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THE INFLUENCE OF THE COVID-19 PANDEMIC ON ECONOMIC GROWTH CONVERGENCE AT THE DISTRICT/CITY LEVEL IN EAST JAVA: WHAT IS THE RIGHT PUBLIC POLICY?

Mohammad Ichsan Verianto*[1]
Muhammad Nur Faiq[2]
Aisyah Tarassyta[3]

[1, 2, 3]Fakultas Ekonomi dan Bisnis, Universitas Airlangga, Indonesia

ABSTRACT

Indonesia has experienced relatively significant and stable economic growth in the last decade. However, Indonesia, a developing country, is still vulnerable to income disparities between regions or regions. It is due to the unequal distribution of natural resources, population, and development concentration. This study aims to examine the effect of the COVID-19 pandemic on the convergence of economic growth in East Java Province. In this study, per capita Gross Regional Domestic Product (GRDP) data or secondary data with panel type is used which is accessed from the annual report of the Central Statistics Agency in each district or city in East Java for the period 2010 to 2020. By using the -convergence analysis technique and -convergence and considering the spatial dependence between regions, the researchers found no substantial evidence of the occurrence of regional income convergence in East Java. There has been a divergence in regional income before and after the pandemic. But with a more significant divergence coefficient before the pandemic, it means that the existence of a pandemic has reduced the level of divergence even though the catch-up effect is negligible on economic growth. In general, this means a decrease in income inequality due to the pandemic, as rich regions are affected more than poor regions. So that public policy recommendations are needed, especially after the pandemic, through recovery that focuses on improving the economic sector in the affected affluent areas such as Surabaya and others.

***Keywords**: Convergence of Economic Growth; East Java; Covid-19 Pandemic; Public Policy*

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*Correspondence:
Mohammad Ichsan Verianto
E-mail:
ichsanveri@gmail.com

ABSTRAK

Dalam dekade terakhir, Indonesia mengalami pertumbuhan ekonomi yang relatif cukup besar dan stabil. Akan tetapi, Indonesia yang merupakan negara berkembang masih rentan terhadap terjadinya disparitas pendapatan antar daerah atau wilayah. Hal ini disebabkan karena ketidakmerataan distribusi yang meliputi sumber daya alam, penduduk, dan masih terjadinya pemusatan pembangunan di suatu wilayah. Penelitian ini bertujuan untuk mengkaji pengaruh pandemi covid- 19 terhadap terjadinya konvergensi pertumbuhan ekonomi Provinsi Jawa Timur. Dalam penelitian ini menggunakan data Produk Domestik Regional Bruto (PDRB) per kapita atau data sekunder dengan tipe panel yang diakses dari laporan tahunan Badan Pusat Statistik di tiap kabupaten atau kota di Jawa Timur periode waktu 2010 sampai 2020. Dengan menggunakan teknik analisis σ-convergence dan β-convergence, serta mempertimbangkan ketergantungan spasial antar wilayah, peneliti menemukan bahwa tidak ada bukti kuat terjadinya konvergensi pendapatan daerah di Jawa Timur. Justru terjadi divergensi pendapatan daerah baik sebelum dan sesudah pandemi. Tetapi dengan koefisien divergensi yang lebih besar sebelum pandemi, artinya

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adanya pandemi telah menurunkan tingkat divergensi meskipun pengaruh catch-up yang kecil terhadap pertumbuhan ekonomi. Secara umum, hal ini berarti terjadi penurunan ketimpangan pendapatan akibat pandemi karena daerah-daerah kaya terkena dampak yang lebih besar dibandingkan daerah-daerah miskin. Sehingga diperlukan rekomendasi kebijakan publik khususnya pasca pandemi melalui pemulihan yang fokus untuk memperbaiki sektor ekonomi di wilayah kaya yang terdampak seperti di Surabaya dan lainnya.

Kata Kunci: *Konvergensi Pertumbuhan Ekonomi; Jawa Timur; Pandemi Covid- 19; Kebijakan Publik*

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Introduction

Indonesia is the largest archipelagic country globally, with a 1.92 million km2. An ocean area includes a territory of 3.1 million km2, and an Exclusive Economic Zone ocean area of 2.7 million km2 even has the longest coastline in the world, which is 81,000 km. As an archipelagic country, Indonesia also has different characteristics between regions, while regional characteristics also strongly influence the pattern of economic development (Sirojuzilam and Piras, 2008). So that the way of economic development in Indonesia is also not uniform in the concept of spatial economy. Areas illustrate this with relatively fast economic development and some relatively slow economic development. The ability of economic growth in each different region is what causes the economy to worry in Indonesia. Other causes also come from differences in resources and population between regions in Indonesia (Martin, 2006).

A regional dimension view is needed in planning economic development in each region of Indonesia. Due to adjustments to regional potentials. These regional income disparities refer to an unequal distribution of natural resources and, most importantly, are related to spatial dynamics, such as the population distribution in each region of Indonesia. So that economic development in the territory of Indonesia is oriented to the integration of regional decentralization called regional autonomy, which is defined as regional development that is included as an integral part of national development. From the point of view of regional development theory, it is also known as the neoclassical growth theory, which explains cross-regional behavior. Neoclassical growth theory predicts that the incomes of poorer regions grow faster than wealthier regions, so this condition creates a “catch up” effect which results in the convergence of regional income across regions (Barro, 2006). This neoclassical regional development theory states that incomes between regions can be different (Rumayya et al., 2005). The difference in regional income becomes the basis of this research related to the development process and empirical evidence.

In the spatial economy, regions interact with each other through several channels of cooperation or related relationships, such as technology transfer and sharing of production factors that can cause externalities in the form of regional income (Sugiharti, 2013). For this reason, the spatial economic aspect is not neglected in research on development or growth that examines the process of regional convergence. Spatial aspects between regions also need to be considered, especially in theoretical-methodological development, to understand growth behavior in each region (Anselin, 2010).

East Java is a fascinating province to study by looking at the process of revenue convergence between districts/cities. It can be seen from the presentation of the East Java Regional Gross Domestic Product, which is significant in the national Gross Domestic Product share in 2019, reaching 15 percent of the Indonesian economy (BPS, 2020). In addition, East Java also

has a trend of high economic growth, even higher than the national economic growth. This condition occurred in 2019 when East Java's economic growth reached 5.52 percent, higher than the national growth of 5.02 percent (BPS, 2020).

However, in terms of income disparity, as measured by the Gini coefficient, the province of East Java is relatively high, meaning that there is still a significant income inequality between regions in East Java, with a Gini coefficient of 0.415 in 2017 and the highest since 2012 (BPS, 2020). The existence of the Covid-19 pandemic also implies that income disparities will change, whether it is relatively higher, lower, or stagnant. Therefore, this study aims to analyze the convergence of district/city revenue in East Java from 2010 to 2020. The following analysis will be carried out by analyzing the convergence of regional income for districts and cities separately, divided into several time durations, before and during the Covid-19 pandemic. The convergence analysis results are needed in formulating policies that follow current conditions to reduce the gap between regions in East Java Province (Saldanha, 2003).

Furthermore, this study will be divided into several parts: part 2 discusses the literature review, part 3 is data and methodology, part 4 is results and discussion, and part 5 or the end is the conclusion.

Literature Review

Convergence Concept

Convergence is a condition when countries and regions have similarities in economic conditions. The convergence condition in question can occur if a country or region with relatively low-income experiences relatively fast growth compared to other regions with relatively high income. In the long term, it experiences convergence (Kaitila, 2013). So that there is a tendency for countries or regions that are poor or low in income to catch up with the economic growth of rich countries (Barro, 2006). This convergence is based on the catch-up hypothesis, which explains that countries or regions with low productivity levels have the potential to achieve high economic growth (Abramovitz, 1986). This catch-up process occurs if the relative variance around the average productivity decreases over time due to faster growth in previously lagging countries or regions. Then another hypothesis is related to the neoclassical growth model (Barro, 2006), which states that the per capita growth rate tends to be inversely related to the initial per capita income level in a closed economy. Assuming the technology and preferences in each economy are the same, developing countries or regions tend to grow faster than rich countries or regions.

According to Brata et al. (2002), there are two main concepts of convergence, namely sigma convergence and beta convergence. Sigma convergence is used to measure the level of dispersion of economic growth. While beta convergence is used to determine the effect of the estimated factors to determine the level of convergence, this understanding also means from the definition of absolute beta convergence, which is one of two types of beta convergence. The other is called conditional beta convergence. Sigma convergence is related to changes in the coefficient of variation in growth rates over time (Gömleksiz et al., 2017).

The two types of convergence measures, namely sigma convergence and beta convergence, are interrelated and imply that the income gap between regions decreases over time. On the other hand, the convergent beta indicates that income growth is relatively faster in poorer regions compared to wealthier regions so that the final income levels can converge. Faster income growth from poorer regions relative to wealthier regions (β-convergence) tends to result in lower income inequality across regions (σ-convergence) (Dey and Neogi, 2015). However, the presence of beta convergence does not necessarily imply the existence of sigma

convergence. Beta convergence can coexist with stable or increasing variance in income coefficients due to region-specific shocks, which impact regional growth rates by offsetting sigma convergence (Neogi, 2015).

Previous Studies

Several previous studies related to regional income convergence in different contexts and times have been carried out. One of them is a study by Kangasharju (1998), which aims to investigate the existence of sigma convergence and beta convergence (absolute and conditional) in Finland from 1934 to 1993 with the result that sigma convergence exists, namely the coefficient of variation of income per capita decreases during the observation period. Furthermore, it also confirmed that found absolute beta convergence exists.

Another study by Muda et al. (2008) explored the existence of absolute sigma convergence and beta convergence in 3,058 regions in the United States from 1970 to 1998. The result was the presence of absolute beta convergence, with the convergence rate decreasing between 6.3 percent to 9.8 percent. But the study did not find sigma convergence in the United States context. In particular, the study found an estimate that the standard deviation of real per capita income in 1998 was 5.8 percent or higher than in 1970.

Then, Rapacki and Prochniak (2009) also investigated absolute sigma convergence and beta convergence in 27 ex-socialist countries from 1990 to 2005. The results of this study stated that beta convergence did not occur from 1990 to 2005. However, there was beta convergence in 2000-2005 at 1.39 percent per year. Similarly, there is no strong evidence of sigma convergence during 1990-2005 in 27 countries. However, when the analysis time is shortened, namely the period of 2000-2005, it is found that there is sigma convergence.

Another study by Cashin and Sahay (1996) which looked at regional economic growth in India in the period 1961 to 1991, found that regional incomes among the 20 observed states tended to converge at a rate of 1.5 percent per year.

Methods

Data

The data used in this study is panel data consisting of Gross Regional Domestic Product (GRDP) Per Capita. This variable is in Rupiah (IDR) or in the nominal currency, which is then reduced to a constant price in 2010 to obtain the actual value. Then it is converted into natural logarithm form. The variable of the average rate of growth of GRDP per capita (Y) is divided into two times, namely 2019 and 2020, to see the convergence of regional income before and during the pandemic. While the natural logarithm of GRDP per capita in 2010 (X).

They are used as the actual value (constant GDP) for the base year. The data covers all 38 districts and cities throughout East Java from 2010 to 2020. This data is taken from the Central Statistics Agency (www.bps.go.id). The descriptive statistics of the variables used in the analysis are presented below:

Table 1: Variable Descriptive Statistics

Variables	Base year				End year			
	Mean	Min	Max	Std. Deviation	Mean	Min	Max	Std. Deviation
GRDP Per Capita (000 Rupiah)	26,869.1	8,758.0	213,789.3	34,392.1	40,133.7	12,516.8	291,844	48,070.6
Ln GRDP Per Capita	16.807	15.985	19.181	0.653	17.212	16.343	19.492	0.665

Analytical Framework

The first line in this research focuses on sigma convergence and beta convergence without considering the spatial dependence between regions. Sigma convergence is measured by coefficient variation (CV) of regional per capita income from time to time. The trend of increasing CV from time to time indicates an increase in income inequality between regions or vice versa. The CV formula for a particular year or time is formulated below:

$$CV_t = \frac{\sigma_t}{\bar{y}_t} \quad (1)$$

Where sigma t is the standard deviation of real GDP per capita across regions in time *t* and *Yt* is the mean or average real GDP per capita across period *t*. From equation (1) above, the standard deviation of regional per capita income is estimated as follows:

$$\sigma_t = \sqrt[2]{\frac{1}{n}\sum_{i=1}^{n}(y_{it} - \bar{y}_t)^2} \quad (2)$$

Where n is the number of areas under study and Yit is the real GDP per capita of area i in period t. Following Young et al. (2008), the variance ratio test (F-ratio test) was also applied to explore statistical differences in the standard deviation of regional per capita income over time.

Furthermore, following the research of Rey and Montouri (1999), the absolute beta convergence analysis for cross-sectional data is estimated through the regression equation below:

$$Ln\left(\frac{Y_{i,t}}{Y_{i,o}}\right) = \alpha + \beta Ln\left(Y_{i,o}\right) + \varepsilon_i \quad ;\varepsilon_i \sim i.i.d \quad (3)$$

Regression equation (3) is estimated using Ordinary Least Square (OLS) with a robust standard error option to avoid heteroscedasticity. Where Ln represents the natural logarithm, Yit shows real GRDP per capita in region i at time t (end of observation), and Yi0 indicates real GRDP per capita in region i at initial observation. Thus, the dependent variable of the regression equation above shows the per capita GDP growth rate of region i during the observation. Meanwhile, sigma and beta are the model coefficients to be estimated, and e is the error symbol. The negative sign of the beta coefficient and its statistical significance indicates the presence of beta convergence (Magalhães et al., 2005).

Discussion

Regional Income Convergence Analysis in East Java

First, the convergence process in East Java is estimated using sigma convergence. Conducted this analysis is based on testing the coefficient of variation (CV) from time to time. Researchers divide sigma convergence into two major parts: 1) all regions (38 districts and cities in East Java); and 2) 37 districts and cities other than the city of Kediri. The exception is Kediri City because it has a very high GRDP per capita compared to other areas in East Java. After all, Kediri is the fifth largest central tobacco production center in Indonesia. It is estimated that around 80 percent of the GRDP of Kediri is contributed by the tobacco industry (BPS, 2020). Thus, the researcher treats the observation of the city of Kediri as an outlier. The results of sigma convergence are shown in the table below:

Table 2: Sigma Convergence Estimation in East Java 2010-2020

Year	Convergence for 38 regions (all regions)				Convergence for 37 regions (Excluding City of Kediri)			
	Mean of GDP Per Capita	SD of GDP Per Capita	CV of GDP Per Capita	p-value	Mean of GDP Per Capita	SD of GDP Per Capita	CV of GDP Per Capita	p-value
2010	16.807	0.6528	0.03884		16.743	0.5266	0.03145	
2011	16.859	0.6536	0.03877	0.9940	16.796	0.5300	0.03156	0.9690
2012	16.912	0.6540	0.03867	0.9916	16.849	0.5318	0.03156	0.9535
2013	16.964	0.6528	0.03848	0.9998	16.902	0.5337	0.03158	0.9360
2014	17.012	0.6563	0.03858	0.9744	16.950	0.5376	0.03172	0.9014
2015	17.058	0.6613	0.03877	0.9379	16.995	0.5439	0.03200	0.8472
2016	17.107	0.6655	0.03890	0.9074	17.044	0.5495	0.03224	0.7997
2017	17.153	0.6685	0.03897	0.8858	17.091	0.5536	0.03239	0.7657
2018	17.200	0.6703	0.03897	0.8737	17.138	0.5557	0.03243	0.7483
2019	17.245	0.6742	0.03910	0.8457	17.182	0.5604	0.03261	0.7110
2020	17.212	0.6650	0.03863	0.9116	17.151	0.5534	0.03226	0.7676

Note: SD stands for standard deviation. CV is the coefficient of variation. P-values are based on the variance ratio test, where the null hypothesis is the regional ratio value. The standard deviation of earnings from 2010 to 2020 is within (against two-tailed alternatives).

Based on the table, the Coefficient of Variation (CV) of Real GDP per capita of 38 districts and cities was 0.038841709 in 2010 and decreased to 0.038576951 in 2014. However, from 2015 onwards, the Coefficient of Variation (CV) of 38 districts and cities in East Java tended to increase, except in 2020, which experienced a decline again due to the Covid-19 pandemic, which caused regional GRDP in East Java to fall. In 2020, East Java's real GRDP Variation Coefficient decreased 1.18 percent from 2019. Regional income disparities tend to decrease during the economic recession caused by the Covid-19 pandemic. This declining result leads to the potential for regional revenue convergence. This finding contradicts Martinho's research (2021), which states that Covid-19 has hampered income convergence in OECD countries. However, based on the ratio of variance test, there is no statistical difference in the standard deviation of regional income per capita during the observation period, which is indicated by an insignificant p-value in table 2. It means that there is no significant change in the regional income distribution in East Java from 2010 to 2020. In other words, it implies that the coefficient of variation of regional income from 2010 to 2020 is in short-term dynamics.

Meanwhile, the coefficient of real GDP per capita variation for 37 regions shows an increasing trend from 2010-to 2019, decreasing the coefficient of variation in 2020. In 2010, the coefficient of variation was 0.03145. It implies that the coefficient of variation in 2010 is much lower than the coefficient of variation obtained for 38 districts/cities in East Java. In 2020 the coefficient of variation also showed a decrease of 0.03226 from 2019, which was 0.03261. In addition, the statistical test also shows that there is no difference in the standard deviation of regional per capita income during observations. Convergence visualization can be seen in the image below:

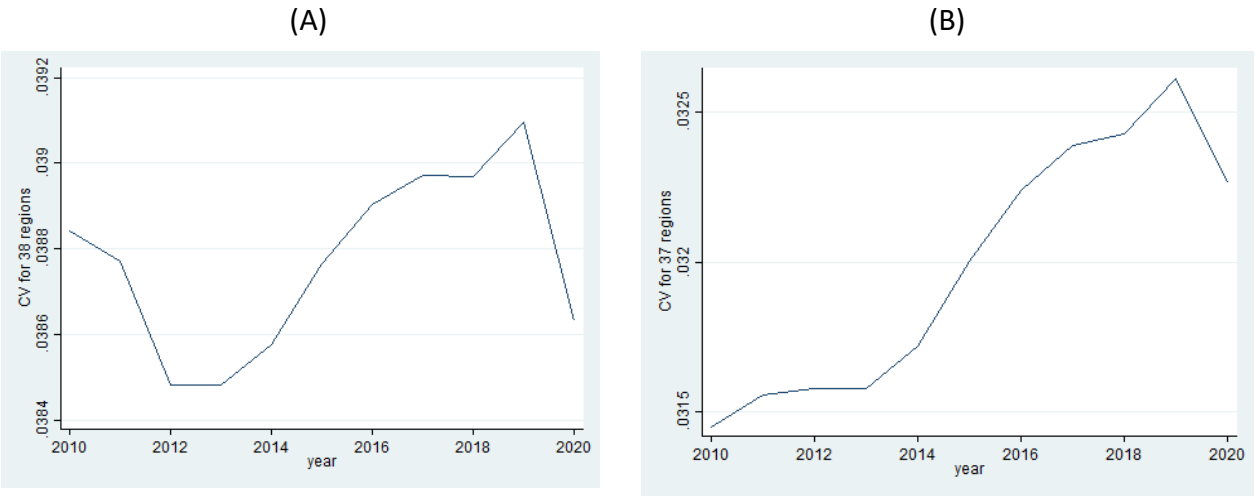

Figure 1: Comparison of Sigma Convergence 38 Regions (A) and 37 Regions (B) in East Java 2010-2020

Source: Data Processed

Figure 1 compares changes in the Coefficient of Variation of real GDP per capita between regions. Specifically, Figure 1 (A) shows the change in the Coefficient of Variation of real GDP per capita for all regions in East Java, while Figure 1 (B) shows the development of the coefficient of variation for 37 regions, excluding the city of Kediri. Visually, it can be seen the general upward trend of the Coefficient of Variation (except in 2020) in Figures 1 (A) and 1 (B), which indicates the presence of -convergence. However, this trend is not statistically significant when viewed as indicated by the variance ratio test in the previous section. Therefore, the presence of convergence is not strong. The existence of this insignificant result is due to the short analysis time. For this reason, future studies using -convergence should consider a more extended observation period to capture significant changes in areas experiencing income dispersion.

Second, pictures also visually show the relationship between regional income growth rates and GRDP base or initial per capita in East Java. The visualization is divided into four parts, namely (A) 38 districts/cities in 2010-2020; (B) 37 regencies/cities excluding the City of Kediri in 2010-2020; (C) 38 districts/cities in 2010-2019; (D) 37 districts/cities in 2010-2019. Separation of time analysis, namely 2010-2020 and 2010-2019, was carried out to distinguish the negative shock effect of the Covid-19 pandemic on regional revenue growth in 2020.

Based on Figure 2 (attached), it can see that the initial or primary GRDP per capita is positively related to the level of income growth. However, the positive relationship in Figures (A) and (C) is relatively weak. While pictures (B) and (D) show a stronger positive relationship. The figure shows that the more affluent regions in the 2010 base year observations show a relatively higher level of regional income growth than poorer regions. In other words, there is a trend of divergence in regional income growth in all districts/cities in East Java during the observation. The regression results show that there was a divergence between the two time periods, namely before and after the pandemic. Still, a more significant divergence occurred before the pandemic, meaning that the Covid-19 pandemic impacted reducing the level of divergence. Specifically, it can be explained that there has been a decrease in inequality due to the Covid-19 pandemic because rich regions are affected more than poor regions.

Recommended Policy Alternatives

Alternative policies to improve the economic sector in the affected rich areas in East Java province are focused on the industrial sector and MSMEs. An alternative policy in the industrial sector is to innovate technology development in the production process. It is essential, considering that technology makes the production process more efficient. In addition, the government also provides fiscal incentives in the short and long term. In industry, long-term policies greatly influence decisions in the production process. In addition, by strengthening supply chains to utilize local raw materials and efforts by business actors to maximize output, they also play a role in improving the economic sector. In terms of MSMEs, there is a need for the potential development of MSME actors to create human resources following the labor market. The local government and the private sector are expected to be able to become facilitators of technology procurement for MSME business actors. And every MSME business actor is expected to be able to master technology.

Conclusion

The focus of this study is to prove the convergence of regional income distribution inequality in East Java during the 2010-2020 time period using a convergent sigma approach. The convergence analysis results, namely sigma convergence for the overall data and data divided by region, show that there is no convergence in income variables in East Java in the 2010-2020 period. It is indicated by the trend in sigma convergence as measured using the Coefficient of Variance, which tends to continue to increase or fluctuate. However, the analysis also shows that there was a divergence between the two time periods, namely before and after the pandemic. Still, a more significant divergence occurred before the pandemic, meaning that the Covid-19 pandemic impacted reducing the level of divergence.

The need for clear regulations so that business actors do not make risky online loans. In facilitating the leading sector in the Rich City area of East Java, the government should be able to improve regulations. The purpose of improving this regulation is so that business actors get convenience in terms of capital assistance.

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Appendix

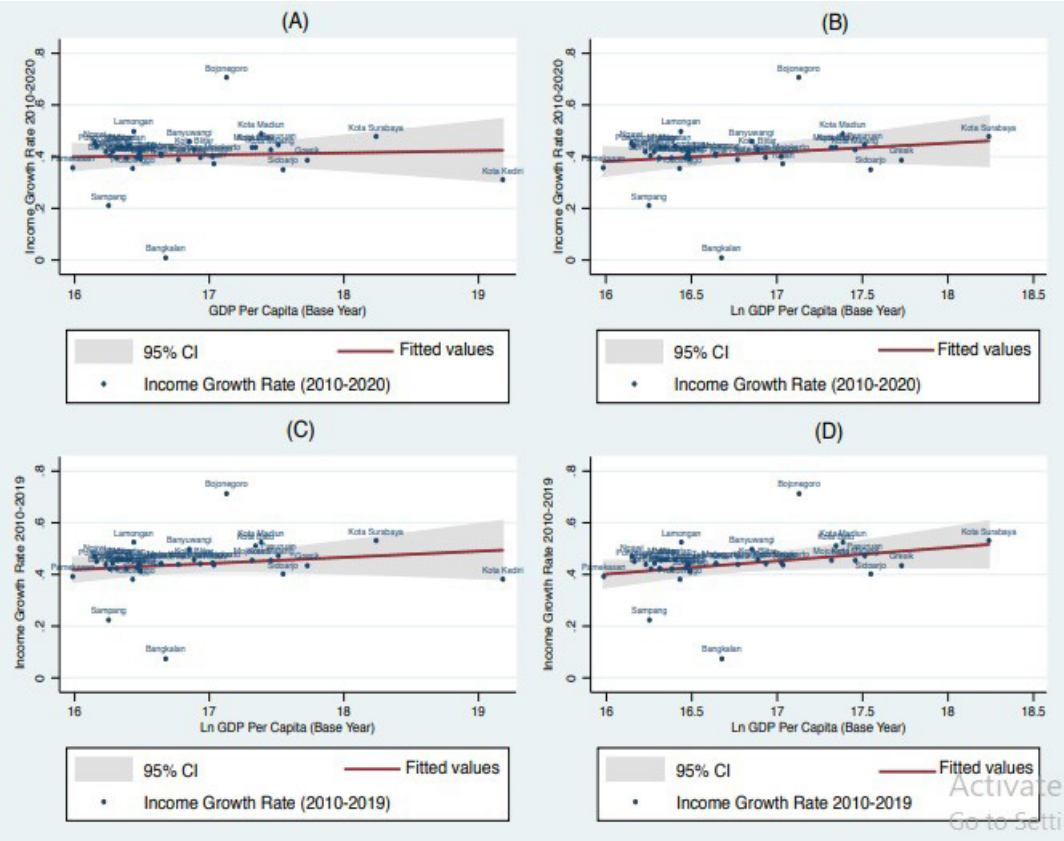

Figure 2: Relationship between Income Growth Rate and Initial GDP Per Capita

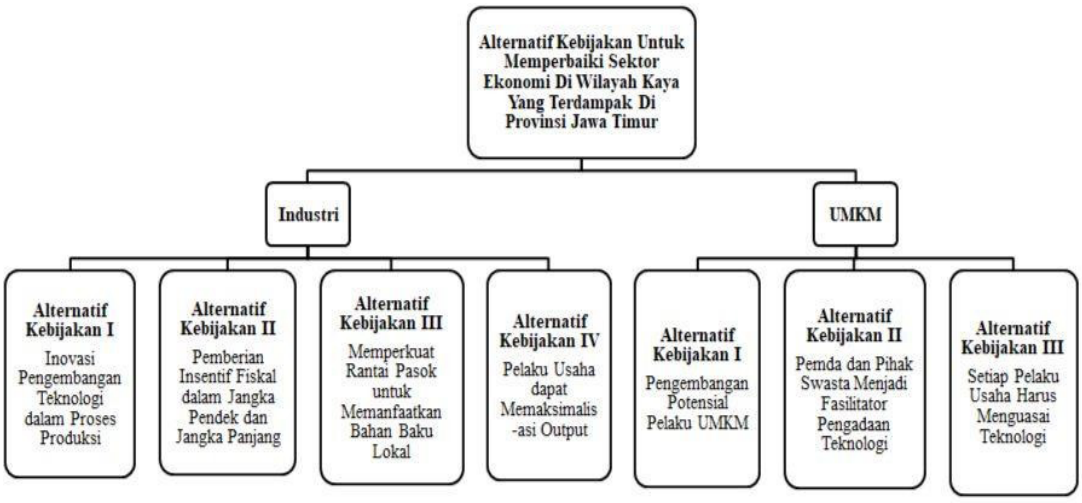

Figure 3: Recommended Policy Alternatives

Source: Author illustration