



Dynamic Linkage Among Population, Urbanization, Poverty and Indonesian Economic Growth

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Indonesia has confronting economic challenges due to many factors such as uncontrolled population and urbanization, among others. It is therefore essential to examine such variables that may take essential roles in determining economic growth. In doing so, this study empirically examines the dynamic linkage between population, urbanization, poverty, and economic growth in Indonesia using a Vector Error Correction Model (VECM) to capture the short and long-term relationship. The research involved data between 2000 and 2020 from the Worldometer and World bank data. The empirical results indicate that the inclination of population growth and urbanization rates have a negative impact on Indonesian economic growth. Conversely, the poverty rate that continues to rise impacts increasing economic growth in Indonesia. This study also concludes that in the long and short run, there are indications of the nexus between the variables of economic growth population growth, urbanization, and poverty level. The research suggests coordination between parties to manage population growth and urbanization with the planning of economic strategies. The government is directed to continually provide censuses to control the urbanization and population among Indonesian.

INTRODUCTION

Economic growth has been a global discussion in the economic development debate, and has been a primary indicator in determining society's welfare (Adejumo & Adejumo, 2019; Benish & Levi-Faur, 2020). Existing literature shows that an uncoordinated population and urbanization will result in a series of long-run negative impacts on economic growth (Chen et al., 2014; Li et al., 2020). Urbanization is an essential sign for economic development in a nation, and it is involved by developing nations to provide economic enhancement (Fan et al., 2019). Some preliminary studies remarked that urbanization can drive economic growth by providing the accumulation dimensions of consumption, distribution, and production (Ahmed et al., 2020; Zheng & Walsh, 2019). Indeed, a prior study also mentioned that promoting the coordinated enhancement of urbanization and population can be essential in addressing the poverty problem and future economic growth in Indonesia (Haryanto et al., 2021).

Concerning Indonesia, the population distribution between the islands throughout the country has not changed much during the decade (Goma et al., 2020). Java is home to approximately 57% of Indonesia's population, followed by Sumatra (21%), Sulawesi (7%), and Kalimantan (6%); the rest are scattered on various other islands in Indonesia (Masrurroh & Soebagyo, 2021). The uneven development of the inter-island economy has consequences for the distribution of the inter-island population, which tends to be unequal (Sukwika, 2018). The construction of education and health facilities will also impact improving the quality of the population (Harahap et al., 2020). It is not only the number that needs to be controlled that can have an impact on large numbers but also the level of population distribution and quality.

In general, the problem of urbanization has long been the concern of scholars and governments (Tadjoeddin & Mercer-Blackman, 2018). The uncontrolled rate of population growth is largely due to the urban population and

it is being the main problem of urbanization in Indonesia (Putri et al., 2020). Furthermore, Liu et al. (2014) remarked that the level of urbanization is positively related to economic growth, but the rate of urbanization change is negatively correlated with economic growth. Analysis of the panel's data also suggests that the potentially negative impacts of urban population growth rates are related to inadequate local public infrastructure spending (Chalfin, 2018). In this case, the local government invests more in the development of the infrastructure sector will be better able to overcome the negative impact caused by the problem of urbanization on the existing economic growth in an area (Chalfin, 2018).

Urbanization and poverty are two matter dimensions that are linked to the goal of sustainable development. Urbanization in Indonesia has not been able to prosper the perpetrators and the areas that are the goal of urbanization. Urbanization is an enhancement process that elaborates several multidimensional: demographic, social, economic, and geographic (Abdul & Yu, 2020). This is identified by the presence of population congregation in urban areas, then accompanied by modernization of other dimensions of life as an outcome of urbanization (Liu et al., 2014). In general, the phenomenon of urbanization occurs more intensively in developing countries such as Indonesia (Chauvin et al., 2017). According to Statistics Indonesia (2021), Indonesia remained to encounter an incline in the composition of urban population from 30.9% in 1990 to 43.1% in 2005 and rose dramatically to approximately 53.12% in 2015.

In addition to urbanization and population issues, poverty is also one that can affect the rate of economic growth. The main purpose of economic growth aims to reduce the level of poverty that exists in an area (Cruz & Ahmed, 2018). The inadequate poverty level of the majority happens in rural areas (Chauvin et al., 2017). In addition, inadequate levels of employment opportunities and education are the main factors of high poverty in rural areas that often drive urbanization (Olofinbiyi & Singh,

2020). At the domestic level, rural poverty is also a driver of urbanization. Data from Statistics Indonesia shows that in the level of poverty in the period 2010-2019, there is a difference in the number of poor people and poverty rates between rural and urban area (BPS, 2021). This indirectly indicates the existence of poverty disparity at the level of rural and urban areas. In addition, Statistics Indonesia also mentioned that the level of the poor population the majority lives in rural areas (BPS, 2021). It is also the underlying Some villagers migrate to urban areas to seek a better quality of life (Meyer-Clement, 2019).

A much-debated question is whether population growth resulting in increasing urbanization rates (Ho et al., 2021) and does this impact the number of additions to the existing level of poverty? Then if it also has an impact on economic growth in Indonesia. Some prior studies in agreement that urbanization is the driver or raising economic growth in some countries (Liu et al. (2014; Tadjoeddin & Mercer-Blackman, 2018), while others finding remarked that there is no any causality for these variables (Putri et al., 2020; Chauvin et al., 2017). This research attempts to provide a perspective related to economic growth in Indonesia.

In addition, whether the statement related to economic growth is solely enjoyed by a few people (Thorat & Madheswaran, 2018), so it does not have a significant impact on poverty alleviation will be discussed in this paper. This research also presents a contribution into the literature by elaborating new dimensions, such as population and urbanization, to predict Indonesian economic growth that is missing in the prior studies. For empirical estimations, we involve the time series' statistical holdings and enumerate the positive and negative occurrence of long-and short-term nexus among the determinants.

The present empirical research focuses on Indonesia since the issues related to population, urbanization, poverty, and economic growth have been classical problems in Indonesia. (Peterson, 2017; Harmadi, 2020). Additionally, this present work helps the government in concerning with urbanization and population

issues in addressing poverty and economic growth in Indonesia. The remainder of this research is presented as follows. Section 2 presents the material and methods, while section 3 presents the empirical findings and discussions. The last section concerns the conclusions.

RESEARCH METHODS

This study empirically analyzes using a quantitative research approach by applying Vector Error Correction Model (VECM). This method is applied to obtain the nature of the positive and negative short and long-term nexus between the variables used. The time series secondary data with a total of 80 quarters for 2000Q1 to 2020Q4 are involved for empirical estimations. Table 1 repositis the data sources and variables involved in this research. The data were obtained from Worldometer and Worldbank-data. In more detail, economic growth is symbolized as (Eco1), population growth rate (Pend1), urbanization growth rate (Up1), and poverty rate (Pov1).

Table 1. Description of data

| No | Variables | Symbol | Data Source |
|----|--------------------|--------|---------------|
| 1 | Economic growth | Eco1 | Worldbankdata |
| 2 | Population rates | Pop1 | Worldometer |
| 3 | Urbanization rates | Urb1 | Worldometer |
| 4 | Poverty rates | Pov1 | Worldometer |

Source: Data Processed, 2022

The main purpose of this study aims to examine the nexus between population, urbanization, poverty, and economic growth in Indonesia. To address the objectives, we employed Vector Error Correction Model (VECM) underdoing E-views application version 11. We present the following standard specification for empirical estimations (see Equation 1).

$$\Delta y_t = \mu_0 x + \mu_1 x_t + \Pi x_{yt-1} + \Sigma ik \Delta y_{t-1} + \epsilon_t \quad (1)$$

Where, y_t is vector consisting variables estimated; $\mu_0 x$ is intercept vector; $\mu_1 x$ is regression coefficient vector; t is time trend Πx is $\alpha \beta'$ in which b' covers long-run cointegration

equation; y_{t-1} is variable in level; Γ is regression coefficient matrix; $k-1$ is ordo VECM from VAR; and ε_t is error-term.

By applying Equation 1, VECM based on the variables involved is provided in Equation 2:

$$\Delta Eco = a + \sum_{i=1}^n \beta_i \Delta Eco_{t-i} + \sum_{i=1}^n \beta_i \Delta Pop_{t-i} + \sum_{i=1}^n \beta_i \Delta Urb_{t-i} + \sum_{i=1}^n \beta_i \Delta Pov_{t-i} + \lambda EC_{t-1} \varepsilon_t \dots\dots\dots (2)$$

Where, ΔEco is Indonesia's economic growth as dependent variable, $\Delta 1_{t-i}$ is the population variable, ΔUrb_{t-i} is urbanization level, ΔPov_{t-i} is the poverty rates in Indonesia.

Before implementing VECM, several steps must be conducted to produce the expected output. The primary purpose is in the framework of the pre-estimation test and validation test before the test is performed in the central part. These steps are stationary test, lag length test, cointegration test, and VECM. The stationary test of time series economic data is generally stochastic or has a non-stationary. Therefore, it is necessary to provide a Unit root test before analysis. In this study, unit root test will be performed using Augmented Dickey-Fuller (ADF). The criteria to be used is that when the t-statistic value of the ADF is smaller than the τ of the MacKinnon table, then the result is minus H_0 and vice versa (see Equation 3).

$$\Delta Y_t = a_0 + z_t + a_1 Y_{t-1} + \sum_{i=1}^p a_i \Delta Y_{t-i} + \varepsilon_t \dots\dots\dots (3)$$

In which a_0 is constant, t is deterministic trend, ε is error-term. When autoregressive from Y (Y_{t-1}) consisting of unit root, thus, t-ratio for a_1 need to persistent with the hypothesis $a_1=0$.

The second step is to perform the optimal lag test. The purpose of performing the optimal lag estimation is to look for the lag which is determined among other lag values. This test is performed to avoid any autocorrelation occurring in VAR analysis. The calculation of the VAR model is made an estimate with different lags and then to be distinguished with the value of the threshold. To see the optimal lag value, the smallest criterion value is designated. Furthermore, the cointegration estimation is intended to investigate whether the non-

stationary variables are cointegrated or not by employing model from by Johansen and Juselius (1990). It covers the Maximum Eigenvalue and Trace test. The VECM considers both short-and long run relationship and provides evidence to the causal components that influence the variables (see Equation 4 and 5).

$$\lambda_{Trace}(r) = -T \sum_{i=r+1}^g \ln(1 - \lambda_i) \dots\dots\dots (4)$$

$$\lambda_{Max}(r, r + 1) = -T \ln(1 - \lambda_{r+1}) \dots\dots\dots (5)$$

Where λ_i is predicted with the value i th ordered eigenvalue. The standard procedure to the Johansen method is the maximum likelihood procedure (ML) which is intended to calculate the Trace and Maximum Eigenvalue statistics, thus distinguish the adequate critical scores. When there is cointegration among variables or the cointegration rank is higher than zero, thus the VECM estimation can be performe

RESULTS AND DISCUSSION

Unit root test is provided to avoid a spurious regression phenomenon. This study adopted the Augmented Dickey-Fuller (ADF) with critical value of 5 percent. This implicates when ADF is lower than the critical value, it can be culminated that the stationary data. In other words, it does not contain root units. Table 2 illustrates the result information from the stationery test using the ADF estimation. The table indicates that it is stationary in the first degree except for the poverty variable, which is stationary in the first degree.

Table 2. ADF estimations

| Var | Stationer | Coefficient Value |
|-------|--------------------|-------------------|
| Eco1 | Second Differences | 0.0001 |
| Pend1 | Second Differences | 0.0000 |
| Urb1 | Second Differences | 0.0000 |
| Pov1 | First Differences | 0.0012 |

Source: Data Processed, 2022

With regard to the next step, the Lag order selection criteria calculation is intended to see how much lag is closest to the value of reality that occurs. This is also one of the main stages before testing the Vector Error Correction Model (VECM) and the results are provided in Table 3.

Table 3. Lag Order Selection Criteria

| Lag | LogL | LR | FPE | AIC | SC | HQ |
|-----|-----------|-----------|-----------|------------|------------|------------|
| 0 | -287.7082 | NA | 0.022945 | 7.576837 | 7.698593 | 7.625538 |
| 1 | -516.8052 | 1054.545 | 2.93e-11 | -12.90403 | -12.29525 | -12.66052 |
| 2 | 660.6577 | 254.0771 | 1.06e-12* | -16.22488* | -15.12907* | -15.78656* |
| 3 | 663.4007 | 4.559864 | 1.51e-12 | -15.88054 | -14.29771 | -15.24742 |
| 4 | 669.1014 | 8.884157 | 2.01e-12 | -15.61302 | -13.54317 | -14.78510 |
| 5 | 688.2215 | 27.81103 | 1.90e-12 | -15.69406 | -13.13719 | -14.67134 |
| 6 | 712.9431 | 33.39029* | 1.58e-12 | -15.92060 | -12.87670 | -14.70307 |
| 7 | 717.9061 | 6.187635 | 2.23e-12 | -15.63393 | -12.10300 | -14.22159 |

Note(s): * remarks lag order selected by the criterion; LR: sequential modified estimation statistic (5%); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion

Source: Data Processed, 2022

Furthermore, the Johansen Cointegration test was performed to determine whether the relationship between the variables used in this study, either in the long term or in the short term. Before cointegration test, the optimal lag length can be determined by AIC, SC, LR, FPE, and HQ. The specific results of the Johansen cointegration test are shown in Table 4.

Table 4. Johansen cointegration test

| Hypothesized No. of CE (s) | Eigen Statistic | Trace Statistic | 5% Critical Value | Prob.** |
|----------------------------|-----------------|-----------------|-------------------|-------------|
| None* | 0.29335881 | 56.32474136 | 47.85612715 | 0.006566131 |
| At most 1 | 0.20683108 | 28.19892840 | 29.79707334 | 0.075551150 |
| At most 2 | 0.10453650 | 9.429684008 | 15.49471287 | 0.327126026 |
| At most 3 | 0.00598405 | 0.486164601 | 3.841465498 | 0.485641926 |

Note(s): Trace test remarks 1 cointegrating eqn (s) at the level of 5%; * denotes rejection of the hypothesis at the 0.05 level

Source: Data Processed, 2022

The empirical findings in Table 4 suggest that the variables are cointegrated, and they shift together in the long-term. Therefore, it is appropriate to involve VECM to answer the research goal. The VECM estimations indicate that, in the long and short run, there are indications of the nexus between the variables Economic Growth (Eco1), Population Growth (Pop1), Urbanization (Urb1), and poverty level (Pov1). The directional of causality can be divided into short-term and long-term nexus between variables and the outputs are informed in Table 5.

Table 5. VECM estimates

| Error Correction | Coefficient | t-statistics |
|------------------|-------------|--------------|
| CoIntEq1 | -0.21075 | -3.93732 |
| Short-term | | |
| D(ECO1(-2)) | 0.080543 | 0.057032 |
| D(POP1(-2)) | -3.535110 | -0.256316 |
| D(URB1(-2)) | -2.819294 | -0.46203 |
| D(POV(-2)) | 0.021609 | -0.021609 |
| Long-term | | |
| POP1(-1) | -14.27236 | -4.11768 |
| URB1(-1) | -0.232779 | -1.26433 |
| POV(-2) | 0.0250031 | 1.17736 |

Note(s): t-statistics are performed in square brackets

Source: Data Processed, 2022

From Table 5, it can be concluded that there is a relationship between several variables used for economic growth in Indonesia. From the

value of the coefficient, the value of ECT has a coefficient of -0.210, which can be interpreted if population growth, urbanization, and poverty levels are at a stagnant level, then it will reduce economic growth by -0.21 percent next year. In short, the value of the coefficient of each variable is as follows (see Equation 6).

$$\begin{aligned}
 & -0.21075 \text{ (ECT)} - 14.27236(\text{URB}(-1)) - \\
 & 0.232779(\text{URB}1(-1)) + 0.0250031(\text{POV}(- \\
 & 2)) + 0.080543(\text{ECO}(-2)) - \\
 & 3.535110(\text{POP}1(-2)) - 2.819294(\text{URB}1) + \\
 & 0.021609(\text{POV}(-2)) \dots\dots\dots (6)
 \end{aligned}$$

The short-term analysis indicates that the population growth rate has a negative impact but is insignificant. This is based on a coefficient value of -3.53 which means that any increase in population growth of 1 percent in this period is safe to give the impact of a decline in the economic growth of -3.53 percent in the following period. The findings indicate that, in the long and short run, there are indications of the nexus between the variables of economic growth population growth, urbanization, and poverty level. The finding follows Rahmawati (2020), which mentioned that population growth in Indonesia is dominated by a non-productive population that has the potential to incline the poor population. In addition, the population growth rate is also a process of dynamic equivalence of population increase and decrease. The raise of can be shown by birth rates, and population reduction due to population deaths and also migration (Azizah et al., 2018). Some inclines in the level of human resources continue to be increased from compulsory education to nine years, the recruitment of new graduates according to their respective skills, the synergy of the world of education with the world of business, as well as the provision of job training incentives provided by the government. This aims to provide self-upgrading to every community, especially people who do not have certain abilities in enhancing their potential (Azizah et al., 2018).

The primary purpose of economic growth aims at ensuring increased welfare for the community in a country and diminishing poverty

levels through income redistribution (Rahmawati et al., 2020). Some scholars are in believing that economic growth can be performed by the synergy of all parties: government, private, and society (Nadya & Syafri, 2019). In doing so, the economic growth in a nation cannot be segregated from the condition of controlling the rate of population growth (Rahmawati et al., 2020; Azizah et al., 2018). In this case, the development of human capital is determined by the magnitude of the capital allocation that makes it up (Plummer et al., 2012). This is related to the quality and management of the population. To enhance population quality, development need to allocate adequate capital (Korhonen et al., 2011).

However, a high economic growth without being grounded in population visionary development can create income inequality (Tenzin, 2019; Adkins & Ylöstalo, 2020; Kennedy & Aguila, 2020). The rapid industrialization and application of foreign technologies will indeed increase efficiency and productivity in the short term, but unemployment will also increase rapidly, which will have an impact in the long term (Nguyen et al., 2020; Obasaju et al., 2019). Urbanization has changed the face of Indonesia a lot. In fact, the projection of urbanization in the future will significantly transform Indonesia into a country where most people live in urban areas.

However, it needs to be noted that the increasing of economic growth can not only be seen from a significant population perspective, but also consider other factors such as investment, technological knowledge and entrepreneurship (O'Connor et al., 2012). Capturing from the long-run relationship, population growth in Indonesia has a significant effect and is also greater. From the statistical analysis, it can be obtained that the value of the coefficient is -14,272, indicating that any increase in population growth in this period, in the long-run, will give the impact of a decrease in the economic growth of 14,272 percent in the forthcoming period. This has a negative impact on the efforts of the Indonesian nation to continue to enhance economic growth for society

welfare. The finding is in agreement with Rahmattullah (2015), which remarked that there has been a surge in population growth in various countries that has led to a decline in the living standards of the general public. More government population is faced with a dilemma between continuing to encourage population growth, even if it harms the people in the long run, or rather suppressing the birth rate (Madsen, 2019).

In the short-term, the urbanization rates in Indonesia provides a coefficient value of -2.819. This can be interpreted that any increase in the migration of rural people to urban areas in Indonesia in the current period will have the impact of a decline in the economic growth of 2.819 percent in the coming period. Similarly, if viewed in the long run, the level of urbanization also has an effect, although not significant. The value of the coefficient is -0.232, meaning that any raising in urban population caused by the relocation of rural people to cities in the current period will have the consequence of a decline in the economic growth of 0.322 percent in the next period. This is supported by Sulistyorini (2020), which note that it has been a classic problem that continues to exist to this day. The statistical estimations also indicates that the negative influence of urban population growth is linked with inadequate local public infrastructure expenditure. In addition, local bureaucratic is more likely to invest in infrastructure to overcome the negative impact from urbanization on economic growth (Sarkar & Mishra, 2020).

The short-term poverty level gives a coefficient value of 0.021. This indicates that one percent increase in the poverty rate in Indonesia in the current period will have the impact of an incline in economic growth of 0.021 percent in the next period. Indeed, from the long-run estimation, the level of poverty in Indonesia has a coefficient value of 0.025, indicating that if any 1 percent raise in poverty in the current period will give the impact of an increase of 0.025 percent on economic growth in the next period. The basic rationale is that poverty has long been an issue in Indonesia. The data from the Statistics Indonesia, the population which living under

was remarkably high in 2009, approximately 14.2 percent of populations. According to Septiadi (2016), the cause of poverty in economic terms is the result of low-quality human resources and insufficient educational level. On the other hand, according to Mohapatra (2020), the condition of poverty can be caused by low levels of health and education.

Empirical studies on the relationship of urbanization seen from the percentage of the urban population with the concept of poverty seen from per capita income can be divided into two sides of the argument (Acosta et al., 2007; Solarin, 2017). First, the proof of the relationship between urbanization and poverty was done with a bivariate approach without considering the combination of other variables. Second, the proof of the relationship between urbanization and poverty is done with a multivariate approach that involves other variables such as economic development. Henderson (2003) showed a positive relationship between urbanization and per capita income for a sample of 28 countries representing developed and developing countries. Fosu (2017); Hassan & Pitoyo (2017); Chen et al. (2019); Jayanthakumaran et al. (2020) used the urban population percentage variable to represent urbanization and the per capita income variable to represent poverty.

The additional rationale to support these findings is that the phenomenon of poverty and the development of slums in urban areas. Urbanization in Indonesia has not been able to bring prosperity and realize equitable development (Sulistyorini, 2020). This rate of urbanization has an impact on improving community welfare (Rahmawati et al., 2020). The impact of this prosperity is a consequence of the city's becoming a center of industry, trade, and business. The centralization of economic orientation creates agglomeration factors in urban areas. Agglomeration allows for innovation and increased productivity. In the agglomeration area, people will be easier to meet with companies looking for labor, exchange ideas and knowledge quickly, and access to markets will be easier (Aritenang, 2021). Thus, the opportunity for society to obtain prosperity is

more excellent so that the country obtains great economic growth as well

CONCLUSION

This research aims at investigating the nexus between population, urbanization, poverty and economic growth in Indonesia. The findings indicate that Population growth has a significant impact on the decline in economic growth. Thus, the level of urbanization is also one of the main factors in the decrease in economic growth. However, the level of poverty has a positive influence on Indonesia's economic growth. The low level of quality of human resources is one of the leading causes of poverty in Indonesia. This study provides some implications. First, the government should take immediate initiatives to address urbanization by providing more job opportunities for each region to stimulate income inequality and poverty problems. The government of Indonesia needs to pay attention to optimizing the potential for urbanization and realizing sustainable development goals. First, the difference in the level of urbanization in Indonesia is due to the development gap created by the city's biased policies.

Therefore, the government should focus on policies that prioritize the integration of rural and urban areas. In addition, the distribution of basic service facilities is essential so that population movement is no longer due to a lack of service facilities in rural areas but because of the cities' opportunities for development. Lastly, increasing connectivity between regions through investment in transportation infrastructure encourages equitable development in Indonesia (World Bank, 2019). Urbanization may be controlled by considering the capacity of job opportunities. Both population and urbanization should be monitored by providing census continually with a proper sample method. Although the present study provides robust empirical evidence, further works for other emerging economies of nations or compares among countries should be performed.

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