EFFICIENT

Analysis Convergence of Income Per Capita Among Regions in West Java 2017-2021

Rizqa Nurhanifah Saputri✉

Development Economic Study Program, Economics Faculty, Universitas Negeri Semarang

Abstract

This research aims to identify the sigma and beta convergence of GRDP per capita, analyze the effect of Local Revenue (PAD), Human Development Index, working workforce, minimum wage, and industry on income per capita in West Java 2017-2021. The data used are secondary data from BPS. The analytical of sigma convergence uses coefficient of variation of GRDP per capita and panel data regression for beta convergence analysis with the best model being the Fixed Effect Model (FEM) Generalized Least Square (GLS) method. The results of this study indicate that there is a convergence of sigma GRDP per capita between districts / cities of West Java in 2017-2021, but general there is no absolute beta convergence or conditional beta. This means that income inequality between regions in West Java has decreased during 2017-2021, but developing regions have not been able to increase high economic growth compared to developed regions, resulting in divergence. The PAD and HDI have a positive effect on GRDP per capita. Minimum wage and industry have a negative effect. Meanwhile, the labor force that works has no effect on GRDP per capita.

Keywords: Convergence, Inequality, GRDP Per Capita, PAD, HDI, workforce, UMK and industry

How to Cite: Analysis Convergence of Income Per Capita Among Regions in West Java 2017-2021. (2024). Efficient: Indonesian Journal of Development Economics, 7(1), 92-101. https://doi.org/10.15294/knxoe250

✉ Correspondence Address :
  Address: Gedung L2 Lantai 2 FE Unnes
  Kampus Sekaran, Gunungpati, Semarang, 50229
  E-mail : rizqanurhanifah16@students.unnes.ac.id

INTRODUCTION

Economic development is a process that encourages an increase in the per capita income of the population in the long term by involving population growth and changes in the economic structure of an area. Measures of the success of economic development can be seen from economic growth, low-income disparities between residents and economic structure (Kuncoro M, 2004). The existence of sustainable

economic development is ultimately expected to create high economic growth and reduce the income gap between economically advanced and poor communities and can reduce unemployment rates.

Gross Domestic Product is used to show the total added value of output in a country, while for the regional level it uses Gross Regional Domestic Product. Based on Statistic Official News in 2021 Java Island contributes 57.89 percent to the national economy, while the remaining 42.11 percent comes from outside Java.

In 2017 the PDRB of the island of Java was 58.38 percent, continuing to increase until 2019, and had decreased in 2020 to 2021 to 57.89 percent but did not shift as the largest contributor to national GDP. But high economic growth is not followed by the same increase in income. Three of the six provinces on Java Island are included in the category of eight regions with the highest inequality in Indonesia. Figure 1 shows eight provinces with Gini index values above Indonesia.


Figure 1. Eight provinces with the highest Gini ratio index in Indonesia in 2020
Source: Badan Pusat Statistik, 2021

In figure 1, West Java is ranked third as the province with the highest inequality value in Indonesia.West Java is one of the provinces with a good economy and West Java ranks third

highest in Indonesia in contributing to national GDP. The high inequality index experienced by West Java shows that the pattern of economic growth in West Java which is always high is followed by high inequality as well. According to the Official Statistics News, West Java is the province with the highest increase in inequality compared to other provinces. West Java's Gini ratio index rate can be seen in Figure 2 as follows.
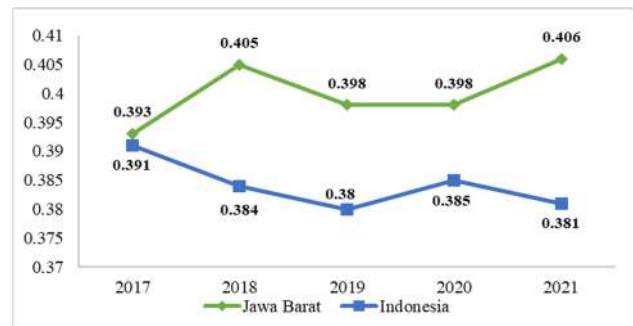
**Figure 2.** Trends in the Gini Index Ratio of West Java and Indonesia in 2017-2021
Source: Badan Pusat Statistik, 2021

According to Saputra (2016) inequality experienced by districts/cities in West Java is a serious problem because the average level of inequality between districts/cities has been relatively high since the post-New Order era. Identification to see welfare in West Java can be seen from the GRDP per capita for 2017-2021.

Figure 2 displays the average GRDP per capita between districts/cities in West Java during 2017-2021 which shows that 7 out of 27 districts/cities that have high per capita GRDP in West Java, namely Kab. Bekasi, Bandung City, Kab. Karawang, Cirebon City, Kab. Purwakarta, Kab. Indramayu and Cimahi City.

Meanwhile, other districts/cities have per capita GRDP in the range of below Rp. 10,000,000.-. Cianjur Regency is the district with the lowest average income in West Java, while

the area with the highest income is Kab. Bekasi, which is IDR 60,000,000. There is a very big difference between Cianjur Regency and Bekasi Regency.
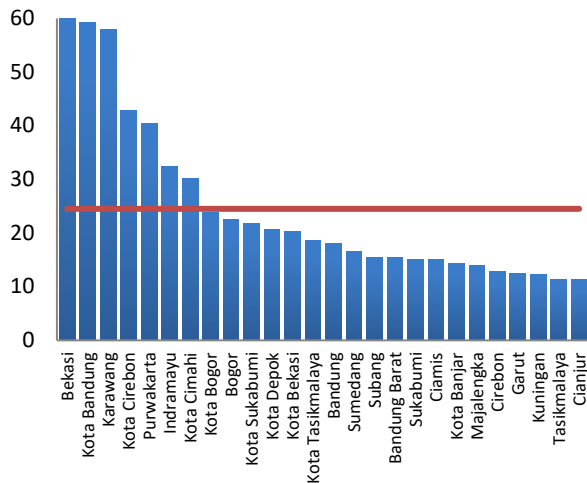
Figure 3. GRDP Per Capita of Regencies/Cities in West Java 2017-2021
Source: Badan Pusat Statistik, 2021

It means almost 70 percent of districts/cities in West Java are still below the provincial level. In this case the role of local government is needed in increasing the average income of the population. The regional government is expected to be able to explore the potential in each region so that it can increase the GRDP per capita in the region.

The high difference in the per capita GRDP gap between regions indicates that there is inequality in West Java Province. From these problems, the question that arises is about accelerating growth in the poorest regions and catching up (catching up effect) to developed regions or what can be called convergence.

Convergence is a condition that shows the smaller gaps that occur between regions in a certain period. An area is said to be convergent if the area tends towards a steady-state point so

that the income gap between regions becomes smaller.

Solow's neoclassical theory argues that economies in various regions will converge to the same level of income and lead to balanced growth. Solow's theory sees in many ways the market mechanism creates a balance so that the government does not need to interfere too much in the market. The growth rate comes from three sources, namely capital accumulation, technological improvements, and increased labor supply.

For the factors of production to always be at full capacity, mechanisms such as investment with savings are needed in conditions of full employment. One of the reasons for the emergence of the concept of convergence is due to differences in GRDP per capita in each region which will lead to inequality between poor regions and developed regions.

Convergence theory is a development of the neoclassical theory, namely the Harrod-Domar and Solow growth theory. The rationale for the conference theory is the factors of production and capital reserves as determinants of differences in income between regions. According to Mankiw (2006), the Solow model introduces initial per capita income as a measure of distance to steady state conditions.

The specification of the Solow growth model is diminishing returns to capital to capital which explains that the rate of economic growth will slow down over time due to the closer the distance of the economy to the level of capital per worker. The first convergence study was conducted by Barro and Sala-i Martin (1992) in the United States to see the convergence of GDP per capita in that area, which was then carried out by other researchers, including Indonesia. Empirical studies show that even though the

economy of poor areas can grow faster than the economy of rich regions, inequality increases at the start of competition.

Wibisono (2003) explains that regional economic growth has a convergence hypothesis which is divided into two concepts, namely sigma convergence and beta convergence. Sigma convergence focuses on reducing regional income inequality as seen from the dispersion of GRDP per capita which has decreased over time.

This type of convergence is consistent with the neoclassical theory which states that each region moves towards a certain level of economic growth, because the factors of production between regions are used in a balanced manner. Sigma convergence analysis can be calculated by looking at the coefficient of variation to measure the level of dispersion of GRDP per capita.

Beta convergence aims to describe the rapid economic growth of a poor area compared to a rich area. Where this condition is indicated by the negative value of beta on the negative relationship between the growth of per capita income in a certain year to the previous year's per capita income (initial level of per capita income).

The beta convergence coefficient indicates how fast an economy's output per worker approaches steady state conditions. Beta convergence is divided into two types, namely absolute and conditional convergence. Absolute convergence is a convergence condition that considers the relationship between the growth of GRDP per capita and the initial GRDP per capita without being influenced by other factors, because other factors are assumed to be the same.

The two convergence concepts above can be briefly explained, namely sigma convergence

focuses on changes in income over time. Meanwhile, beta convergence studies income mobility in the same distribution. Even though the two are different, they are still related, because beta convergence will produce sigma convergence. Therefore, beta convergence is a necessary condition but not a sufficient condition for sigma convergence to occur.

According to Barro and Sala-i Martin besides convergence calculations. Measuring the speed of convergence is important to know when convergence occurs the faster it indicates that the economy is getting closer to steady state conditions. Much research on the convergence of GRDP per capita has been carried out by Zaenuri (2022), Yeniwati (2021), Akram (2021) Gama (2019), Septian (2018), Tian Xu (2016) and other researchers.

The results of their research show that the convergence process occurs in the provinces of Indonesia at different speeds. Based on the background and description above, the purpose of this research is to identify the convergence of sigma and beta, and to analyze the factors that are thought to influence the growth of GRDP per capita in West Java in 2017-2021.

RESEARCH METHODS

This study uses a type of quantitative research. According to Sugiyono (2017), quantitative research is a research method based on the philosophy of positivism, used to examine certain populations or samples, collecting data using research instruments, statistical data analysis to test established hypotheses. This study uses secondary data types collected from various official sources.

The variable data used in this study were obtained from data sources originating from various statistical reports and documents that

have been published and can be accessed on official websites such as the Central Bureau of Statistics (BPS). The data analysis technique in this study used panel data regression with the help of Eviews 10 software. This research used time series data for 5 years, namely 2017-2021 and cross section data from 27 districts/cities in West Java.

The variables in this study are the growth of GRDP per capita as the dependent variable and initial GRDP per capita, local revenue (PAD), HDI, the working workforce, UMK, and industry. The calculation of sigma convergence is by calculating the standard deviation of the log GRDP per capita of districts/cities in West Java and then dividing it by the average GRDP per capita.

If it produces a standard deviation value that decreases from year to year, income inequality between districts/cities in West Java decreases. Meanwhile, beta convergence is done by panel data regression. Where there are three models in panel data regression, namely CEM, FEM, and REM where to determine which of the three models is the best, the Chow test and Hausman test are carried out first.

The classical assumption test is used as a requirement that the best regression model does not violate the classical assumptions that have been set. In this study the estimation method used is Generalized Least Square (GLS) because in estimating the regression parameters, the GLS method is superior to the Ordinary Least Square (OLS) method.

According to Abdullah (2013) the GLS method does not require classical assumption tests because violations of these assumptions in the GLS method have been anticipated so that this method is able to produce estimators that meet the BLUE (Best Linear Unbiased Estimator) criteria. Beta convergence is divided into two, namely absolute beta convergence and conditional beta convergence.

Absolute beta convergence has only one independent variable, namely the initial GRDP per capita variable with the assumption that other factors are considered constant. The absolute convergence equation is as follows:

$$\ln(\text{GRDP Capita})i,t/T = \alpha + \beta \ln(\text{GRDP Capita}\_1)i,t + eit$$

While the equation for conditional beta convergence needs to include other variables that are thought to have an effect on GRDP per capita growth with the following equation:

$$\ln(\text{GRDPCapital})i,t/T = \alpha + \beta_0 \ln(\text{PDRBKapita}\_1)i,t + \beta_1 \ln(\text{PAD}) i,t + \beta_2 \text{IPM}i,t + \beta_3 \ln(\text{AKB}) i,t + \beta_4 \ln(\text{UMK}) i,t + \beta_5 \ln(\text{Industry}) i, t + i,t\varepsilon$$

Where GRDPcapita is GRDP per capita, GRDP Capita _1 is initial GRDP per capita, PAD is Local Own Revenue, IPM is Human Development Index, AKB is The Working Force, UMK is Regional Minimum Wage, Industry is Number of industries, β_0 is Constant, $\beta_1 – \beta_5$ is Regression coefficient for each research variable, i is Data cross section, and t is Data time series. If the sign of the coefficient β_0 is negative and below 0, it indicates that the economy between regions indicates conditional beta convergence in West Java.

RESULTS AND DISCUSSION

Sigma convergence is seen using the dispersion of GRDP per capita, where the dispersion is calculated using the coefficient of variation. Where the coefficient of variation is

the ratio of the standard deviation ratio of the logarithm of GRDP per capita in West Java to the average GRDP per capita in West Java with the results expressed as a percentage. Sigma convergence occurs when income dispersion experiences a decreasing trend, it can be interpreted that the per capita GRDP inequality faced by districts/cities in West Java tends to shrink and a process of income convergence occurs. The results of calculating the dispersion value of GRDP per capita for districts/cities in West Java 2017-2021 are as follows.
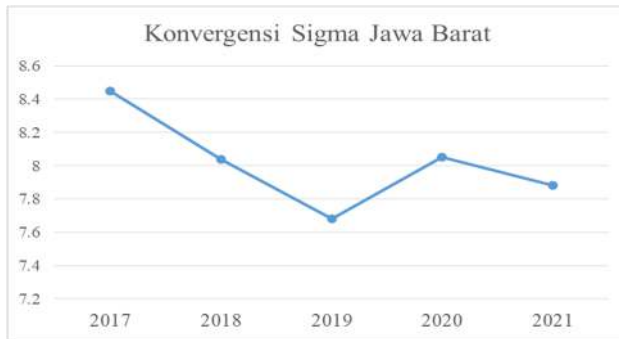
Figure 4. Dispersion of GRDP per Capita of West Java in 2017-2021
Source: Data Processed, 2023

The results of the calculation of the sigma convergence by calculating the coefficient of variation of GRDP per capita in West Java during 2017-2021 show that the efficiency of variation in 2017 was 8.4 percent and decreased in 2021 to 7.8 percent despite experiencing an increase in dispersion in 2020 due to the existence of the Covid-19 pandemic which had an impact on the weakening of the economy both West Java and the national one faced.

This indicates that there was a sigma convergence process in the districts/cities of West Java during the research year. Where the tendency of the dispersion coefficient tends to decrease from 2017-2021. The results in this

study are in accordance with the research results in Figure 4.5. In line with the research of Kumara et al (2021), Roseta and Tri (2020), Calculation of absolute and conditional beta convergence using panel data regression analysis. In this study the model chosen was FEM for both absolute and conditional. The absolute beta convergence regression estimation results are shown in table 1 as follows:

Table 1. Absolute Convergence Estimation

Variable	Coefisient (t-Statistics)	Probability	Results
Constant	6.203820 (7.522334)	0.0000	Significant
LN_PDRBKapita_1 (GRDP per capita t-1)	0.623556 (12.83959)	0.0000	Significant
R-squared	0.997250		
Adjusted R-squared	0.996556		
F-statistics	1437170		
Prob(F-stat)	0.000000		

Source: Data Processed, 2023

The positive value of the independent variable coefficient explains that there is no absolute beta convergence process. This means that the GRDP per capita between districts/cities in West Java has diverged, that is, there has been no reduction in disparities during the research year and the economic level has not moved towards the same level.

Meanwhile, a constant value of 6.203820 explains that when the value of GRDP per capita in the previous year was fixed, the GRDP per capita growth for districts/cities in West Java was 6.2 percent. To cover half of the gap, a speed of 9.6% is required, which takes 8 years to cover half of the gap. For the results of conditional beta convergence which was carried out by panel data regression the model chosen was FEM with the GLS method.

The conditional beta convergence regression analysis includes several independent variables as a consideration of the factors that affect the average GRDP per capita. The variables used include the previous year's per capita GRDP, PAD, HDI, the labor force employed, UMK and the number of industries. The estimation results of the absolute beta convergence regression are shown in table 2 as follows:

Table 2. Estimation of Conditional Convergence

Variable	Coefficient (t-Statistics)	Probability	Results
Constant	11.55663 (5.529215)	0.0000	Significant
LN_PDRBKapita_1 (GRDP per capita t-1)	0.551228 (4.475404)	0.0000	Significant
LNPAD	0.029102 (2.351959)	0.0206	Significant
IPM	0.072499 (7.674451)	0.0000	Significant
LNAKB	-0.048045 (-0.678347)	0.4991	Not significant
LNUMK	-0.381753 (-4.061871)	0.0001	significant
INDUSTRY	-0.393897 (-2.417760)	0.0174	Significant
R-squared		0.997856	
Adjusted R-squared		0.997183	
F-statistics		1483,358	
Prob(F-stat)		0.000000	

Source: Data Processed, 2023

In table 3 obtained the coefficient of determination is 0.997856, which means that the ability of the initial GRDP per capita variable, PAD, HDI, AKB, UMK, and industry is able to explain the variation of the dependent variable by 99.7 percent. While the remaining 1% is explained by other variables outside the model. The statistical f value is 1483.358 and the probability is 0.000000 which is less than 0.05. So the initial per capita GRDP variables, PAD,

HDI, the working workforce, UMK, and industry together influence the growth of district/city GRDP per capita in West Java. The labor force variable that works has no effect on GRDP per capita.

The initial per capita GRDP coefficient in the conditional convergence analysis yielded a positive sign of 0.551228, so that there was no per capita GRDP conditional convergence between districts/cities in West Java.The required speed is 8.8% and it takes 8 years to close half of the inequality. The results of this conditional convergence study are in line with research by Kumara et al (2021), Zaenuri (2022) who did not experience a conditional convergence process.

The PAD variable has a significant effect with a positive relationship to GRDP per capita. where this research is in accordance with Purwandari's research (2016). An increase in PAD shows that there is community participation in the running of the regional government.

The higher the PAD, the more local government funds will be used to build facilities and infrastructure in the area. In 2021 the West Java provincial government PAD revenues reach IDR 25.06 trillion in the Regional Revenue and Expenditure Budget (APBD), where this amount increases by 35.3 percent from the realization of the 2020 APBD which amounted to IDR 18.52 trillion.

The HDI variable has a significant effect with a positive relationship to GRDP per capita. The results of the research are the same as the results of research conducted by Zaenuri (2020), Kumara (2021), Gama (2019), Tian Xu (2016) who agree that human capital has a positive effect on GRDP per capita growth. BPS noted that during 2010 to 2021 the average West Java HDI continued to increase by 0.83 percent per year

from 66.15 in 2010 to 72.45 in 2021. Recovery of the HDI in 2021 the impact of the pandemic can be realized in line with policies economic recovery which has a positive effect on real per capita consumption indicators of IDR 10.934 million per year.

The labor force variable that works has no significant effect on the direction of a negative relationship to GRDP per capita. The theory of marginal productivity explains that the negative relationship to labor shows that the marginal productivity of labor has decreased. Therefore, when a company invests in temporary labor, it is not followed by production factors that do not change, it will actually reduce production results.

Too many workers are not able to increase productivity. This can also be based on the relatively low quality of the workforce which can be seen in the quality of education and health. As a result, productivity is relatively low, while the contribution to GRDP per capita growth also has no significant effect.

The UMK variable has a significant effect with a negative relationship to GRDP per capita. This study is in contrast to Hutama's research (2018) which states that the MSE has a positive effect on GRDP per capita. According to Mankiw (2006) a high minimum wage increase can have a negative impact on companies because employers will be more careful.

So that it is too high, any increase will have a negative impact on unemployment so that in the end it will have an indirect effect on GRDP per capita. The minimum wage has a significant negative relationship from 2017 to 2021 due to a wave of relocations, reductions in workforce and factory closures in West Java during 2016 to 2019. There have been 83 thousand people who have lost their jobs in the last five years.

The variable number of industries has a significant effect with a negative relationship to GRDP per capita. This indicates that medium and large industries in West Java districts/cities have a significant negative effect on per capita output. This research is not in line with the results of research conducted by Akram et al (2021) in whose research it was explained that the industrial and service sectors were the main drivers of the convergence process.

CONCLUSION

Based on the results and discussion in the research previously described, it can be concluded that there has been a convergence of sigma GRDP per capita between regencies/cities in West Java during 2017-2021 due to the downward trend of per capita GRDP dispersion from 2017-2021.

The coefficient of variation for districts/cities in West Java has relatively decreased resulting in a decrease in income inequality between districts/cities in West Java. However, in general there is no convergence of absolute beta and conditional beta between districts/cities in West Java. This means that developing regions in West Java do not experience higher economic growth when compared to developed regions.

For an absolute convergence process to occur, a growth rate of GRDP per capita is required of 9. 6% and takes 8 years to close half of inequality. Meanwhile, the speed needed for conditional convergence to occur is 8.8% and it takes 8 years to close half of the gap.The initial GRDP per capita variables, PAD, HDI, UMK, and industry have an effect on the growth of GRDP per capita in districts/cities in West Java. The labor force variable that works has no effect on GRDP per capita.

REFERENCES

Adha, R., & Wahyunadi. (2015). Disparitas Dan Konvergensi Pertumbuhan Ekonomi Antar Kabupaten Dan Kota Di Provinsi Nusa Tenggara Barat. *Jurnal Sosial Ekonomi & Humaniora 1(1)*, 13-23.

Akram, V., & Ali, J. (2021). Output convergence at sector level across Indian states: Evidence from weak sigma and club convergence analysis. *Journal of International Development*, 33(7), 1166–1188. https://doi.org/10.1002/jid.3571

Akram, V., Sahoo, P. K., & Rath, B. N. (2020). A sector-level analysis of output club convergence in case of a global economy. *Journal of Economic Studies*, 47(4), 747–767. https://doi.org/10.1108/JES-03-2019-0103

Aulia, M. K. (2013). Analisis Konvergensi Pertumbuhan Ekonomi Negara ASEAN+3 Dan Faktor-Faktor Yang Mempengaruhi Pertumbuhan Ekonomi.

Atmasari, N. M., Priyono, T. H., & Viphindrartin, S. (2020). Konvergensi Pertumbuhan Ekonomi Kota dan Kabupaten Klaster Metropolitan Jawa Timur. E-Journal Ekonomi Bisnis Dan Akuntansi, 7(2), 91. https://doi.org/10.19184/ejeba.v7i2.17867

Banendro, S. D. (2016). Analisis Ketimpangan Pembangunan Antar Kecamatan Di Kabupaten Bondowoso Tahun 2006-2012. 1-26.

Barro, R. J., & Sala-i-Martin, X. (1992). Convergence. *Journal of Political Economy 100(2)*, 223-251.

Barro, Robert J., & Sala-i-Martin, X. (2004). *Economic Growth* (2nd ed.). The MIT Press. Barro, Robert J., & Sala-i-Martin, X. (2004). Economic Growth (2nd ed.). The MIT Press.

BPS. (2021). *Statistik Daerah Provinsi Jawa Barat.* Bandung: Badan Pusat Statistik.

Dekiawan, H. (2014). Analisis Konvergensi Pengeluaran Pemerintah Provinsi Di Indonesia Dengan Pendekatan Data Panel Spasial Tahun 2000-2012. Economics & Business Research, 842-867.

Gujarati, D. N. (2015). Dasar-dasar Ekonometrika: Buku 1. Jakarta: Salemba Empat.

Iswanto, D. (2015). Ketimpangan Pendapatan Antar Kabupaten/Kota Dan Pertumbuhan Ekonomi Di Provinsi Jawa Timur. Signifikan, 41-66.

Jhingan, M. L. (2014). Ekonomi Pembangunan Dan Perencanaan. Jakarta: Rajawali Pers.

Kharisma, B., & Saleh, S. (2013). Convergence Of Income Among Provinces In Indonesia 1984-2008: A Panel Data Apporach. Journal of Indonesia Economy and Business 28(2), 167-187.

Kuncoro, M. (2004). Otonomi Dan Pembangunan Daerah: Reformasi, Perencanaan, Strategi Dan Peluang. Jakarta: Erlangga.

Kuncoro, M. (2013). Mudah Memahami Dan Menganalisis Indikator Ekonomi. Yogyakarta: UPP STIEM YPKN.

Mankiw, N. G. (2004). Teori Makroekonomi Edisi Kelima. Jakarta: Erlangga.

Negara, B. P., & Khoirunurrofik. (2021). Dampak Desentralisasi Fiskal Terhadap Konvergensi Pendapatan Perkapita Antar Kabupaten/Kota Di Indonesia. Jurnal Perbendaharaan, Keuangan Negara Dan Kebijakan Publik, 6(1), 1–18.

Prasetyo, P. E. (2011). Fundamental Makro Ekonomi. Yogyakarta: Beta Offset.

Purwandari, A. E. (2016). Pendekatan Model Panel Dinamis Dalam Kajian Konvergensi Pendapatan Daerah Istimewa Yogyakarta Tahun 2003-2014. 45-52.

Putra, Z., & Jamal, A. (2017). Konvergensi Pertumbuhan Ekonomi Antar Provinsi Di Pulau Sumatera. Jurnal Ilmiah Mahasiswa, 31-41.

Robiani, B. (2005). Analisis Pengaruh Industrialisasi terhadap Pertumbuhan Ekonomi di Sumatera Selatan. In Jurnal Ekonomi dan Pembangunan Indonesia (Vol. 6, Issue 1, pp. 93–103). https://doi.org/10.21002/jepi.v6i1.153

Samuelson, P. A., & Nordhaus, W. D. (2004). Ilmu Ekonomi Makro. Jakarta: PT. Media Edukasi.

Schmitt, C., & Strake, P. (2011). Explaining Convergence Of OECD Welfare States: A Conditional Approach. Journal Of European Social Policy, 1-39.

Sekaran, U. (2015). Metodologi Penelitian Untuk Bisnis. Jakarta: Salemba Empat.

Septian, M. R. (2018). Kecenderungan Konvergensi Ekonomi Antardaerah di Provinsi Sumatera Utara. Journal of Regional and Rural Development Planning, 2(1), 90. https://doi.org/10.29244/jp2wd.2018.2.1.90-103

Sodik, J. (2006). Pertumbuhan Ekonomi Regional: Studi Kasus Analisis Konvergensi Antar Provinsi Di Indonesia. Jurnal Ekonomi Pembangunan, 21-32.

Subandi. (2011). Ekonomi Pembangunan. Bandung: Alfabeta.

Sugiyono. (2011). Metode Penelitian Kuantitatif, Kualitatif Dan R&D. Bandung: Alfabeta.

Sukirno, S. (2006). Ekonomi Pembangunan: Proses, Masalah, Dan Dasar Kebijakan. Jakarta: Prenadamedia Group.

Todaro, M. P. (2000). Pembangunan Ekonomi Di Dunia Ketiga. Jakarta: Erlangga.

Todaro, M. P., & Smith, S. C. (2006). Pembangunan Ekonomi: Edisi Kesembilan. Jakarta: Erlangga.

Wau, T. (2015). Konvergensi Pembangunan Ekonomi Antar Daerah Kabupaten Dan Kota Di Sumatera Utara. Ekonomi Manajemen Dan Akuntansi, 104-115.

Wibisono, Y. (2003). Konvergensi Di Indonesia: Beberapa Temuan Awal Dan Implikasinya. Ekonomi Dan Keuangan Indonesia, 53-82

Yeniwati. (2021). Determinan Yang Mempengaruhi Perekonomian Dan Analisis Konvergensi Antar Provinsi Di Sumatera. Jurnal Penelitian dan Kajian Ilmiah, 122-132.