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**THE EFFECT OF POPULATION GROWTH AND INFLATION ON ECONOMIC
GROWTH IN EAST ASIA**

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Abstract . *This study delves into the longstanding debate surrounding the impact of population growth and inflation on economic growth, particularly focusing on East Asia. Past studies on the impact of population growth and inflation on economic growth have yielded contradictory results, with some indicating positive effects, others suggesting negative effects, and some find no significant impact at all. This study aims to find whether population growth and inflation affects the economic growth of East Asia using panel data regression. The data are taken from sample of East Asian countries from 2001-2022 annually. The findings reveal that when population growth and inflation are considered together, they have a significant effect on the economic growth of East Asia. Specifically, it was found that population growth has a significant positive relationship on the economic growth of East Asia. Conversely, inflation does not have a significant effect on the economic growth of East Asia.*

Abstrak. Studi ini menyelidiki perdebatan lama seputar dampak pertumbuhan penduduk dan inflasi terhadap pertumbuhan ekonomi, khususnya dengan fokus di Asia Timur. Penelitian-penelitian terdahulu mengenai dampak pertumbuhan penduduk dan inflasi terhadap pertumbuhan ekonomi memberikan hasil yang kontradiktif, ada yang menunjukkan dampak positif, ada pula yang menunjukkan dampak negatif, dan ada pula yang tidak menunjukkan dampak signifikan sama sekali. Penelitian ini bertujuan untuk mengetahui apakah pertumbuhan penduduk dan inflasi berpengaruh terhadap pertumbuhan ekonomi Asia Timur dengan menggunakan regresi data panel. Data diambil dari sampel negara-negara Asia Timur dari tahun 2001-2022 setiap tahunnya. Temuan mengungkapkan bahwa jika pertumbuhan penduduk dan inflasi digabungkan, keduanya mempunyai pengaruh yang signifikan terhadap pertumbuhan ekonomi Asia Timur. Secara khusus ditemukan bahwa pertumbuhan penduduk memiliki hubungan positif yang signifikan terhadap pertumbuhan ekonomi Asia Timur. Sebaliknya inflasi tidak berpengaruh signifikan terhadap pertumbuhan ekonomi Asia Timur.

Introduction

Population growth and inflation effect of the economy has been debated for a long time by many economists around the world. Example of this is the theory by Thomas Malthus (1998) that said increasing human population could cause the society and the economy to be unable to provide for the growing population, thus causing the society to ruin. Despite this, Mankiw (2021) mentioned that population growth could indeed be beneficial to either society or economy since the direct effects of an increase in population is an increase in the size of the labor force. Therefore, population growth should increase the productivity and the economy of a country. The case is the same for inflation. According to the theory of Philip curve, inflation has an inverse relationship with unemployment rate (Mankiw, 2021). Therefore, up to a certain point, inflation can increase the productivity of a country thus increasing economic growth. Despite this, a lot of countries have been observed with rising inflation and increasing unemployment rate.

In East Asia, many cases of low or even negative inflation and population growth are found. Many of East Asian countries' population have been found to be shrinking in 2022. The most prominent of this case is Japan. Japan's population has been shrinking for a long time. Now, other East Asian countries such as Taiwan and South Korea have been met with similar case. Other than that, East Asian countries have been known for its low inflation, with some have hit negative inflation in the past. This situation of low inflation, shrinking population, and slowing of economic growth from the impact of COVID-19 pandemic, underscores the need to investigate the relationship between population growth, inflation, and their impact on economic growth in the region.

This study aims to find out the relationship between population growth and inflation in East Asia and its significance to economic growth. This investigation is crucial and intriguing due to the region's unique demographic and economic condition. The result of this research will be useful as it provides insight into the relationship of population growth and inflation on economic growth in a region with unique demographic and economic conditions. This insight may provide information for an idea of a better and effective government policy thus contributing to stability and sustainability on the economy.

Literature Review

The effect of population growth and inflation on the economy has been debated by economists for a long time. In paper by Fischer (1993), it shows that inflation has a negative impact on the economy in the long-run while having a positive impact in the short-run. On study done to USA and Turkey by Çanakci (2021), it was found that inflation has a negative impact on economic growth. In research done to a sample of 85 countries by Vaona and Schiavo (2007), it was found that the threshold for inflation is 12% with inflation above 12% creating negative impact to economic growth while inflation below 12% has little to no significant impact to economic growth. Khan & Hanif (2020) adds that this threshold differs for each country and depends on the institutional quality of the economy. In research done by Gylfason and Herbertsson (2001), they found that increasing inflation tends to lower economic growth in large groups of countries across all income levels. If the countries have an increase of 5-50% on inflation in a year, its impact reduce 0.6-1.3 percent in GDP growth rate. Overall, the majority of these studies agree that inflation has a certain threshold where it will impact the economy negatively when it rises above that threshold while some find that inflation has a fully negative impact on economic growth.

Regarding population growth effects on the economy, it was found that assuming natural unemployment rate and labor force participation remain unchanged, the reduction in the size of working age population can reduce potential GDP growth rate. (Cai & Lu, 2013)

Contrary to this, population growth was found to be a potential driver for economic growth in Singapore under the assumption of good human capital development (Suluk, 2021). From these results, a contrasting view can be seen highlighting a need for further research and analysis.

Methods

This research uses the quantitative approach to examine the relationship between inflation and population growth on the economic growth of East Asia. A sample of East Asian country and special administrative region is made including all East Asian countries and special administrative region except North Korea. In this research, GDP growth rate is used to measure economic growth. Since the data for inflation rate, population growth rate, and GDP growth rate are measured numerically, a quantitative approach to this research is appropriate. In this research, the data of East Asian Countries' inflation rate, population growth rate, and GDP growth rate is collected from the World Bank Open Data. This study uses the data of East Asian Countries' inflation rate, population growth rate, and GDP growth rate from 2001 until 2022 that is available on World Bank Open Data. Since most of the data fulfills the inflation threshold proposed by Vaona and Schiavo (2007) that is 12%, researchers use the data as is.

From this study, the researchers wanted to analyze the effect of inflation and population growth on economic growth. As such, inflation and population growth are independent variables and economic growth is the dependent variable. Through this research, the researchers wanted to see the significance of the effect of inflation and population growth on economic growth of East Asia. The Null Hypothesis (H_0) is that inflation and population growth do not affect economic growth of East Asia, and The Alternative Hypothesis (H_1) is that inflation and population growth affect economic growth of East Asia. Since this research captures the characteristic of each East Asian countries individually, panel data regression method seems appropriate in analyzing the data. Other than that, Descriptive Statistics is also going to be used to expand on the results of panel data regression.

Before analyzing the data, researchers needed to choose the model that fit the data the most. There are 3 available models for panel data regression: Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). To choose between the models, Chow Test, Hausman Test, and Lagrange Multiplier Test need to be done.

Results and Discussion

The following are the descriptive statistics of each variable and the result of model estimation test:

Table 3.1 Descriptive Statistics of Each Variables

Variable	Mean	Std. Dev.	Min	Max
Inflation Rate	3.025937386	3.934952394	-2.983138781	27.95566502
Population Growth Rate	0.827353923	0.851067604	-0.911776749	2.821504467
GDP Growth Rate	4.334291901	8.208133251	-54.33587564	26.63034271

Table 3.2 Result of Model Estimation

Model Estimation Test	P-value
Chow Test	0.015
Hausman Test	0.2043
Lagrange Multiplier Test	0.0878

The data observed for this research come from 6 East Asian countries and special administrative region: China, Japan, South Korea, Hong Kong, Macao, and Mongolia. The data consists of yearly inflation rate, population growth rate, and GDP growth rate of each country mentioned above from 2001 to 2022.

From the result of model estimation test, it was found that Chow Test yields a p-value of less than 0.05 and that Hausman Test and Lagrange Multiplier Test yields a p-value of greater than 0.05. Hence, the appropriate model for this research is the Random Effect Model (REM). The regression equation of the Random Effect Model (REM) is the following:

$$Y_i = \beta_{1i}INF_i + \beta_{2i}POP_i + \beta_{3i} + \epsilon_i, \tag{1}$$

Y_i = The variable for GDP growth rate of country i .

β_{1i} = The coefficient for the variable inflation rate of country i .

INF_i = The variable for inflation rate of country i .

β_{2i} = The coefficient for the variable population growth rate of country i .

POP_i = The variable for population growth rate of country i .

ϵ_i = The error term of the model.

Table 3.3 Coefficient and Z-Test Result

Variable	Coefficient	Z-score	P-value
Population Growth Rate	2.586877	2.13	0.033
Inflation Rate	0.2797451	1.31	0.189
Constant	1.347538	0.82	0.412

Table 3.4 Wald χ^2 Test Result

Wald χ^2	P-value	R-squared
7.58	0.0226	0.0572

From the result of Panel Data Regression using Random Effect Model, it was found that only population growth rate variable is significant. Thus, the regression equation of the dependent variable (economic growth) that is measured in GDP growth rate is the following:

$$Y = 2.586877X_1, \tag{2}$$

where Y is GDP growth rate and X_1 is population growth rate. From the variables' coefficient, we found that population growth rate has a positive relationship to GDP growth rate, a measure of economic growth. The coefficient of the variable population growth rate (X_1) shows that an increase of 1% in population growth rate will result in an increase of approximately 2.60% in GDP growth rate for East Asia economy.

From the z-test result table, the p-value for the variable population growth rate is 0.033 while the p-value is 0.189 for the variable inflation rate. The p-value is less than 0.05 for the variable population growth rate while it is more than 0.05 for the variable inflation rate. From the result of the z-test of each variable, it is concluded that for East Asian countries, the variable population growth rate significantly affects GDP growth rate while the variable inflation rate does not affect GDP growth rate. The Wald χ^2 Test is used to determine the effect of both variables on economic growth. From the result of the Wald χ^2 , it was found that the p-value is less than 0.05. Therefore, there is enough evidence to reject the Null Hypothesis and it can be concluded that inflation and population growth together affect the economic growth of East Asian countries.

In past research by Dao (2012), a contrasting result is found regarding population growth effects on the economy. Dao found a negative correlation on the effect of population growth on per capita GDP growth from a sample of 43 developing economies. Furthermore, it was found that a 1% decrease in population growth rate increases per capita GDP growth rate by 13.7%. This is a rather contrasting result from the findings of this research. On another research done in Pakistan, it was found that population growth has a positive impact on economic growth. (Ali et al., 2013) This research by Ali et al. (2013) also explains our small value of R-squared since the variable used in the preceding research includes human resource

development and unemployment rate where both also have a significant effect on economic growth.

In the case of inflation's effect on economic growth, based on the theory of Philips curve, inflation should affect economic growth positively up to a certain inflation threshold. This is due to the inverse relationship between inflation and unemployment rate (Mankiw, 2021). Higher inflation causes the unemployment rate to go down in theory and should result in higher productivity and higher economic growth. But contrary to this theory, a lot of research found that inflation either has a fully negative effect on a country's economic growth or does not have any significant effect on economic growth. Study done by Mandala (2020), found that inflation significantly decrease economic growth in either long run or short run in Indonesia. In another study done by Vaona and Schiavo (2007), they found that inflation under 12% has no significant effect on economic growth while above it, inflation has a negative effect on economic growth. In the case of this research, similarities can be found with research by Vaona and Shiavo. In this study, the data of inflation rate from the samples have an average of 3.026%. Therefore, most of the sample fulfills the threshold limit found by Vaona and Shiavo (2007) that is 12%. Other than that, this study found that inflation has no significant effect on economic growth, in line with previous study by Vaona and Shiavo.

These differing outcomes do make sense since economic growth is not only affected by a few numbers of factors. In the case of this study, it can be argued that population growth affects the economic growth of East Asian countries positively because most of the sample countries have a high human capital index. This indicates that the positive effect of population growth on economic growth may be attributed to the productivity and the human capital of the population. In the case of inflation's effect on economic growth, the government's economic policy and the overall economic condition may also play a role on the effect of inflation.

Conclusion

This research is done to find the effect of population growth and inflation on economic growth for East Asian countries. Through annual data from 2001 until 2022 modelled using panel data regression, it was found that population growth and inflation combined has a significant effect on the economic growth of East Asia. The partial regression results also found that population growth has a positive effect on economic growth while inflation does not have a significant effect on economic growth.

From further analysis, a lot of differing outcomes were found from various past studies. According to the theory of Philip curve, inflation should have a positive effect on economic growth under certain threshold since inflation increases productivity by lowering the unemployment rate. However, the result from this research shows that inflation has no significant effect on the economy much like the case from Vaona & Schiavo (2007) when inflation is below the threshold. In the case of population growth, past research on its effect has mixed results. In the case of this study, it was found that population growth has a positive effect on economic growth.

Through these differing outcomes, an implication can be made that economic growth cannot be attributed solely by demographic or economic factors in isolation. Other than that, the income level, geography, government economic policy and the sample countries' development and human capital condition can also affect the outcomes of this research. Further research regarding this topic can explore more demographic and economic variables effect on economic growth. It can be done for countries in a certain region or of a certain classification as it will provide considerable insight that can help inform more targeted and effective government policy across the globe.

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