Economic Convergence Analysis in Western Indonesia: Convergence Sigma Beta Approach

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ABSTRACT:*Regional disparities are important issues that must be addressed so that disparities do not widen. A smaller disparity means that the region is experiencing convergence, conversely if the disparity is greater, it means that the region is experiencing divergence. This study aims to analyze the level of disparity in each province and analyze the convergence of economic growth in western Indonesia from 2015 to 2021. The method uses convergence sigma and beta with Generalized Method of Moments (GMM) analysis. The results of the analysis show that provincial disparities in the western region of Indonesia are increasing every year. Convergencebeta absolute and conditional analysis shows divergence occurred in the western region of Indonesia from 2015 to 2021.*

KEYWORDS:*Regional Disparity, Convergence, Divergence, Sigma and Beta Convergence, Generalized Method of Moments*

INTRODUCTION

Economic growth is a priority that must be considered by every region and country. Prioritization of economic growth is carried out because economic growth can reflect how much prosperity occurs in a region. An economy will experience an increase or decrease in each period. An increase in economic growth reflects that welfare in the region is improving, conversely a decline in the economy reflects that welfare in the region has worsened [1][2]. Differences in economic growth in each region can reflect differences in welfare that occur, there are areas that have high welfare with high GRDP ownership and there are areas that have low welfare with low GRDP ownership as well. Differences in the conditions of economic growth in each region are caused by differences in the resources they have.

The success of regional development is reflected in the achievement of high economic growth followed by equal distribution of income. In the process of economic development, economic growth and income distribution are two aspects that must be achieved, because if economic growth is not balanced with equity, it will have an impact on differences in the level of welfare between regions. Differences in welfare levels between regions will result in regional disparities [3]. Extreme regional disparities can have negative impacts such as weakening social stability and solidarity, economic inefficiency, and regional disparities are also seen as unfair. Due to the negative impact of regional disparities which will certainly reduce the welfare of a country's people, the government in the 2014-2024 National Medium Term Development Plan/*Rencana PembangunanJangkaMenengahNasional* (RPJMN) says that the national development agenda is carried out from the periphery (underdeveloped areas) to reduce inequality and ensure equity in the country of Indonesia [4].

Strengthening the ability of human resources is important to develop because by having good human capital, it can maximize the resources it has for better economic growth. Theodore W. Schultz (1961) stated that humans are an important form of capital to drive economic growth as are other forms of capital such as machines and technology. The theory of human capital by Schultz emphasizes the forms of human capital including knowledge, education, skills and health because they can generate returns in the future as well as investment in physical capital [5]. Measurement of human capital can be seen from the HDI (Human Development Index) owned by each region.

Schultz's theory is used as the basis for research conducted by researchers. The results of research conducted by researchers are different because they adjust to conditions in the field. Schultz's theory is in line with research conducted by (Sugama, 2016), (Iqbal et al., 2019), (Hendarmin, 2021), and (Zainuri et al., 2022) which say that HDI has a positive and significant effect on economic growth, but not in line with research conducted by (Hartati, 2019), (Iqbal et al., 2019), (Zusanti et al., 2020), (Aprilianti&Harkeni, 2021), (Awaludin et al., 2021), (Dewi et al., 2021), (Gabriel et al., 2021), and (Pamiati&Woyanti, 2021) who say

that HDI has a negative and significant effect on economic growth. The results of research from (Nadia et al., 2021), (Elbar et al., 2021) and (Azim et al., 2022) say that there is no effect of HDI on economic growth.

In addition to strengthening human resource capabilities, improving infrastructure is also important so that economic activities carried out by the community run smoothly. Completeness of infrastructure available in each region is different. Infrastructure can facilitate economic activity. One of the types of infrastructure according to the Presidential Regulation of the Republic of Indonesia number 38 of 2015 is road infrastructure [6]. Road infrastructure can facilitate economic activity because it can be an accommodation in the distribution of goods and services. Convenience supported by complete infrastructure makes an area have a high productivity value. Neil S Grigg (1988) explains that the availability of regional infrastructure, especially roads and other transportation facilities greatly influences regional economic growth and at the same time development disparities between regions. Infrastructure construction and development can connect many areas which makes distribution smooth. Smooth economic distribution increases regional economic growth [7] [8] [9] [10].

The results of research conducted by researchers are different because they adjust to conditions in the field. Neil S Grigg's theory is in line with research conducted by (Sukwika, 2018), (Hartati, 2019), and (Azim et al., 2022) which states that infrastructure has a positive effect on economic growth, but is not in line with research conducted by (Hamzah&Setiawan, 2019) and (Aritenang, 2021) which results that infrastructure has a negative effect on economic growth. Research conducted by (Rosmeli, 2018), (Iqbal et al., 2019), and (Oktavia et al., 2021) found that infrastructure has no effect on economic growth.

Commodity development in the region is no less important than the availability of human capital and infrastructure. In the economy, commodities or output owned by a region can be traded in the region itself and can also be traded in other regions, this is in accordance with the export basis theory presented by Tiebout. Tiebout said that the more output produced, the region can sell its output to other regions and generate additional income received in the region [11]. Tiebout said that exports depend on demand for goods and services from outside the region [12] [13].

Tiebout's export basis theory is used as the basis for research conducted by researchers. The results of research conducted by researchers are different because they adjust to conditions in the field. Tiebout's export basis theory is in line with research (Astuti&Ayuningtyas, 2018), and (Paksi, 2021) which states that exports have a significant positive effect on economic growth, but is not in line with research conducted by (Adnan et al., 2022) which states that exports have a negative and insignificant effect on economic growth.

HDI, road infrastructure, and inter-regional exports need to be studied further so that regional economic levels do not have high gaps, because differences in resources in each region create imbalances in regional development. North C, Nouglas (1956) in the neo-classical hypothesis says that development inequality will be high in the early stages of a country's development which over time, this process will continue until it reaches a peak. After reaching the peak point, the development inequality that occurs tends to decrease. An increase in regional inequality is divergence, while a decrease in regional inequality is convergence [8].

Economic convergence in the region is important to know so that the government can apply the right policies. Research conducted by (Azwar et al., 2013), (Muzani&Benardin, 2019) and (Wulandari&Istiqomah, 2021) shows that economic disparities between regions have the potential to converge if there is policy intervention from the government to reduce disparities. Research conducted by (Jose, 2019) is in line with Myrdal's cumulative causation theory which says that convergence will not occur, because the rich will get richer and the poor will get poorer, this will keep happening again.

Theories and studies have been carried out by previous researchers with different results according to the conditions of the area that is the object of research. Indonesia's current condition is also inseparable from the differences or similarities in the results obtained in this study. Indonesia is a member country of ASEAN. Indonesia has the highest economic value when compared to other ASEAN member countries, even though Singapore is the only developed country in ASEAN. Since the previous few years, Indonesia has always been in the lead by having the most GNP (Gross National Product).

The high economic growth in Indonesia is not only evenly distributed in every region. The economy in each region in Indonesia has different values, this can be seen from the GRDP (Gross Regional Domestic Product) value in each province. It is known that the Western Region of Indonesia has a higher GRDP value than the Eastern Region of Indonesia. GRDP in the Western Region of Indonesia on average is very fluctuating because there are provinces with large GRDP values and provinces with small GRDP values. The

Western Region of Indonesia is different from the Eastern Region of Indonesia, which has a relatively small GRDP value. Differences in GRDP in the Western Region of Indonesia and the Eastern Region of Indonesia. The GRDP of each province in the Eastern and Western Regions of Indonesia has different values as can be seen in Fig1.
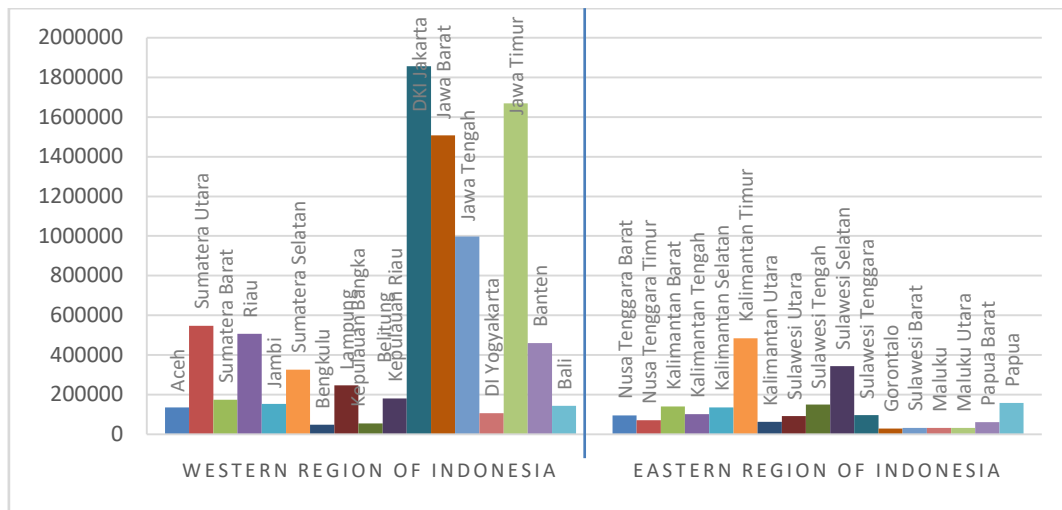

Fig. 1GRDP of the Provinces of the Western and Eastern Regions of Indonesia 2021 (Billion Rupiah)

Can be seen in Fig. 1 that the western region of Indonesia has a very fluctuating GRDP. GRDP in the eastern region of Indonesia has fluctuated, but the fluctuations that occur are not as high as in the western region of Indonesia. From the results of the explanation previously stated, the researcher therefore wants to analyze economic convergence in the western region of Indonesia. To analyze economic convergence can be done by using convergence sigma beta. Convergence sigma functions to analyze regional disparities, while convergence beta functions to analyze whether a region is experiencing convergence or divergence. Convergence beta is divided into two, firstconvergence beta absoluteandtwo convergencebetaconditional. Convergence beta conditionaluses independent variables is HDI, infrastructure, and interregional trade. This study examines the convergence that occurs in the western region of Indonesia because it is known that the level of GRDP in the western region of Indonesia fluctuates very much, in contrast to the level of GRDP in the eastern region of Indonesia, where the majority have low GRDP. Convergence analysis in this study was carried out from 2015 to 2021 because in October 2014 Indonesia had a new president JokoWidodo, so the researchers chose 2015 as the beginning of the research year so that it would be under the auspices of the president's policy and to meet the requirements for good regression data, namely more than 5 years, as well as the limitations of the research data. Thus, this research is needed in order to be able to find out and make a policy that is right on target to reduce regional disparities that occur, especially in the western region of Indonesia.

LITERATURE REVIEW
1. Gunnar Myrdal
The basic concept put forward by Gunnar Myrdal 1975 in his Cumulative Causation Theory is that the main cause of regional inequality is strong backwash effects and weak spread effects. Backwash effects are changes that occur in an area that are detrimental from the expansion of other areas, both circular causes of economic and non-economic factors, while spread effects are the impact of spreading the momentum of regional development centrifugally from the center of economic development to other regions [14]. To overcome the problem of disparity in development, the process are facing is a vicious circle. Underdeveloped areas are caused by poor people, they become poor because of weak human capital capacity and limited availability of development facilities. Expansion in one region has a detrimental effect on other areas. The existence of migration, transfer of capital, and trade is a means for a cumulative process that tends to benefit regions that are experiencing rapid expansion and are detrimental to underdeveloped regions. Capital movements tend to result in increasing disparities, while trade also tends to benefit more developed regions and harm other regions [15].

2.   Douglas C North

The neo-classical hypothesis on regional economic inequality is based on the theory of equalizing inter-regional production factor payments pioneered by George H. Borts (1960) which is a continuation of the theory described by Douglas C North (1956). North in his analysis of the neo-classical growth theory mentions the relationship between the level of national economic development of the country and development disparities between regions which is currently referred to as the Neo-Classical Hypothesis [16]. The neo-classical hypothesis states that in the early stages of development in a country the development disparities that occur are so high. This process can continue until it reaches a peak, after which the development of a country continues to develop, the development disparities that occur tend to decrease. An increase in the level of regional disparity can be divergence, while a decrease in the level of regional disparity is convergence. It can be concluded that in developing countries, there will be more disparities than in developed countries [8] [17].

3.   J. H. Boeke

J. H. Boeke 1930 put forward the theory of dualism which was developed by looking at the former colonial countries, especially Indonesia. Boeke said that conditions from western economic thought could not be applied to eastern economic conditions. Eastern economic conditions cannot implement western economics without a separation to approach problems in the economy. Boeke considers that what can affect the development process is socio-cultural values. Boeke said if a society is too fixated on socio-cultural values, then the government in its efforts to drive economic stagnation will not be successful [18]. The dualism theory put forward by Boeke assumes that the precondition that occurs is the coexistence of two social systems that only interact marginally. Western economic activities according to Boeke are based on stimulation of economic needs, in contrast to activities in the East (Indonesia) which are based on social needs. There is a clear difference between modern and traditional economic and social activities and organizations. This difference between western and eastern economic activities is what Boeke calls economic dualism, where there are high differences in social systems and the two occur side by side [19].

RESEARCH METHOD

The type of research used in this research is quantitative with explanatory research methods. The purpose of using the explanatory research method is to test a theory or hypothesis against the resulting research results. The samples used in this study are the western regions of Indonesia (Aceh, North Sumatra, West Sumatra, Riau, Jambi, South Sumatra, Bengkulu, Lampung, Bangka Belitung Islands, Riau Islands, DKI Jakarta, West Java, Central Java, DI Yogyakarta, Java East, Banten, Bali) in 2015 to 2021.

The type of data used in this research is secondary data. In this study, data analysis was carried out using the economic convergence method. The economic convergence method can be carried out in two steps, first using convergence sigma and second using convergence beta. The convergence sigma function is used to see the disparities that occur, while the convergence beta is used to analyze whether convergence or divergence occurs in the area studied. Convergence beta is divided into two, absolute convergence beta and conditional convergence beta. Conditional convergence beta adds independent variables to find out the role of these variables whether they have an influence on convergence or divergence.

1.   Convergence Sigma

Sigma convergence discusses disparities between regions. Regional disparity can be measured by using the unweighted coefficient of variation.

$$CV = \frac{\frac{\sum \sqrt{(Yi - Y')^2}}{n}}{Y'}$$

where CV = unweighted coefficient of variation in year t; Yi = Provincial per capita income at constant prices; Y' = national income per capita at constant prices; and N = total national population.

2.   Convergence Beta Absolute

Convergence beta discusses reducing economic disparities between regions through increasing the economic growth of lagging regions in catching up with developed regions. Beta convergence absolute is carried out by means of regression which only uses initial income as the independent variable, while the other variables are considered constant. The equation can be seen as follows:

$$GRDP_{i,t} = \delta GRDP_{i,t-1} + u_{i,t} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(1)$$

WhereGRDPi,t = Gross Regional Domestic Product Per Capita in the western region of Indonesia for the period 2015 to 2021 and GRDPi,t-1 = Lag of the dependent variable.

3. Convergence Beta Conditional

Convergence beta conditional is carried out by means of regression which uses several control variables needed in the analysis carried out. The dynamic panel data regression equation in this study uses the Generalized Method of Moments (GMM) estimation method. The equation can be seen as follows:

$$GRDP_{i,t} = \delta GRDP_{i,t-1} + HDI_{i,t}\beta + INFR_{i,t}\beta + ER_{i,t}\beta + u_{i,t} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(2)$$

Where GRDPi,t = Gross Regional Domestic Product Per Capita for the western region of Indonesia for the period 2015 to 2021; GRDPi,t-1 = Lag dependent variable; HDI = Human Development Index (score); INFR = Infrastructure (km); ER = Inter-regional Exports (million rupiah).

4. The Specification of the Generalized Method of Moments Estimation Methods
4.1 Sargan Test

The Sargan test is used to determine the validity of variable instruments that have a larger number of estimated parameters. Sargan test hypothesis as follows:

H0: overidentifying restriction in valid model estimation
H1: overidentifying restriction in model estimation is not valid

The assessment decision is shown if the probability value is ≥ 0.05, then it indicates that the instrument used is valid, so that the validity requirements have been fulfilled.

4.2 Arellano-Bond Test

The Arellano-Bond test is used to test consistency. Arellano-Bond test hypothesis as follows:

H0: there is no autocorrelation in the iith order first difference
H1: there is autocorrelation on the iith order first differential

The valuation decision is indicated if the probability value is ≥ 0.05, indicating that there is no autocorrelation so that the consistency requirements have been fulfilled.

4.3 Unbiased Test

The unbiased test is used to find out that the data is unbiased. The GMM estimation is used if the dynamic panel data regression with Ordinary Least Square (OLS) estimation produces biased and inconsistent data caused by the presence of dependent lag with errors. The decision-making criteria for the unbiased test were obtained from a comparison of the GMM dependent lag estimator with the Fixed Effect Model (FEM) and Pooled Least Squares (PLS). In general, FEM is biased downward and PLS is biased upwards. Judgment decisions can be shown if the estimator value is between FEM and PLS, indicating that the data is not biased.

DATA ANALYSIS

1. Convergence Sigma Results

Sigma convergence discusses disparities between regions. Regional disparity can be measured by using the unweighted coefficient of variation on the logarithm of economic growth. If the period variation coefficient (t) in the study shows a smaller value compared to the previous period coefficient, it can be concluded that sigma convergence has occurred, but if the period variation (t) in the study shows a greater value compared to the previous period coefficient, it can be concluded that it did not occur sigma convergence.The results of the unweighted coefficient of variation test can be seen in Fig. 2.

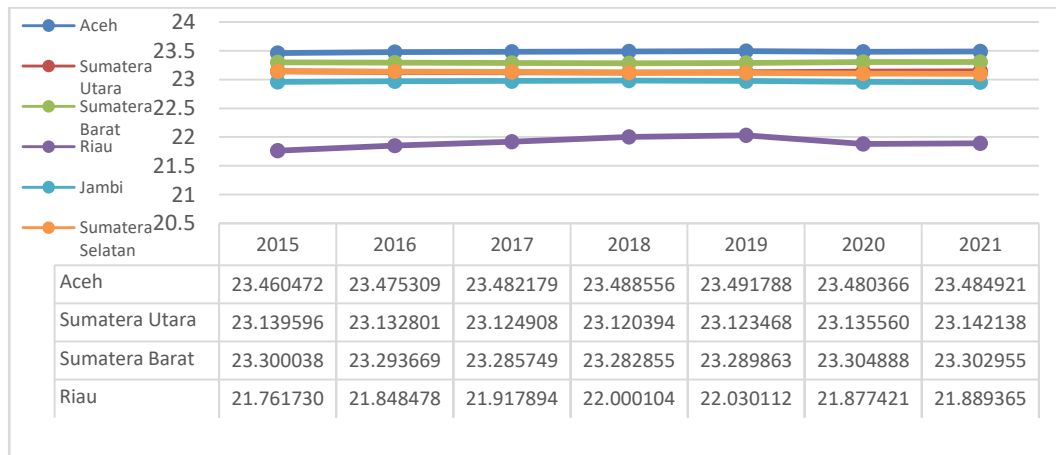|	2015	2016	2017	2018	2019	2020	2021
Aceh	23.460472	23.475309	23.482179	23.488556	23.491788	23.480366	23.484921
Sumatera Utara	23.139596	23.132801	23.124908	23.120394	23.123468	23.135560	23.142138
Sumatera Barat	23.300038	23.293669	23.285749	23.282855	23.289863	23.304888	23.302955
Riau	21.761730	21.848478	21.917894	22.000104	22.030112	21.877421	21.889365

Fig 2. Unweighted Coefficient of Variation Results (%)

Fig. 2 illustrates the coefficient variance in the Provinces of Aceh, North Sumatra, West Sumatra, Riau, Jambi, and South Sumatra from 2015 to 2021. The results of the coefficient of variation in Aceh Province show an increasing trend of disparity marked by getting further away from zero, but in 2020 it shows a decrease in disparity marked as getting closer to zero. North Sumatra Province from 2015 to 2018 has a downward trend showing a decrease in disparities, but from 2019 to 2021 it has an upward trend indicating an increase in disparities. West Sumatra Province from 2015 to 2018 has a downward trend showing a decrease in disparity, however in 2019 and 2020 it has an upward trend indicating an increase in disparity and rising again in 2021. Riau Province from 2015 to 2021 continues to experience an increase in disparity as indicated by an upward trend throughout the year. Jambi Province from 2015 to 2018 has an upward trend indicating an increase in disparity levels and disparities begin to decline in 2019 to 2021. South Sumatra Province has decreased disparities from 2015 to 2021 which is shown by a downward trend throughout the year.

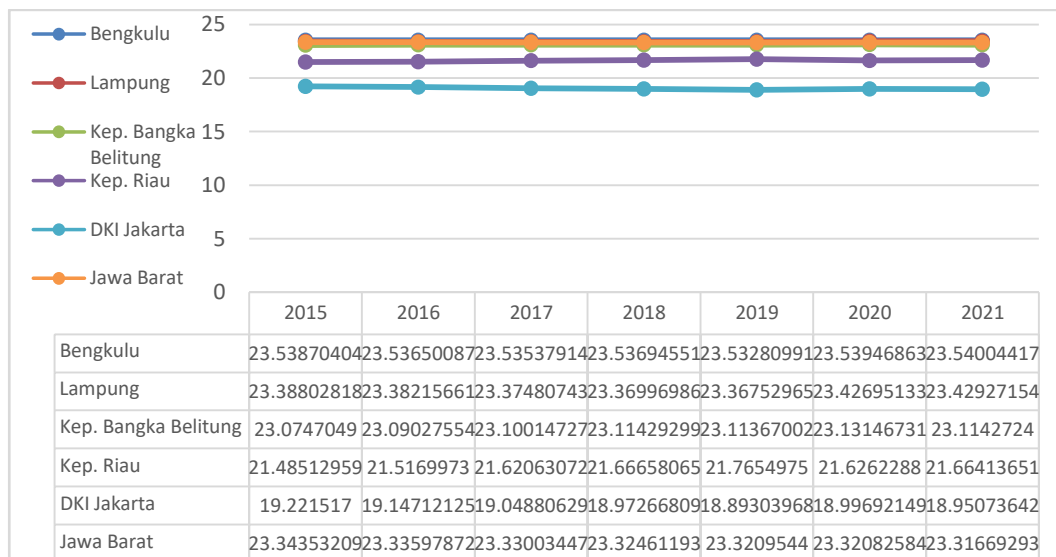|	2015	2016	2017	2018	2019	2020	2021
Bengkulu	23.53870404	23.53650087	23.53537914	23.53694551	23.53280991	23.53946863	23.54004417
Lampung	23.38802818	23.38215661	23.37480743	23.36996986	23.36752965	23.42695133	23.42927154
Kep. Bangka Belitung	23.0747049	23.09027554	23.10014727	23.11429299	23.11367002	23.13146731	23.1142724
Kep. Riau	21.48512959	21.5169973	21.62063072	21.66658065	21.7654975	21.6262288	21.66413651
DKI Jakarta	19.221517	19.14712125	19.04880629	18.97266809	18.89303968	18.99692149	18.95073642
Jawa Barat	23.34353209	23.33597872	23.33003447	23.32461193	23.3209544	23.32082584	23.31669293

Fig 3. Unweighted Coefficient of Variation Results (%)

Fig. 3 illustrates the coefficient variance in the Provinces of Bengkulu, Lampung, Bangka Belitung Islands, Riau Islands, DKI Jakarta, and West Java from 2015 to 2021. The results of the coefficient of variation in Bengkulu Province have a decreasing trend from 2015 to 2017 which illustrates a decrease in disparity, in contrast to 2018 which experienced a decrease in disparity, but not long after that it decreased again in 2019 and then there was an increase in disparity in 2020 and 2021. Lampung Province experienced a downward trend in 2015 to 2019 showing a decrease in disparity, but in 2020 and 2021 there was an increase in disparity which indicated by the ownership of an upward trend.Bangka Belitung Province has a trend that

resembles Bangka Belitung Province, but Riau Province has an increasing trend from 2015 to 2019. DKI Jakarta Province has a decreasing trend from 2015 to 2019 which shows a decrease in disparity, but in 2020 the disparity rises and falls again in 2021. West Java Province has an ever-increasing trend from 2015 to 2021 which shows a decrease in disparities.
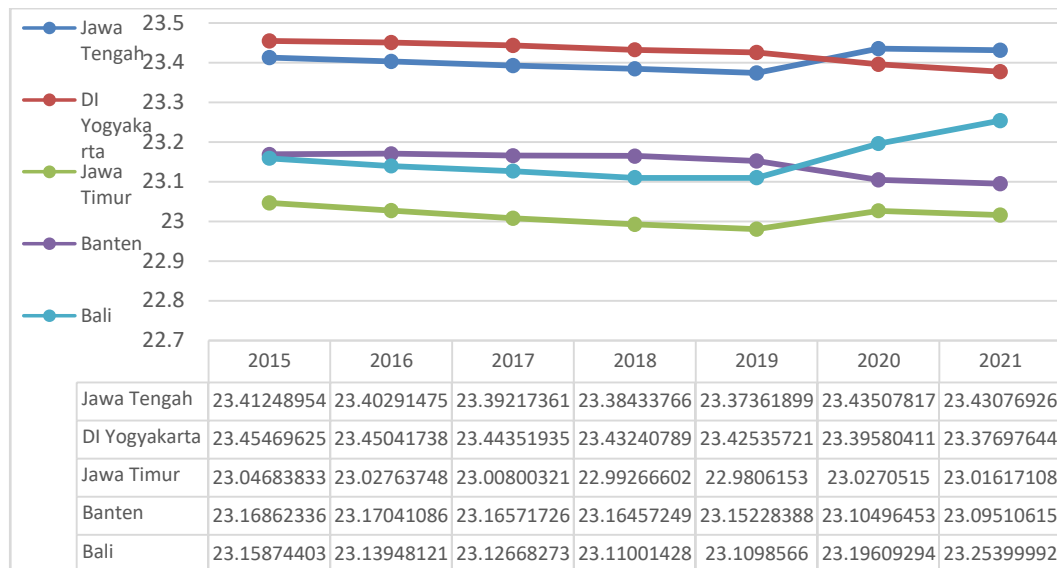
	2015	2016	2017	2018	2019	2020	2021
Jawa Tengah	23.41248954	23.40291475	23.39217361	23.38433766	23.37361899	23.43507817	23.43076926
DI Yogyakarta	23.45469625	23.45041738	23.44351935	23.43240789	23.42535721	23.39580411	23.37697644
Jawa Timur	23.04683833	23.02763748	23.00800321	22.99266602	22.9806153	23.0270515	23.01617108
Banten	23.16862336	23.17041086	23.16571726	23.16457249	23.15228388	23.10496453	23.09510615
Bali	23.15874403	23.13948121	23.12668273	23.11001428	23.1098566	23.19609294	23.25399992

Fig 4.Unweighted Coefficient of Variation Results (%)

In Fig. 4 depicts the variance coefficient in the Provinces of Central Java, DI Yogyakarta, East Java, Banten, and Bali. The DI Yogyakarta and Banten provinces have a declining trend from 2015 to 2021 indicating that there has been a decline in disparities. The provinces of Central Java, East Java and Bali show an increasing disparity as indicated by an upward trend away from zero.

2. Convergence Beta Absolute Results
2.1 Sargan Test

The Sargan test is used to determine the validity of variable instruments that have a larger number of estimated parameters. The assessment decision is indicated if the probability value is ≥ 0.05, then it indicates that the instrument used is valid, so that the validity requirements have been fulfilled. Sargan test results can be seen in Table 1.

Table1.Sargan Results

Mean dependent var	1041,058	S.D. dependent var	1917,27
S.E. of regression	2091,427	Sum squared resid	367000000
J-statistic	16,34476	Instrument rank	14
Prob(J-statistic)	0,231013		

From Table 1 it can be seen that the probability of the J-statistic is 0.231013 greater than the alpha value of 0.05 which means that the instrument used is valid, so that the validity requirements have been fulfilled.

2.2 Arellano-Bond Test

The Arellano-Bond test is used to test consistency. The valuation decision is indicated if the probability value is ≥ 0.05, indicating that there is no autocorrelation so that the consistency requirements have been fulfilled. Arellano-Bond test results can be seen in Table 2.

Table2. Arellano-Bond Results

Test order	m-Statistic	rho	SE(rho)	Prob.
AR(1)	-1,50812	-183213133,8	121484464,2	0,1315
AR(2)	0,933489	13715369,6	14692594,9	0,3506

From Table 2 it is known that the probability value of AR(2) is 0.3506 which is greater than the alpha value of 0.05 which means that there is no autocorrelation so that the consistency requirements have been fulfilled.

2.3 Unbiased Test

The unbiased test is used to find out that the data is unbiased. The decision-making criteria for the unbiased test were obtained from a comparison of the GMM dependent lag estimator with FEM and PLS. Judgment decisions can be shown if the estimator value is between FEM and PLS, indicating that the data is not biased. Unusual test results can be seen in table 3.

Table3.Unbiased Results

FEM	GMM	PLS
0,00000957	0,00000984	0,0000145

From Table 3 it is known that the GMM has a value between the FEM and PLS tests. From the results of the test of unbiased means that the data is not biased.

2.4 Generalized Methods of Moments

After testing the model specifications, the next step is to estimate. Estimation in this study uses Generalized Methods of Moments (GMM). The absolute convergence beta results can be seen in Table 4.

Table4.Convergence Beta Absolute

Variable	Coefficient	Std. Error	t-Statistic	Prob.
β-convergence	9,84E-06	4,67E-08	210,5779	0,0000

From Table 4 it is known that the convergence beta absolute coefficient is positive 0.00000984, which means that there is no convergence in the western region of Indonesia in 2015-2021. The probability of the convergence beta coefficient is 0.0000 which is less than the alpha of 0.05. The results of the probability coefficient of absolute convergence beta mean that convergence beta has a significant influence on GRDP per capita.

3. Convergence Beta Conditional Results
3.1 Sargan Test

The Sargan test is used to determine the validity of variable instruments that have a larger number of estimated parameters. The assessment decision is shown if the probability value is ≥ 0.05, then it indicates that the instrument used is valid, so that the validity requirements have been fulfilled. Sarga test results can be seen in Table 5.

Table5.Sargan Results

Mean dependent var	1041,058	S.D. dependent var	1917,27
S.E. of regression	2130,41	Sum squared resid	368000000
J-statistic	11,99863	Instrument rank	15
Prob(J-statistic)	0,363746		

From Table 5 it can be seen that the probability of the J-statistic is 0.363746 greater than the alpha value of 0.05 which means that the instrument used is valid, so that the validity requirements have been fulfilled.

3.2 Arellano-Bond Test

The Arellano-Bond test is used to test consistency. The valuation decision is indicated if the probability value is ≥ 0.05, indicating that there is no autocorrelation so that the consistency requirements have been fulfilled. Arellano-Bond test results can be seen in Table 6.

Table6. Arellano-Bond Results

Test order	m-Statistic	rho	SE(rho)	Prob.
AR(1)	-0,843526	-46726598,0	55394370,8	0,3989
AR(2)	-0,318715	-4442402,6	13938498,0	0,7499

From Table 6 it is known that the probability value of AR(2) is 0.7499 which is greater than the alpha value of 0.05 which means that there is no autocorrelation so that the consistency requirements have been fulfilled.

3.3 Unbiased Test

The unbiased test is used to find out that the data is unbiased. The decision-making criteria for the unbiased test were obtained from a comparison of the GMM dependent lag estimator with FEM and PLS. Judgment decisions can be shown if the estimator value is between FEM and PLS, indicating that the data is not biased. The results of the unfamiliarity test can be seen in Table 7.

Table7. Unbiased Results

FEM	GMM	PLS
-0,326041	0,263976	1,024109

From Table 7 it is known that the GMM has a value between the FEM and PLS tests. from the results of the test of unbiased means that the data is not biased.

3.4 Generalized Methods of Moments

After testing the model specifications, the next step is to estimate the data. Data estimation in this study uses Generalized Methods of Moments (GMM). The results of conditional convergence beta can be seen in Table 8.

Table8. Convergence Beta Conditional

Variable	Coefficient	Std. Error	t-Statistic	Prob.
β-convergence	0,263976	0,020888	12,63785	0,0000
HDI	2383,263	131,0857	18,18095	0,0000
Road Infrastructure	-38168,48	11573,61	-3,29789	0,0014
Inter-regional	203,7076	29,39874	6,929128	0,0000

From Table 8 it can be seen that the beta coefficient converges with a positive notation which means that there is no economic convergence even though there are three conditional variables HDI, road infrastructure, and inter-regional exports in the western region of Indonesia in 2015-2021. The probability of convergence beta showing 0.0000 is smaller than alpha of 0.05, meaning that convergence beta has a significant effect on GRDP per capita. The HDI coefficient of 2383.263 means that if the HDI rises by 1 percent, it will increase per capita GRDP by 2383.263 percent assuming other variables are constant. The probability of HDI showing 0.0000 is less than an alpha of 0.05, meaning that HDI has a significant influence on GRDP per capita. The road infrastructure coefficient is -38168.48 meaning that if road infrastructure increases by 1 percent, it will reduce the per capita GRDP by -38168.48 percent assuming other variables are constant. The probability of road infrastructure is 0.0014, which is less than an alpha of 0.05, meaning that road infrastructure has a significant influence on per capita GRDP. The inter-regional export coefficient of 203.7076 means that if inter-regional exports increase by 1 percent, it will increase per capita GRDP by 203.7076 percent assuming other variables are constant. The probability of inter-regional exports is 0.0000, which is less than an alpha of 0.05, meaning that inter-regional exports have a significant effect on per capita GRDP.

4. Discussion
4.1 Disparities in the Western Region of Indonesia

The analysis in this study uses convergence sigma to analyze disparities in the western region of Indonesia from 2015 to 2021. The results of convergence sigma analysis using the calculation of the unweighted coefficient of variation are carried out in order to determine the high and low levels of regional disparities that have occurred in the western region of Indonesia since 2015 until 2021. Provinces with the lowest levels of disparity can be used as a reference in the process of economic development to promote equality between regions in the western region of Indonesia.

The province with the highest level of disparity is Bengkulu Province with an Unweighted Coefficient of Variation value of 23.54004%. The province with the second highest level of disparity in the western region of Indonesia is followed by Aceh Province. The province with the lowest level of disparity is DKI Jakarta Province with an Unweighted Coefficient of Variation value of 18.95074%. Factors that cause high diparity in Bengkulu and Aceh Provinces are geographical factors, limited facilities and infrastructure,

infrastructure, human capital, and other factors. The factor causing the low disparity in DKI Jakarta Province is that the available facilities and infrastructure are more complete than those in Aceh and Bengkulu Provinces. Because of the government's policy that wants equality in Indonesia's territory, the government must carry out greater development in areas that have the highest levels of disparity, especially in this study the regions located in the western part of Indonesia is Aceh and Bengkulu Provinces in the results of convergence sigma analysis. With extra development of large-scale investment simultaneously in accordance with the theory of the big puff model, it does not mean ignoring economic growth in areas that have low levels of disparity. Regions with low levels of disparity are still considered, but extra attention should be paid to areas with high levels of disparity so that the government's goal of equality in Indonesia's regions can be achieved.

4.2 Convergence of Economic Growth in the Western Region of Indonesia

The analysis in this study uses convergence beta absoluteto analyze the occurrence of convergence or divergence in the western region of Indonesia from 2015 to 2021 without any other variables influencing the occurrence of convergence or divergence, in other words, other variables are assumed to be constant. The results of research on convergence beta absolute show that there is no economic convergence in the western region of Indonesia from 2015 to 2021. There are no other factors or variables that affect economic growth in the western region of Indonesia from 2015 to 2021 making economic growth in each region experiencing divergence. Divergences that occur commonly occur because there are no policies from the government that help stimulate economic growth that has low economic growth. So that the western regions of Indonesia which have high economic growth will be higher and likewise the regions which have low economic growth will be even lower. The absence of policy or government intervention in a situation like this will increase regional disparities. If the regional disparities that occur are not handled properly, extreme levels of disparities will be achieved. An extreme level of disparity is certainly not expected to occur because if extreme disparity occurs it will cause many problems. One of the problems resulting from extreme disparity is increasing crime, social jealousy, poverty, economic inefficiency, unemployment, and weakening social stability and regional solidarity within one country.

4.3 Convergence of Economic Growth with Conditional Variables in the Western Region of Indonesia

The analysis in this study uses convergence beta conditional to analyze the occurrence of convergence or divergence in the western region of Indonesia from 2015 to 2021 by using conditional variables which influence the occurrence of convergence or divergence. The conditional variables used in this study are HDI, road infrastructure, and inter-regional exports. The conditional variables HDI, road infrastructure, and exports are used to see whether economic growth in the western region of Indonesia from 2015 to 2021 has converged with policies or government intervention in an effort to encourage convergence so that regional disparities can be overcome and regional equity can be achieved.

The analysis used shows that there is no convergence in the western region of Indonesia from 2015 to 2021. The policies provided by the government to address equity in Indonesia's regions have not achieved the desired results. HDI has a positive and significant influence on economic growth in the western region of Indonesia from 2015 to 2021. Infrastructure has a negative and significant influence on economic growth in the western region of Indonesia from 2015 to 2021. Exports between regions have a positive and significant influence on economic growth in the western region of Indonesia 2015 to 2021.

The policies implemented by the government in accordance with RPJMN three and four to reduce disparities and achieve equity did not produce results for equity that occurred in the western region of Indonesia in 2015 to 2021. Economic growth in the western region of Indonesia with policies from HDI, road infrastructure, and Exports between regions create divergence. The existence of divergence means that areas with high growth will be higher and areas with low growth will be lower. The existence of divergence that occurs is not solely because the policies implemented by the government are useless, but there are other factors that cause this divergence to occur. One of the many factors that can influence the existence of divergence is the effectiveness of the government in implementing policies, in the sense that the government in each region has carried out the mandate from the president properly or not. Some regions will be ineffective in carrying out various policies mandated by the government if they do not have good quality human capital. There are still many elements from government institutions who distort their position as community representatives, so that the policies made by the central government are not optimal.

This study obtained the result that there was no convergence in the convergence sigma and beta approaches. Analysis on convergence sigma describes disparities that have an increasing trend and illustrates that as the years go by, the disparities get higher. The results of convergence sigma research are in line with research conducted by (Juliarta&Setyari, 2022), (Jose, 2019) and (Arapi et al., 2022). Analysis on absolute convergence beta found that there was no convergence in western Indonesia from 2015 to 2021. The results of convergencebetaabsolute analysis in this study are in line with research conducted by (Jose, 2019), (Zainuri et al., 2022), (Juliarta&Setyari, 2022), (Canlas, 2020), and (Arapi et al., 2022). The results of the convergencebetaconditional analysis in this study resulted that there was no convergence in the western region of Indonesia from 2015 to 2021. The results of the convergencebetaconditional analysis in this study were in line with research conducted by (Jose, 2019), (Juliarta&Setyari, 2022), (Canlas, 2020), and (Arapi et al., 2022).

Analysis using convergencebetaconditional in this study uses conditional variables HDI, road infrastructure, and exports between regions. The results of the Generalized Methods of Moments regression from the conditional variable HDI produce that HDI has a positive and significant effect on economic growth in the western region of Indonesia from 2015 to 2021. The results of the analysis of the effect of HDI on economic growth in this study are in line with research conducted by (Sugama, 2016), (Iqbal et al., 2019), (Hendarmin, 2021), and (Zainuri et al., 2022). Analysis of the road infrastructure conditional variable results that road infrastructure has a negative and significant effect on economic growth in the western region of Indonesia from 2015 to 2021. The results of the analysis of the effect of road infrastructure on economic growth in this study are in line with research conducted by (Hamzah&Setiawan, 2019) and (Aritenang, 2021). Analysis of the conditional variable exports between regions results that exports between regions have a positive and significant effect on economic growth in the western region of Indonesia from 2015 to 2021. The results of the analysis of the effect of inter-regional exports on economic growth are in line with research conducted by (Astuti&Ayuningtyas, 2018), and (Paksi, 2021).

The results of the convergence analysis using the convergence sigma and beta approaches yield results with divergence conditions in accordance with the theory put forward by Myrdal. Myrdal said that backward areas would get poorer, and developed areas would get richer. The cumulative causation theory by Myrdal suggests that the economy on the outskirts of the region has a bad condition based on the strengthening of the market which can exacerbate the gap between urban and regional areas. According to Myrdal, this phenomenon is backwash effect, where developed regions can be superior compared to underdeveloped regions, and this will continue. In tackling the problem of development inequality, the process we are facing is a vicious circle. The majority of underdeveloped areas are due to the large number of poor people. Communities become poor because they have weak quality human capital, limited availability of development facilities, and expansion in one region exacerbates disparities due to a backwash effect on other regions.

The theory put forward by Myrdal is reinforced by the theory put forward by Boeke. Boeke in the theory of economic dualism says that real disparities exist and do not stop the economy, but the economy can still grow side by side. It is related to the results of this study that the provinces of Bengkulu and Aceh in the western region of Indonesia have the highest inequality values while DKI Jakarta has the lowest inequality, but the economies in the provinces of Bengkulu, Aceh and DKI Jakarta continue to run and grow side by side. Boeke said that the conditions from western economic thought could not be applied to eastern economic conditions (economic conditions in colonial countries), this was in line with the conditions of the Provinces of Bengkulu, Aceh and DKI Jakarta where the Provinces of Bengkulu and Aceh were still too fixated on socio-cultural values. So that the government in its efforts to drive economic stagnation does not run optimally, which is different from the conditions that occurred in DKI Jakarta Province which has socio-cultural values that tend not to be as strong as socio-cultural values in Bengkulu and Aceh Provinces so that the government can more easily control the territory of the Province DKI Jakarta.

In the conditional convergence beta analysis using the conditional variables HDI, road infrastructure, and inter-regional exports to see their effect on economic growth whether the conditional variables HDI, road infrastructure, and inter-regional exports can make economic growth occur in the western region of Indonesia in 2015 to 2021 converge or diverge. The results of the analysis that has been carried out show that there is no convergence in the western region of Indonesia from 2015 to 2021, but the HDI has a significant positive influence on economic growth which means that higher HDI ownership will lead to higher economic growth. HDI is important for economic growth because a high HDI can make the economy of a region

higher, this is in line with the theory put forward by Schultz. Schultz said that humans are an important form of capital to drive economic growth as are other forms of capital such as machines and technology. Schultz emphasizes that forms of human capital include knowledge, education, skills and health because they can generate returns in the future as well as investment in physical capital. Measurement of human capital can be seen from the HDI owned by each region.

The conditional variable of road infrastructure results that increasing road infrastructure will reduce economic growth in the western region of Indonesia from 2015 to 2021. Of course the existence of infrastructure does not only have a positive effect on economic growth, but can also have a negative effect. Road infrastructure has a negative influence on economic growth in line with the theory put forward by Grigg. Grigg said that the availability of road infrastructure greatly influences regional economic growth and at the same time disparities in regional development. It is known that the condition of road infrastructure in the western region of Indonesia from 2015 to 2021 is less than optimal. One of the many events that made the existence of road infrastructure negatively affect economic growth in the western region of Indonesia from 2015 to 2021, there were many areas that misused government funds allocated for road infrastructure but were not implemented, while the reported data said that it had construction of road infrastructure for the region. The latest case is what happened in Lampung Province. The funds that the government has channeled to the Lampung government for the construction of road infrastructure have turned out to be in the field not in accordance with the results that have been reported. There are still many irresponsible elements that hamper the economy.

The conditional variable of exports between regions has a positive and significant influence on economic growth, this is in accordance with the theory put forward by Tiebout. Tiebout said that those that affect economic growth are investment, consumption, and exports, but in the long run only exports affect economic growth. High exports between regions can generate input or income for the region itself, so that the economic activity that occurs will be higher.

Regional development is one of the national priorities in the 2020 to 2024 RPJMN which is directed at resolving the main strategic issue inter-regional disparities. The president established five main directives as a strategy in implementing the Nawacita mission and achieving the goals of the Indonesia Vision 2045. The five presidential directives cover human resource development, infrastructure, simplification of regulations, simplification of the bureaucracy, and economic transformation. The policies carried out by the government aim to reduce disparities and make convergence occur so that the government will focus on developing areas from underdeveloped regions. Reducing disparities between regions needs to be done not only to improve the welfare of people in all regions of Indonesia, but also to maintain national unity and stability [4].

The government has carried out various policies to overcome disparities so that convergence occurs between regions. The government in implementing policies and strategies for reducing disparities prioritizes the development of hinterland areas which are around growth centers in order to achieve equality and justice in fulfilling people's basic rights according to the rules of development goals, namely not leaving any community group behind. Implemented policies and strategies:

a. Expansion in access to basic community services such as education and health
b. Increasing accessibility and infrastructure for land, air, sea and river transportation including logistics networks from villages to trade centers in local, regional and international markets.
c. Expansion of cooperation and partnerships in investment, promotion, marketing and trade.
d. Improving good governance through mentoring, capacity building of village apparatus, and inclusive participation of village communities.
e. Optimizing the use of village funds to encourage productive activities, empower village communities, including financing local village assistants.
f. Policies and strategies have been carried out by the government as an effort to achieve convergence, but due to the many obstacles, the western region of Indonesia, in particular from 2015 to 2021, will experience divergence.

CONCLUSION

In the convergence sigma analysis, there is an increase in inter-regional disparities every year indicating higher inter-regional divergence. Underdeveloped provinces cannot catch up with advanced provinces. The convergence betaabsolute analysis shows that there is no convergence, but rather a divergence in the western region of Indonesia from 2015 to 2021. Underdeveloped provinces cannot catch up with advanced provinces

without the influence of other variables. The convergence betaconditional analysis shows that there is no convergence but divergence in the western region of Indonesia from 2015 to 2021. The conditional variables consisting of HDI, road infrastructure, and inter-regional exports have not been able to encourage convergence in the western region of Indonesia from 2015 to 2021.

From the research results obtained, it is hoped that the government will carry out an evaluation related to development planning policies in the western region of Indonesia because the results of this study indicate that there is a disparity that is getting wider every year. Divergence shows the relationship between regions. The results of this study indicate a divergence that reflects the absence of mutually supportive economic activities to create convergence, therefore the government needs to communicate between regions regarding policies and conduct evaluations to minimize disparities and create convergence. Economic conditional variables cannot encourage convergence, therefore a non-economic variable approach is needed to shape convergence. The development plan must be oriented towards overcoming it so that disparities are getting smaller. For future researchers, it is recommended to include non-economic variables and a longer year of research in order to see a broader perspective regarding convergence.

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