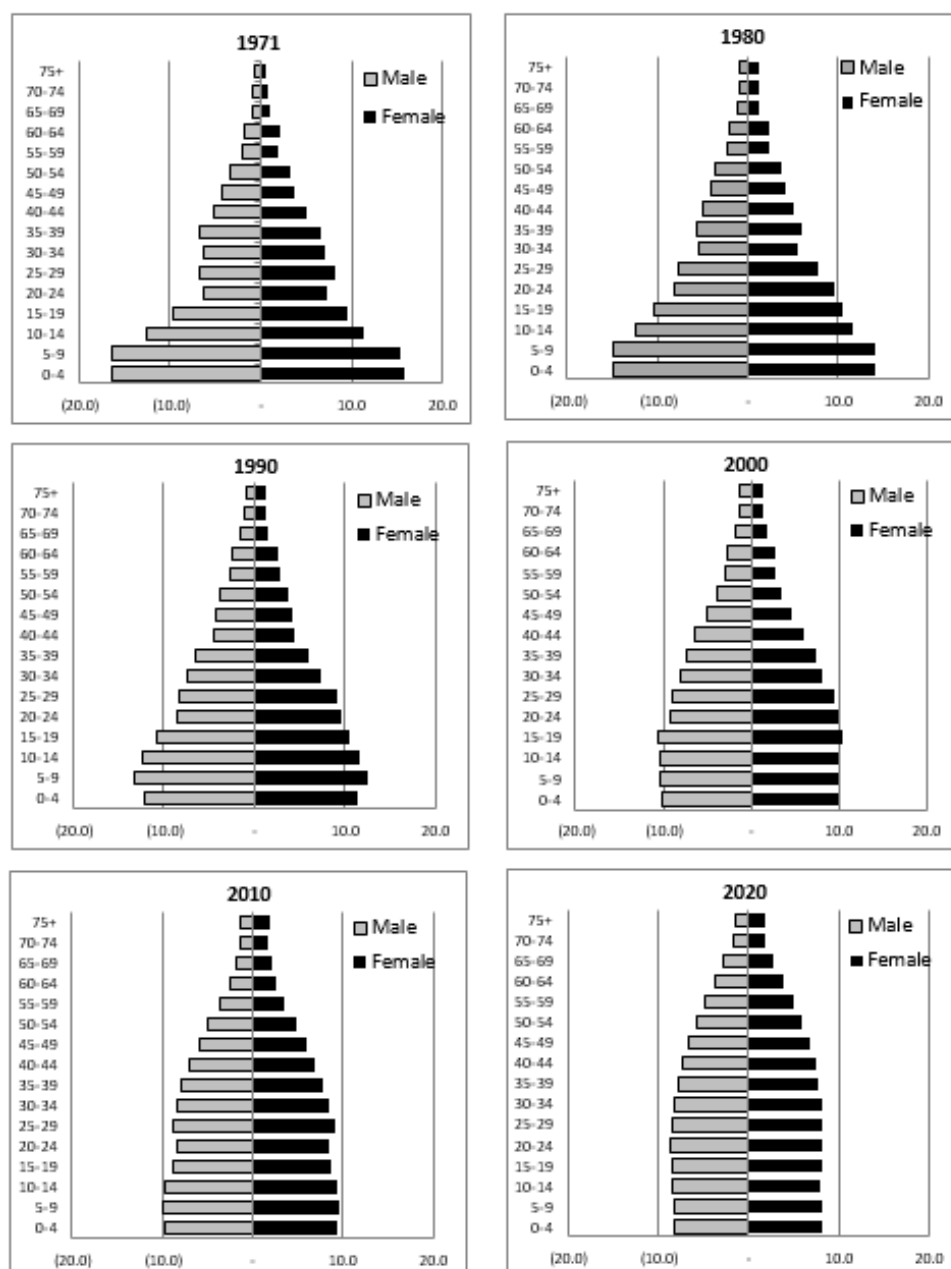


Figure 1. Population Pyramids of Indonesia

Source: BPS-Statistics Indonesia (Population Census 1971, 1980, 1990, 2000, 2010, 2020)

2. RESEARCH METHOD

In this study, demographic factors refer to changes in age structure that eventually affect labor force and labor movement across sectors and economic growth refers to the mean annual growth rate of GDP per capita. To estimate the contribution of demographic factors we followed Bloom and Williamson (1998) and Bloom, Canning, and Malaney (1999) by

applying a simple shift-share accounting framework. This framework is a descriptive tool, consisting of two related accounting identities. Both identities hold at all points of time and work under the assumption that the change of the components is independent of each other.

The first identity decomposes output per capita into labor productivity, changes in labor participation rate and changes in age structure. The first identity is as follows:

$$\frac{Y_t}{P_t} = \frac{Y_t}{L_t} \cdot \frac{L_t}{WA_t} \cdot \frac{WA_t}{P_t} \dots\dots\dots (1)$$

where Y is GDP, P is total population, L is labor force, WA is the working-age population, and t is the time index.

The second identity simply defines the total labor productivity as a simple employment-weighted average of labor productivity across three broad economic sectors, namely, agriculture, industry, and service sector. The second identity is as follows:

$$\frac{Y_t}{L_t} = a_t^A \left(\frac{Y_t^A}{L_t^A} \right) + a_t^I \left(\frac{Y_t^I}{L_t^I} \right) + a_t^S \left(\frac{Y_t^S}{L_t^S} \right) \dots\dots\dots (2)$$

where a_t^A is the share of labor force working in agriculture, a_t^I is the share of labor force working in industry and, a_t^S is the share of labor force working in service. Accordingly, $a_t^A + a_t^I + a_t^S = 1$, $Y_t = Y_t^A + Y_t^I + Y_t^S$ and $L_t = L_t^A + L_t^I + L_t^S$.

To estimate the contribution of demographic factors to output per capita growth, we take natural logarithm of Equation (1) and Equation (2)

$$\ln \frac{Y_t}{P_t} = \ln \frac{Y_t}{L_t} + (\ln L_t - \ln WA_t) + (\ln WA_t - \ln P_t) \dots\dots\dots (3),$$

since labor productivity is the weighted average of sectoral productivity, the natural logarithm of the labor productivity is approximately the weighted sum of the logs of each sectoral productivity, $\ln \frac{Y_t}{L_t} \approx a_t^A \ln \left(\frac{Y_t^A}{L_t^A} \right) + a_t^I \ln \left(\frac{Y_t^I}{L_t^I} \right) + a_t^S \ln \left(\frac{Y_t^S}{L_t^S} \right)$, we can write Equation (3):

$$\ln \frac{Y_t}{P_t} \approx \left[a_t^A \ln \left(\frac{Y_t^A}{L_t^A} \right) + a_t^I \ln \left(\frac{Y_t^I}{L_t^I} \right) + a_t^S \ln \left(\frac{Y_t^S}{L_t^S} \right) \right] + (\ln L_t - \ln WA_t) + (\ln WA_t - \ln P_t) \dots\dots\dots (4)$$

Equation (4) shows that there are three components that contribute output per capita growth. The first is the productivity effects, which are a weighted sum of productivity growth in each sector. The second is labor force participation, that is the difference between labor force participation growth and working-age population growth. The third is changes in age structure, which is the difference between working-age population growth and total population growth. In addition to these three components, the labor re-allocation between sectors might affect productivity growth.¹ The labor participation, the changes in age structure and the labor reallocation effect compose the pure labor effects.

¹ We calculated the growth of productivity in each sector by assuming that sectoral employment shares stay constant. For example, to calculate the weighted average of productivity growth in agriculture between 1980 and 1990, we used the agricultural employment share in 1980. The difference between actual total productivity growth

Our main objective here is to estimate the contribution of demographic factors on Indonesia's economic growth during 1971-2020. We measure the contribution of demographic factors by approximating Equation (4) to get the pure labor effects relative to the productivity effects. To approximate the productivity and the pure labor effects, we collected secondary data from BPS-Statistics Indonesia and the World Bank. In particular, to approximate the productivity effects (the weighted sum of productivity growth in each sector), we obtained sectoral labor force (L_t^A, L_t^I, L_t^S) from BPS-Statistics Indonesia, which we then use to derive sectoral employment share (a_t^A, a_t^I, a_t^S), and GDP data (Y_t^A, Y_t^I, Y_t^S) from the World Bank. We specifically used GDP in constant 2015 US\$ prices. To calculate the pure labor effects, we sourced population and labor data (P_t, WA_t, L_t) from BPS-Statistics Indonesia.

3. RESULTS AND DISCUSSION

Table 3, 4, and 5 present data necessary to approximate productivity effects and pure labor effects. Table 6 is the main table that reports our main results.

Table 3. Sectoral Structure of Indonesian Economy (1971-2020)

	1971	1980	1990	2000	2010	2020
Agricultural employment share (%)	64.2	55.9	49.9	47.2	40.4	29.8
Industrial employment share (%)	8.4	13.2	16.7	19.6	16.0	21.6
Service employment share (%)	27.4	30.9	33.4	33.4	43.8	48.7
Agriculture output per worker (constant 2015 US\$)	1,317.0	1,514.6	1,650.5	1,413.4	1,986.4	3,586.9
Industrial output per worker (constant 2015 US\$)	9,422.3	10,063.1	10,421.9	10,018.2	15,704.1	15,051.4
Service output per worker (constant 2015 US\$)	2,041.3	2,887.9	3,629.0	4,931.7	6,350.5	7,574.9
Total output per worker (constant 2015 US\$)	2,196.3	3,067.3	3,776.2	4,269.1	6,079.4	8,000.2

Sources: Sectoral employment shares are from BPS-Statistics Indonesia (1971, 1980, 1990, 2000, 2010, 2020), GDP data are from the World Bank (1971, 1980, 1990, 2000, 2010, 2020).

Notes: Total output per worker and sectoral output per worker is author's own calculation using GDP data (constant 2015 US\$) from the World Bank and sectoral labor force from BPS-Statistics Indonesia.

Table 3 shows that Indonesia has gradually shifted from a predominantly agrarian economy to a more industrial and service-based economy during 1971–2020. In 1971 agriculture absorbed almost 65% of the labor force; the percentage decreased to only 30% in 2020. In addition, total output per worker increased more than double, from around 2,000 US\$ in 1971 to 8,000 US\$ in 2020. Output per worker also increased in all sectors. Comparing agriculture, industrial and service sectors, the industrial sector was the most productive.

and sectoral productivity growth is changes in productivity due to movement of workers between sectors with differing levels of productivity.

Table 4 presents the output per capita calculated using Equation (1). It also informs labor force participation rate, the age structure and output per worker during 1971–2020. As a result of the demographic transition, the percentage of working-age to total population has increased, from 50 percent in 1971 to 80 percent in 2020. In contrast, labor participation rates have been relatively constant, around 60–70 percent. Following Equation 1, changes in working-age population, labor force participation and output per worker stimulate the growth rate of per capita income.

Table 4. Labor Force Participation and Age Structure (1971-2020)

	1971	1980	1990	2000	2010	2020
Working-age to population ratio	0.5	0.6	0.6	0.7	0.7	0.8
Labor force participation rate	0.6	0.6	0.7	0.7	0.7	0.6
Output per worker (constant 2015 US\$)	2,196.3	3,067.3	3,776.2	4,269.1	6,079.4	8,000.2
Output per capita (constant 2015 US\$)	698.2	1,077.4	1,507.7	1,962.9	2,768.2	3,803.3

Source: labor force participation rate and population to working-age ratio are from BPS-Statistics Indonesia (1971, 1980, 1990, 2000, 2010, 2020), GDP data are from the World Bank (1971, 1980, 1990, 2000, 2010, 2020).

Notes: output per worker is author's own calculation using GDP data from the World Bank and labor force data from BPS-Statistics Indonesia. Output per capita is author's own calculation following Equation (1).

Table 5 informs growth rates for each factor that contributes to economic growth. The first is population growth. Population growth has declined; from 2.2 percent during the 1970s to 1.2 percent during the 2020s. The Family Planning Program, which was initiated in 1968, was particularly successful in reducing population growth to an average of 1.1 percent during the 1990s. However, its implementation became less aggressive in the subsequent years, failing to achieve further reductions in the population growth rate.

Table 5. Population, Labor Force, and Productivity Growth by Sector

	1971-1980	1980-1990	1990-2000	2000-2010	2010-2020
Population growth (%)	2.2	1.8	1.1	1.5	1.2
Working-age population growth (%)	2.6	2.4	1.9	1.7	2.4
Labor force growth (%)	3.2	3	2.4	1.4	1.6
Labor productivity growth (%)	3.4	1.9	1.1	3.3	2.5
Agricultural productivity growth (%)	1.4	0.8	-1.4	3.1	5.5
Industrial productivity growth (%)	0.7	0.3	-0.4	4.2	-0.4
Services productivity growth (%)	3.5	2.1	2.8	2.3	1.6
GDP per capita growth (%)	4.4	3.1	2.4	3.2	2.9

Source: Population, age structure, labor force and sectoral GDP are from BPS-Statistics Indonesia (1971, 1980, 1990, 2000, 2010, 2020), GDP (in 2015 US\$) is from the World Bank.

Notes: the growth rate is calculated using an annual compound growth rate.

The second factor is the share of the working-age population. The working-age population growth was generally higher than the total population growth. This indicates a population shift from young toward working-age population. In addition to the share of the working-age population, another factor is labor force growth. Labor force growth rate declined rapidly; from 3.2 percent during the 1970s to 1.6 percent during the 2010s. Prior to 2000, the labor force grew faster than the working-age population. However, after 2000 the growth rate of the labor force fell below that of the working-age population. The labor force growth that was lower than working-age population growth indicates that Indonesia did not fully leverage its large working-age population as the low labor force growth implies that the labor market did not fully absorb the growing number of the working-age population.

The last factor is labor productivity. The growth of labor productivity has generally declined, from 3.4 percent in the 1970s to 2.5 percent in the 2010s. Ryandiansyah and Azis (2018) argues that the decline in productivity was due to the shift of labor from the agricultural sector to the less productive jobs in the service sector. Thus, the expansion of labor in the service sector was not productivity-enhancing. Comparing productivity growth among the three sectors, industrial sector productivity growth has the lowest average growth among the three broad sectors, which is only 0.88 percent on average. In addition, its growth rate decreased; from 0.7 during 1971–1980 to -0.4 percent during 2000–2010. Similarly, the service sector has shown a declining growth rate, with an average of 1.6 percent. In contrast to industry and service, labor productivity in agriculture has increased in the last five decades. Agriculture productivity grew 1.4 percent during 1971–1980 and 5.5 percent during 2010–2020.

We report the results of our decomposition analysis in Table 6. The decomposition analysis attributes the GDP per capita growth to two broad factors, namely productivity and pure labor effects. Table 6 consists of two panels; Panel I report the absolute value of growth whereas Panel II reports the relative terms. In general, the decomposition analysis shows a positive contribution of demographic factors to Indonesia's economic growth during 1971–2020. Nevertheless, the contribution has been declining.

Table 6. Components of GDP per Capita Growth

	1971-1980	1980-1990	1990-2000	2000-2010	2010-2020
I. Contribution to GDP per capita growth					
Agricultural productivity growth	0.9	0.4	-0.7	1.5	2.2
Industrial productivity growth	0.1	0.0	-0.1	0.8	-0.1
Services productivity growth	1.0	0.6	0.9	0.8	0.7
Productivity effects	1.9	1.1	0.2	3.1	2.9
Labor reallocation effect	1.5	0.8	0.9	0.2	-0.3
Labor force participation	0.6	0.6	0.5	-0.2	-0.8
Changes in age structure	0.4	0.6	0.8	0.1	1.2
Pure labor effects	2.5	2.0	2.2	0.1	0.1
Total	4.4	3.1	2.4	3.2	2.9

	1971-1980	1980-1990	1990-2000	2000-2010	2010-2020
II. Percent contribution to GDP per capita Growth					
Agricultural productivity growth	20.4	14.1	-28.8	46.6	76.1
Industrial productivity growth	1.3	1.4	-2.5	25.7	-2.1
Services productivity growth	21.9	20.9	38.9	24.4	24.2
Productivity effects	43.6	36.4	7.7	96.7	98.2
Labor reallocation effect	33.3	25.1	38.6	6.1	-11.8
Labor force participation	13.4	19.0	20.5	-7.5	-28.5
Changes in age structure	9.8	19.4	33.2	4.7	42.1
Pure labor effects	56.4	63.6	92.3	3.3	1.8
Total	100	100	100	100	100

Source: author's own calculation following Equation (4)

Notes: Sectoral productivity growth is calculated following Equation (4), where the sectoral employment share is the employment share in the initial year reported in Table 3 and the sectoral productivity growth is from Table 5. The labor reallocation effect is the difference between labor productivity growth (Table 5) and the total sectoral growth. Labor force participation component is the difference between working-age growth (Table 5) and labor force growth (Table 5). Changes in age structure are the differences between population growth (Table 5) and working-age growth (Table 5).

Table 6 shows that between 1971 and 2000 the pure labor effect was larger than the productivity effect. During these years, the major factor contributed to the labor effect was labor reallocation. Labor moved out of agriculture to industry which had higher labor productivity. In addition to labor reallocation, changes in age structure also played a significant role (See Figure 1). The 1971 and 1980 Indonesian population pyramids were very wide at the younger age. In the 1990 pyramid, the bulge gradually moved to the middle part of the band. The following decade, decade 1990–2000, scored the lowest population growth, namely 1.1 percent. Consequently, the proportion of younger population was further reduced and that of adults and the elderly increased, so that the 2000 pyramid was constrictive. These favorable demographic changes along with labor force participation growth that was higher than the working-age population growth led to a higher contribution of pure labor effect. Following 2000, the contribution of pure labor effect was no longer significant. During 2000–2020, labor movements were largely from agriculture to service sector activities that had lower productivity. In addition, the labor force growth was lower than the working-age population growth, implying that many working-age individuals did not participate in the labor market. The contribution of changes in age structure was particularly low during decade 2000–2010. Population growth was increased to 1.5 percent and the proportion of older population also increased. The labor movement that was not productivity enhancing and labor force growth that was lower than working-age population growth lowered the contribution of pure labor effect.

4. CONCLUSIONS

The decomposition analysis reveals that the contribution of demographic factors to GDP per capita growth has generally declined, from 56.4 percent during 1971–1980 to 1.8 percent during 2010–2020. From 1971 to 2000, the contribution of the pure labor effect surpassed that of the productivity effect. During 1971–2000, the growing working-age population coincided with productivity-enhancing labor reallocation and a higher labor force participation rate, resulting in the pure labor effect exceeding the productivity effect. However, between 2000–2020, the positive impacts of age structure changes were largely offset by labor reallocation from high to low-productivity sectors and a decline in the labor force participation rate. This led to a decrease in the relative importance of the pure labor effect during 2000–2020.

The decomposition analysis conducted by this study is a descriptive analysis that cannot reveal the causal link between demographic factors and economic growth. However, it indicates the relative importance of main factors that compose GDP per capita growth in Indonesia during 1971–2020. It can serve as a preliminary analysis for further studies investigating the causal link between demographic factors and economic growth in Indonesia.

5. ACKNOWLEDGEMENT

We gratefully acknowledge financial support from the Faculty of Economics and Business, Diponegoro University. We thank Febby Tiur Nur Carolina and Muhammad Muhadi Ashari for excellent research assistance. We also thank Bella Mutiara Sabrina, Faustina Cahya Kamila, Gabriel Valerion Lengkong, and Gaza Al Ghifary Rifky Kasmal for collecting the data.

6. REFERENCES

- Ananta, A. & Pungut, U. H. (1992). Population Change and Economic Development in Indonesia. *ASEAN Economic Bulletin*, 9(1), 55–65.
- Becker, G. S., Glaeser, E. L., & Murphy, K. M. (1999). Population and Economic Growth. *American Economic Review*, 89(2), 145–149. <https://doi.org/10.1257/aer.89.2.145>
- Bloom, D. E., Canning, D., & Malaney, P. N. (1999). Demographic Change and Economic Growth in Asia. *CID Working Paper Series*.
- Bloom, D. E. & Williamson, J. G. (1998). Demographic Transitions and Economic Miracles in Emerging Asia. *World Bank Economic Review*, 12(3), 419–455.
- Cass, D. (1965). Optimum Growth in an Aggregative Model of Capital Accumulation. *The Review of Economic Studies*, 32(3), 233–240.
- Dutu, R. (2016). Why has economic growth slowed down in Indonesia? An investigation into the Indonesian business cycle using an estimated DSGE model. *Journal of Asian Economics*, 45, 46–55. <https://doi.org/10.1016/j.asieco.2016.06.003>
- Furuoka, F. (2013). Population and Economic Development in Indonesia: A Revisit with New Data and Methods. *Acta Oeconomica*, 63(4), 451–467.
- Gobin, R. (1992). The Relationship between Population and Economic Growth in LDCs. In *Population and Development in Poor Countries* (pp. 180–198). Princeton University Press. <https://doi.org/10.1515/9781400862177.180>
- Grossman, G. M. & Helpman, E. (1991). Trade, Knowledge Spillovers, and Growth. *European Economic Review*, 35(2), 517–526.

- Kelley, A. C. & Schmidt, R. M. (2005). Evolution of Recent Economic Demographic Modeling: A Synthesis. *Journal of Population Economics*, 18(2), 275–300.
- Koopmans, T. C. (1965). *On the Concept of Optimal Economic Growth*.
- Musyawwiri, A. & Üngör, M. (2019). An Overview of the Proximate Determinants of Economic Growth in Indonesia Since 1960. *Bulletin of Indonesian Economic Studies*, 55(2), 213–237. <https://doi.org/10.1080/00074918.2018.1550251>
- Parjiono, Beg, A. B. M. R. A., & Monypenny, R. (2013). The Driving Forces of the Level and the Growth Rate of Real Per Capita Income in Indonesia. *Applied Economics*, 45(17), 2389–2400.
- Romer, P. M. (1990). Endogenous Technological Change. *Journal of Political Economy*, 98.
- Ryandiansyah, N. R. & Azis, I. J. (2018). Structural Change, Productivity, and the Shift to Services: The Case of Indonesia. *Economics and Finance in Indonesia*, 64(2), 97–110.
- Sánchez-Romero, M., Abio, G., Patxot, C., & Souto, G. (2018). Contribution of demography to economic growth. *SERIEs*, 9(1), 27–64. <https://doi.org/10.1007/s13209-017-0164-y>
- Solow, R. M. (1956). A Contribution to the Theory of Economic Growth. *The Quarterly Journal of Economics*, 70(1), 65–94.
- Tamura, R. (2006). Human capital and economic development. *Journal of Development Economics*, 79(1), 26–72. <https://doi.org/10.1016/j.jdeveco.2004.12.003>
- van der Eng, P. (2010). The sources of long-term economic growth in Indonesia, 1880–2008. *Explorations in Economic History*, 47(3), 294–309. <https://doi.org/10.1016/j.eeh.2009.08.004>