Regional Fiscal Policy Convergence In The Decentralization Era: A Dynamic Spatial Analysis

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Abstract: Fiscal disparity between regions (horizontal imbalance) and between levels of government (vertical imbalance) is a strategic issue in the era of decentralization. The implementation of fiscal decentralization in Indonesia with regional conditions that are very diverse both in Java and outside Java in terms of fiscal capacity, human resources, and economic capabilities so that often this actually creates fiscal imbalances between regions and this will have an impact on regional development inequality so it has implications for the variety of output produced. Regional fiscal disparity at the district / city level in Indonesia still shows high inequality, using the Williamson index shows that regional fiscal inequality in Indonesia shows an increasing trend. By using spatial econometric namely Dynamic Spatial Analysis, this study aims to analyze the process of convergence of regional fiscal policy both revenue and expenditure, as well as detecting spatial interactions between local governments in fiscal policy at the district / city level in Indonesia, especially in Java and outside of Java.

Index Terms: Convergence, Decentralization, Dynamic Spatial Analysis, Fiscal Policy

1 INTRODUCTION

Fiscal decentralization policy is expected to improve public services to local communities, decisions on the allocation of public goods are more efficient because local governments have good information about their communities. This is known as knowledge in society (Khusaini, 2006). On the other hand, decentralization has led to fiscal disparities between regions, especially between cities and districts, which has implications for the provision of public services in urban areas to be obtained more than in regency areas which are generally still rural areas. Inequality in the provision of public facilities in urban and rural areas will lead to high inequality in community welfare. The fiscal policy convergence hypothesis is stated by Scully (1991) and Coughlin, Garrett, & Hernandez-Murillo (2007), Saruç, Sagbaş, & Ciğerci (2007) based on the Solow model which states that tax is a constant proportion of output. Neoclassical theory states that there will be a convergence of output in the long run, so it is expected that there will be a convergence of fiscal policies in both local government revenue and expenditure. Convergence is a condition that describes the gap or disparity in a variable between regions within a certain period. The smaller gap can be seen from two approaches, namely the gap in economic growth and the gap in per capita income (Barro & Sala-i-Martin, 1992; Islam, 2003). Barro & Sala-i-Martin (1992) state that convergence means there is a negative relationship between the level of initial income and economic growth during a certain period, while the level of income in question is income per capita. The current study of convergence is not only associated with economic growth and per capita income, but convergence in fiscal policy (Skidmore, Toya, & Merriman, 2004); (Coughlin, Garrett, & Hernandez-Murillo, 2007); (Saruç et al., 2007); (Skidmore & Deller, 2008); (Mohanty, 2013). Related to fiscal decentralization, the main factor that becomes the center of attention is the authority of a region in terms of revenue and expenditure management. Government spending basically reflects the stages of economic development and in the development process, which has a greater tendency (Skidmore et al., 2004). Coughlin et al. (2007) argues that the Solow growth theory implies that the level of growth in taxes and government spending is equal to the level of income growth, so that convergence in fiscal policy is possible. So far, the analysis used for estimation has always looked at the object as an independent unit, and has ignored the possibility of space interactions between regions such as an analysis of growth in government expenditure (Case, Rosen & Hines, 1993). According to Šťastná (2009) the form of regional fiscal policy responses to other regions can be positive or negative where a positive response indicates a process that mimics the fiscal policies of other regions and this process is called yardstick competition. While negative responses occur if there is a positive welfare effect from the fiscal policy of neighboring regions in an area and this phenomenon is called free riding. On the other hand, the use of spatial econometrics can improve the efficiency of the model where neglecting the possibility of spatial interactions between economic units in the empirical model can lead to inferences that are wrong (Anselin, 1988). The fundamental difference between spatial statistics and classical statistics lies in the assumption that says that the unit of observation analyzed is not independent. Thus according to (Driscoll and Kraay, 1995), the assumption that cross sectional units are independent becomes inappropriate because disturbance errors are very likely to arise from the countries or regions observed, so that it will cause a correlation between errors of cross sectional units different. The use of spatial econometrics in research on economic growth and convergence began to be carried out. The advantage of this method is that one of them is able to capture the spatial effects or spatial relationships in an economy geographically. The following is the first law of geography proposed by Tobler (1979): "Everything is related to everything else, but near things are more related than distant things". (Dekiawan, 2014). Inequality between regions in Indonesia shows a different character and of course different policy touches are needed. The amount of the balance fund / DAU should be able to correct horizontal fiscal inequality in which the DAU function itself as a fiscal instrument used by the central government to eliminate fiscal disparities between regions due to potential revenue and the ability of regions to mobilize income varies greatly. According to (Saruç et al., 2007) government expenditure is an indicator of welfare distribution while tax / PAD is an indicator of the region's ability to finance its expenditure. Inequality of public services received by the community, especially basic services that will lead to increasingly imbalanced prosperity between regions. This condition is a source of interest to find out more deeply whether what happened and the cause of the phenomenon. Thus, the objectives of this paper are to investigate is there a

convergence of government revenues and expenditures in Indonesia and what is the role of balance funds in the process of regional government expenditure and revenue growth in Indonesia.

2 LITERATURE REVIEW

2.1 Convergence Theorem

In general, convergence can be understood as a process of reducing the income gap between regions so that it can also be understood as a process of "catching up" the backward of low-income regions to high-income regions. Convergence theory states that the level of prosperity experienced by developed countries and developing countries will one day converge (meet at one point). Economics also states that there will be a catching up effect, which is when developing countries catch up with developed countries. This is based on the assumption that developed countries will experience steady state conditions, namely countries whose income levels cannot increase again because additional investment does not increase income. In Saruç et al. (2007) convergence theory is a further development of Harrod-Domar and Solow's growth theory which refers to neoclassical growth theory. Furthermore, it is said that the rationale for convergence is the mobility of factors of production and capital reserves so that in the neoclassical growth model the factors of labor, capital, technology, factor mobility of production, education, and public expenditure or government spending are used as determinants of income differences between regions. (Lall and Yilmaz, 2000) stated that the gap arises because of differences in the ratio of capital to labor in an area, and this will be increasingly reduced. Trade and the flow of factors of production will equate the prices of factors of production between regions. Convergence theory based on neoclassical growth theory is derived through the Cobb-Douglas production function with a constant return to scale. By following (Barro and Sala-i-Martin, 1992) this can be explained as follows:

$$Y_t = K_t^{\alpha}(A_t L_t)^{1-\alpha}, 0 < \alpha < 1 \quad (2.1)$$

Y is output, K is capital, and L is labor, A is the level of technology. The Solow model, saving rates, population growth, and technological progress are considered exogenous. If g and n indicate the growth rates A and L, and the share of output that is s is constant and saved, then:

$$k_{(t)} = sy_{(t)}^{\cdot} - (n + g + \delta)k_{(t)},\ \delta = depreciation \quad (2.2)$$

By using the steady state value of k in the above equation, the steady state income per capita is:

$$ln\left[\frac{\cdot}{\cdot}\right] = \ln A(0) + g_t + \frac{}{} \ln s - \frac{}{} \ln(n + g + \delta \quad (2.3)$$

If y * indicates a steady state income level, then:

$(\partial \ln Y_t)/\partial t = \lambda(\ln Y^{\cdot} - \ln Y_t)$ (2.4)

Thus, the convergence model that will be obtained based on neoclassical growth theory is:

$$\ln Y_t = e^{-\lambda\tau} \ln y_{t-1} + \left(1 - e^{-\lambda\tau}\right) \ln y \quad (2.5)$$

In equation (2.5) above τ is the time period while λ is the level of convergence. (Barrientos, 2007) states that the term economic convergence is used when two or more economies are going to almost the same level in development and prosperity. On the other hand the study of convergence is debated between the neoclassical growth model, the endogenous growth model, and the distribution dynamics model. Furthermore (Paas, Kuusk, Schlitte, & Võrk, 2007) states that convergence studies are mostly focused only on the concept of production factors, while their impact on microeconomic aspects is not discussed. The implications of economic institutional theory are also not considered even though economic institutions encourage growth through social systems (systems of society). (Afxentiou and Serletis, 1996) stated that in addition to the institutional aspects, infrastructure factors were also important factors to consider.

2.1.1 Sigma-Convergence and Beta-Convergence

Nowadays there are two approaches used to see convergence, namely sigma convergence and beta convergence (Paas et al., 2007). The sigma convergence illustrates the decreasing per capita income gap over time. To see whether there is convergence, it can be done by looking at the dispersion through the coefficient of variation. The smaller the level of gap per capita is indicated by the smaller coefficient of variation over time, so the smaller coefficient of variation indicates the existence of sigma convergence. Beta convergence illustrates the faster economic growth of a country or region that is poorer than a richer country or region. This condition is shown by the negative beta value in the negative relationship between the growth of income per capita in a certain period to the income per capita in the initial period (initial level of percapita income). Further stated by (Lall and Yilmaz, 2000) and (Paas et al., 2007), in beta convergence there are two types of convergence, namely unconditional convergence or often referred to as absolute convergence and conditional convergence. Unconditional convergence is a condition of convergence that assumes that economies between countries or regions have similarities such as in terms of economic structure, demographic conditions, saving rates, and other economic variables. Conversely, conditional convergence assumes that structural characteristics between countries or regions have inequality so that convergence is influenced by the structural characteristics of the country or region (Lall and Yilmaz, 2000); (Islam, 2003); (Paas et al., 2007). This has consequences in the conditional convergence model that needs to be supplemented by various explanatory variables. The issue of convergence is clear both in terms of types, assumptions, models, and estimates described by (Islam, 2003). In general, beta convergence will encourage the creation of sigma convergence, but the inverse does not apply. The sigma convergence process is likely to be disrupted by new shocks which result in higher income level gaps. Quah (1993) in (Paas et al., 2007) states that the relationship between growth rates and initial income levels does not provide a clear answer about convergence such as the emergence of negative relationships while differences in income do not decrease. For this reason, the convergence of sigma pertains to a decrease in the gap in cross sectional income per capita income over time. Beta convergence provides structural model information on growth models. Beta convergence is referred to by (Paas et al., 2007) as necessary conditions, but not sufficient conditions for sigma convergence.

2.2 Convergence Theorem of Fiscal Policy

The theory of convergence of fiscal policy stated by Scully (1991), Annala (2000) and Coughlin et al. (2007) based on the Solow model where the level of tax growth and government spending is equal (equal to) to the level of growth in public

income. If there is a convergence in public income, it can be expected that there will be convergence at the tax and government expenditure levels. This implies that when there is a dynamic process of economic growth towards convergence there will be fiscal convergence in a region. Skidmore et al. (2004) reduce the current convergence model of government spending (Gt) which is part of the output of the previous period (Qt-1) to obtain the equation:

$G_t = a_t Q_{t-1}$ (2.6)

In the equation the parameter at is constant so that the government budget reflects the events and conditions of the past. Current conditions are not irrelevant to current government spending, but past conditions also have relevance. Per capita output (Q / L) is a function of private capital (K) and government social input (Gt) while private input is a separate part of government input. This was stated by Skidmore & Deller (2008) as follows:

$$\frac{\tilde{Y}_t}{\tilde{L}_t} = f\left[\frac{\tilde{K}_t}{\tilde{L}_t}, \frac{\tilde{G}_t}{\tilde{L}_t}\right] = V_p(k_t)\, v_e(g_t) \quad (2.7)$$

By substituting (2.7) into (2.6) and using the constant returns to scale approach of the Cobb-Douglas production function, the equation will be obtained:

$$G_t \equiv a_t L_{t-1} q_{t-1} \approx a_t A L_{t-1} k_{t-1}^{\alpha} g_{t-1}^{\mu} \quad (2.8)$$

If in equation (2) the population variable is included to find the per capita variable and then divided by the government expenditure per capita in the previous period, the equation will be obtained:

$$\ln\left[\frac{G_t}{G_{t-1}}\right] \approx \ln A a_t - n_t + \alpha \ln k_{t-1} + (\beta - 1) \ln g_{t-1} \quad (2.9)$$

In this case nt = ln (Lt / Lt-1), which is the population growth rate. Based on equation (2.9), the growth rate of per capita government expenditure depends on the value of private and public inputs, population growth, and the proportion of output provided by the government or at. As long as β <1 means diminishing returns on government spending, the level of past government spending will cause current government spending to grow more slowly, thus achieving convergence. In convergence, the ratio of current government spending to past output is not systematically related to per capita government spending. Barro (1991) in Skidmore et al. (2004) state that the ratio of current government spending to past output should not increase with an increase in output, but if this does not fully occur, it is still possible to test convergence using other control variables that cause the ratio to change over time. Some studies use government expenditure variables to see the convergence that occurs between countries and between regions or regions such as Afxentiou & Serletis (1996), Annala (2000), Lall & Yilmaz (2000), Skidmore, et al. (2004), Saruç et al. (2007), Annala & Chen (2011), Skidmore & Deller (2008), Mohanty (2013) and Garg (2015). Regional government expenditure in the context of regional autonomy is expected to be allocated more optimally. Government spending basically reflects the stages of economic development and in the development process there is a tendency for increasingly large government spending (Skidmore, Toya & Merriman, 2004).

2.3 Fiscal Decentralization and Fiscal Policy Divergence

It is said in the literature stated in certain circumstances, fiscal decentralization can cause disparities between regions (Prud'homme, 1995); (Manor, 1999); and (Borge, Brueckner and Rattso, 2014). This divergence is triggered by the framework of regional government autonomy having authority in the provision and financing of public services. For example, Tiebout (1956) argues that fiscal federalism promotes competition among local governments. This requires that individuals, households and businesses in the area are assumed to be free to move from one jurisdiction to another in the search for local authorities who are able to match the supply of local public goods to their own tastes and preferences. This creates horizontal competition between local jurisdictions. One consequence of household and business outflows from one jurisdiction to another is that the city where this flow occurs can reduce the tax base. To avoid this exit also called "tax mobility" the area will be efficient in providing public services so that these services are in accordance with the tastes and preferences of the people. This means that different cities will offer different tax and expenditure packages, which translate into divergent fiscal policy.

2.4 Interaction among Local Governments

In the panel data model that describes convergence often ignores the possibility of patterns or interrelationships between spaces (regions), so the models are less able to describe spatial conditions (Piras and Arbia, 2007). On the other hand, neglecting the possibility of spatial interactions between economic units in the empirical model can lead to incorrect inferences (Anselin, 1988). The use of cross section data or panel data needs to pay attention to spatial effects in order to provide a more realistic picture. If there is a spatial dependency between regions, estimates using the OLS model will give biased or inaccurate results. In the literature on the convergence of government spending, yardstick competition between countries is also suspected as one of the potential driving forces towards the convergence of spending. Skidmore & Deller (2008) proposed the inclusion of this aspect as an important avenue for future research. One study by Coughlin et al. (2007) examined the convergence of fiscal policy across US states with spatial econometrics. The authors find a convergence of expenditures and a significant impact on spatial proximity for the same economic and demographic countries. In the era of decentralization, regions are given limited freedom to determine their own fiscal policies, thus allowing interaction of fiscal policies between regions. This interaction can occur given the factors of production such as capital, labor, goods and services, can move without any obstacles. Displacement of these factors of production follows an intensive and intensive pattern of government policy Alves (2005) in Cahyono (2014). Local government policies that are disintensive to the factors of production, allow these factors of production to move to other regions. Vice versa, if local government policies are intensive, it will encourage the factors of production to enter the area. In the context of fiscal competition, each region uses budget policy instruments through government spending and local taxes. The more expansive regional government budget policies will cause more and more factors of production to enter the area. Thus the economy of a region will increase along with the increasing input of production factors (Bucovetsky, 2005). According to Breton (1996) in Cahyono (2014), government competition can occur at all levels of government. The competition can occur between state governments or between regional governments. Furthermore, in the competition model, each local government always tries to maximize the strategy / policy between constraints. The level of inter-governmental competition is limited by the assumption that each government has a

balanced degree of power (unequal). Expenditure competition is a form of competition between governments in terms of government spending with the aim of fighting over factors of production. More and more factors of production enter a region causing faster and higher economic growth, and automatically local government income will also increase along with this. Expenditure competition is a form of competition between governments in terms of government spending with the aim of fighting over factors of production. More and more factors of production enter a region causing faster and higher economic growth, and automatically local government income will also increase and cause an externality / spillover Wildasin (2001). Understanding tax competiton is a form of intergovernmental competition aimed at fighting over tax objects in the form of goods / services and labor (Hauptmiere, 2009). In the tax competition model, each region will compete with each other. Whereas in the tax coordination model, each region actually cooperates in formulating taxation policies to produce a taxation formulation that is mutually beneficial. According to Justmant (2001) in Cahyono (2014) fiscal competition in the field of taxation (tax competition) can cause damage (destructive competition). Destructive competition occurs when the two regions are too protracted in competition, so the game of the two regions is too low in taxation. Research on tax competition and yardstick competition in Indonesia was conducted by Arze del Granado, Martinez-Vazquez, & Simatupang (2008) which aims to analyze the existence of fiscal competition between provinces in Indonesia. The findings of this study are the absence of provincial PAD competition in Indonesia which is a proxy for tax. the cause of the absence of tax competition is due to the limited decentralization of taxes given to local governments and the small contribution of PAD to total regional income. Fiscal interaction between local governments can be explained by a variety of effects stemming from non-cooperative or cooperative behavior (Šťastná, 2009). The main sources of strategic interaction on non-cooperative behavior are spillovers, fiscal competition and yardstick competition. positive or negative spatial dependence of regional spending in the game with non-cooperative government is equivalent to local spending being a strategic complement / strategic substitute. The first and most important source is the spillover effect. The benefits of public spending in the domestic area can easily spill over into neighboring regions. This additional welfare effect affects local government decisions on public spending. We can observe either positive or negative correlations between neighboring public spending resulting from substitutions or complementing each other. The optimal reaction of local governments to the positive welfare effects will be free ride on neighboring regions, reducing their spending on certain policies and allocating resources to different policies. A third source of strategic interaction with local governments can also mimic the decision to supply public goods to neighboring regions. There are two main pathways that cause this behavior to occur. First, explained by yardstick competition If voters are not fully informed of evaluating the performance of their government, they can take the policies adopted by their neighbors as benchmarks (Besley & Case, 1995), because they have no information about the costs of running offices or providing public services. Secondly, it can be that the regional government has incomplete information. To avoid information costs such as the cost of analyzing requests from citizens or from elaborating cost-benefit analysis the local government can tend to mimic its own neighbors. To capture the spatial effect, in the analysis added variables in the form of spatial weight (spatial weight) which illustrates the inter-regional linkages (Paas et al., 2007); (Coughlin et al., 2007); (Battisti & Vaio, 2008). According to Paas et al. (2007) the simplest and widely used spatial weight is the contiguity matrix in the form of distances between regions, in the form of binary numbers 0 and 1, which are geographically adjacent regions (neighbors) given a weight of 1 while others are given zero weight. However, the type of spatial weight also depends on the scope of the research to be conducted. (Coughlin et al., 2007) uses spatial weights in the form of income weights, racial weights, and age weights to see the spatial effects of fiscal policy. Research on convergence, especially in Indonesia, still rarely uses the issue of spatial dependence (spatial dependence) in its analysis. On the other hand, the convergence aspect used as a study study, especially in Indonesia, is the convergence of per capita income, which rarely studies the convergence of local government revenue and expenditure. In addition, in various convergence studies, weights that are often used in the matrix are the weight of geographical proximity (contiguity) or distance weight (distance), Anselin (1988), the right estimation method when in analysis using panel data and include spatial elements such as Spatial Lag Model (SLM) or also called the Spatial Autoregressive Model (SAM), and the Spatial Error Model (SEM).

3 METHOD

This study uses panel data, by taking research sites in districts / cities in Indonesia by sampling several regions in Java and outside of Java with the observation period of 2010 - 2018. There are several analytical methods applied in this study, namely:

3.1 Sigma Convergence (σ)

Sigma convergence analysis is a time series analysis to observe the convergence of observational variables performed by calculating the coefficient of variation, as conducted by Coughlin et al. (2007) and Saruç et al. (2007), as follows:

$$CV_{it} = [(\sum_{i=1}^{N}(G_{it} - \overline{G_{it}})^2)/N]^{0.5} / \overline{G_{it}} \qquad (4.1)$$

In this case,
CV: Coefficient of Variation observation variable;
G_i : District / city APBD variable income and expenditure;
G: Average of each variable (average G); and
N: number of districts / cities.

3.2 Beta Convergence (β)

Beta convergence analysis is carried out using the unconditional convergence and unconditional convergence approaches to PAD and total district government expenditure.

3.3.1 Absolut Beta Convergence (β)

In general, this study uses quantitative analysis, and specifically the analytical method used in this study is to use descriptive statistics and spatial econometrics. The data processing is carried out using STATA software for estimating the model. In general, the stages of analysis in this study are shown in the following steps.

Step I:

This stage is used to determine and analyze the existence of sigma convergence, by calculating the coefficient of variation (CV) for the dispersion of regional per capita income and the revenue component as well as the expenditure component of local governments in Indonesia

Step II:
At this stage it is used to determine and analyze the existence of absolute beta convergence, Kon absolute convergence, defined as a negative relationship between the level of initial income and the level of income in the next period. This model is used to estimate absolute beta.

$$Y_{Exp_{it}} = \beta_0 + \beta_1 lnExp_{it-1} + \varepsilon_{it} \quad (4.5)$$

Where:
$Y_{Exp_{it}}$: Growth in district / city per capita government expenditure;
$lnExp_{it-1}$: Government expenditure per capita early;
ε: error term; and
i,t: district / city i at time t.

$$Y_{PAD_{it}} = \beta_0 + \beta_1 lnPAD_{it-1} + \varepsilon_{it} \quad (4.6)$$

Where:
$Y_{PAD_{it}}$: Regional Original Revenue per capita district / city;
$lnPAD_{it-1}$: Initial PAD per capita;
ε: error term; and
i,t: district / city i at time t.

4 RESULT AND DISCUSSION

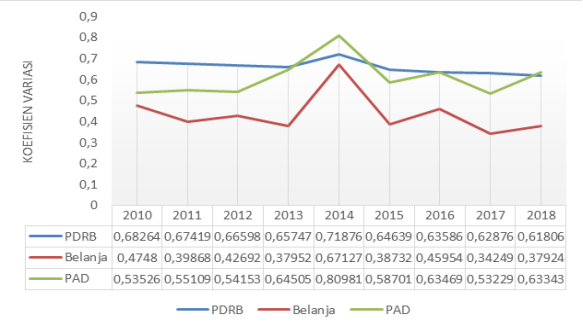
4.1 Sigma Convergence Testing

Sigma convergence analysis is a time series analysis to observe the convergence of the observed variables by calculating the coefficient of variation. In this study, a convergence test was conducted on 3 (three) dependent variables, namely Per capita GRDP, Government Expenditure, and Government Revenues reflected by PAD. Whereas the regencies / cities that will be observed for convergence are classified into Java and Outer Java regions with a sample of 30 districts / cities each in 2010 to 2018. In addition, the results of testing the convergence of the total area of Indonesia are also presented with a sample of 60 districts / cities.

4.1.1 Convergence in Java

Convergence analysis is divided into two, namely sigma convergence and beta convergence. Sigma convergence occurs when there is a decrease in the dispersion of the dependent variable between regions throughout the year. In Java, the convergence of per capita GRDP variables, Government Spending, and PAD were observed. The results are as follows:

Figure 1 *Sigma Convergence in the Java Region in 2010-2018*

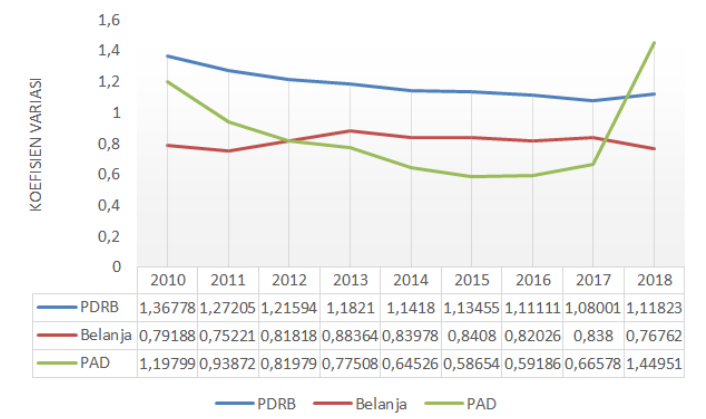


In 2010-2018, the coefficient of variation in the variable GRDP per capita in the Java region was relatively stable, but tended to decline. This decrease indicates per capita GRDP between regions in Java becoming more homogeneous or more evenly distributed. In addition, the coefficient of variation in the current year compared to the value in the previous year shows a downward trend. This means that the average income received by the population between regencies / cities in Java is more uniform, so it is concluded that the tendency of sigma convergence occurred in the period 2010-2018 in the Java region. Furthermore, the government expenditure and PAD variables fluctuate considerably and experience the same tendency of fluctuation patterns. Nevertheless, between 2010-2018 government spending has a coefficient of variation that tends to decrease, whereas PAD tends to increase. That is, the average district / city government spending on Java is more evenly distributed, while the average PAD is increasingly different. So it can be said that sigma convergence occurs in government expenditure variables and sigma convergence does not occur in PAD variables.

4.1.2 Convergence outside Java

In addition to the Java region, sigma convergence was observed for the Outer Java region with samples representing Sumatra, Kalimantan, Sulawesi, Nusa Tenggara and Papua. The results of the sigma convergence test can be seen in Figure 2:

Figure 2 *Sigma Convergence in Indonesia in 2010-2018*



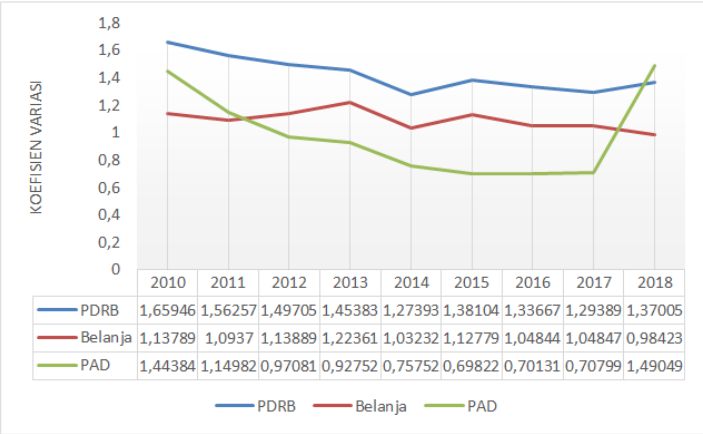
From Figure 2 it can be seen that the coefficient value of variable GRDP per capita outside Java is relatively stable and

tends to decrease. Almost the same as the Java region, this decrease indicates per capita GRDP between regions outside Java is more homogeneous or the income of the people is more evenly distributed. In addition, the coefficient of variation in the current year compared to the value in the previous year shows a downward trend. This means that the average income received by residents between regencies / cities outside Java is also more evenly distributed, so it is concluded that the tendency of sigma convergence occurred in the period 2010-2018 in the Outer Java region. In the government expenditure variable, the coefficient value from year to year tends to increase, even the increase is quite sharp between 2011-2013. This increase indicates government spending between districts / cities outside Java is increasingly heterogeneous or government spending is increasingly different and there is no convergence of government spending sigma in 2010-2018. In contrast to the PAD variable, the coefficient of variation tends to decrease even though it experienced a significant increase in 2018. The reduction in the coefficient of variation can be interpreted as the increasingly homogeneous amount of PAD obtained by districts / cities in the Outer Java region and the sigma convergence of the PAD variable in 2010-2018.

4.1.3 Convergence in Indonesia

As a total picture of the Java and Outer Java regions, a sigma convergence test was carried out in the Indonesian region and the results are as follows:

Figure 3 *Sigma Convergence in Indonesia in 2010-2018*



At the national level, the GRDP variable and spending have almost the same fluctuation patterns. For both of these variables, the coefficient of variation tends to decrease since 2010 to reach its lowest point in 2014. This decrease indicates GRDP and government spending between districts / cities in Indonesia in general is increasingly homogeneous or evenly distributed and there is a convergence of sigma PDRB and government spending in the year 2010-2018. Likewise, the downward trend in the coefficient of variation is more pronounced in the PAD variable. On average, the coefficient has consistently decreased even though it has increased quite sharply in 2018. Similar to the GRDP and government spending, a decrease in the coefficient of variation in PAD indicates the convergence of sigma as the income distribution between the regencies / cities in Indonesia becomes even more prevalent. If the inequality between regions narrows, it means that there is a good impact (trickling down effect), whereas if the inequality between the two regions further means a polarization effect occurs.

4.2 Absolut Beta Convergence Testing

Convergence is a condition that describes the gap or disparity in a variable between regions within a certain period. In the economic context, Schmitt and Starke (2011) state that convergence makes conditions between regions in certain variables more and more similar. Analysis of beta convergence is divided into two, namely absolute beta convergence which uses the lag variable as the only exogenous variable and conditional beta convergence which includes variables other than lag. The value of Test Magnitude indicates the presence or absence of spatial autocorrelation of all dependent variables, namely GRDP per capita, Government Expenditures per capita, and PAD per capita. The results of this test will be complemented by an absolute beta convergence test to see cross sectional dependencies between research variables. Following are the values of the Magnification Index in the Java and Outer Java regions.

TABLE 1

PESARAN TEST OF DEPENDENT VARIABLE TESTS IN JAVA AND OUTSIDE JAVA 2010-2018

Pesaran CD Test	PDRB Per Capita	Government Expenditures	PAD
Java	21,295* (0.0000)	17,837* (0.0000)	20,006* (0.0000)
Outside Java	9,014* (0.0000)	21,208* (0.0000)	20,555* (0.0000)

Note: *), **), ***) significant at levels of 0.01, 0.05, 0.10

Table 4.1 shows the results of the estimation of the Magnification Test in which the results of the identification of significant spatial autocorrelation on the three variables both in Java and Outside Java, which shows the stability of the spatial dependencies of the growth of each variable during the study period. This means that relations between regions in the GRDP, government spending, and PAD always occur. Furthermore, the convergence results between regencies / cities in Java and Outer Java in 2010-2018 is shown from the calculation of the value of the convergence betanya. The following table 4.2 presents the results of the estimated beta convergence:

TABLE 2

ABSOLUTE CONVERGENCE OF DEPENDENT VARIABLES IN JAVA AND OUTSIDE JAVA 2010 - 2018

Model Konvergensi Absolut	Javanese Dependent Variable			Dependent Variable Outside Java		
	PDRB Per Capita	Government Expenditures	PAD	PDRB Per Capita	Government Expenditures	PAD
Constanta	10.61544*	1.057174 *	0.0979493*	11.47374*	0.9034247*	0.1909611*
PDRB Percapita (t-1)	0.5461655*			0.8832345*		
Government Expenditures (t-1)		0.4890223*			0.9116059*	
PAD (t-1)			0.6965452*			0.7148649*
Speed of Conv.	0.55%	0.49%	0.70%	0.88%	0.91%	0.71%

Note: *), **), ***) significant at levels of 0.01, 0.05, 0.10

The determinant of beta convergence is that the resulting

regression coefficient must be less than 1 (<1), because the economy is moving towards the initial conditions. Based on testing the absolute beta convergence above, in general the value of the lag variable coefficient shows a positive number of less than one and significant, meaning that absolute beta convergence occurs. Both in Java (0.5461655) and outside Java (0.8832345), absolute beta convergence of the first dependent variable that uses GRDP per capita one year before (t-1) as the only exogenous variable experiences a convergent tendency because each region reaches a condition steady state, so that the increase in GRDP per capita growth tends to be constant or slow. However, the level of convergence in the Java region is higher than that of the Outer Islands, which means that the GRDP in Java is more steady. In accordance with BPS data (2018), Indonesia's spatial economic structure in 2018 is dominated by provincial groups in Java and Sumatra. Java Island gave the biggest contribution to Gross Domestic Product, which was 58.48 percent, followed by Sumatra Island with 21.58 percent and Kalimantan Island 8.20 percent. Likewise until the first Quarter of 2019, spatially the island of Java was still the largest contributor to the national economy in the first quarter of 2019, reaching 59.03% with economic growth of 5.66%. In second place, Sumatra contributed 21.36% and 4.55% growth. Four other regions, namely Kalimantan, Sulawesi, Bali and Nusa Tenggara, as well as Maluku and Papua, contribute to the national economy, which is still below 10%. The contribution of Maluku and Papua to the Indonesian economy was the smallest at only 2.19% with growth of -10.44%.Likewise in the government expenditure variable, it is known that the lag coefficient of the initial government expenditure in Java is 0.4890223 less than 1 and it is significant that outside Java it is 0.9116059 also less than 1 and is significant. This indicates a convergence between districts / cities both in Java and outside Java in terms of government spending. Although both are convergent, the level of convergence outside Java is lower than Java. That is, in government spending, regions in Java tend to experience more steady state conditions compared to those outside Java. Thus, government spending outside Java will continue to increase compared to Java. Government spending reflects the policies pursued by the government. If the government has established a policy to buy goods and services, government spending reflects the costs that must be incurred by the government to implement the policy. With the more even distribution of regional expenditure, it can be indicated that the even distribution of policies among regions will have an impact on the even distribution of public goods and services. Then in the PAD variable, results are almost the same as the other two variables. The coefficient of PAD lag in Java is 0.6965452 while outside Java is 0.7148649. With boundary 1 as the convergence - divergence limit, the two regions can be said to experience convergence in their PAD variables. Nevertheless the degree of convergence in the Java region is slightly more converging compared to Outside Java. It can be interpreted that in exploring the source of revenue in the form of PAD, districts / cities in Java tend to have experienced steady state conditions while districts / cities outside Java are still trying to increase their PAD revenues to achieve steady state conditions. After observing the absolute convergence of the lag of each variable, then also observed the speed of convergence or the speed of convergence shows the amount of speed produced by each coefficient β of absolute convergence. Based on table 4.2 it can be seen that the absolute convergence speed of GRDP variables in Java is 0.55% per year. Thus it is known that the per capita income gap between regencies / cities in Java will decrease at an average speed of 0.55% per year based on the calculation of absolute convergence. While the per capita income gap between regencies / cities, regencies / cities outside Java will decrease with a higher average speed of 0.88% per year. The speed of convergence of government spending in Java is known to be 0.49% while outside Java is 0.91%. So on average the gap in government spending between districts / cities will fall faster in the Outer Java region compared to Java. This is in line with the level of convergence of spending in Java which is higher (more steady) than outside of Java. Finally, the speed of convergence of PAD in Java is 0.70%, indicating that the PAD gap between regencies / cities in Java will decrease with an average speed of 0.70% per year, while the speed of convergence of PAD outside Java is almost the same, namely 0 , 71% which can be interpreted that the PAD gap between regencies / cities in Java will decrease with an average speed of 0.70% per year. The high speed of convergence of regencies / cities outside Java can be part of efforts to accelerate the convergence by pushing provinces outside Java as growth centers through improving the quality and quantity of infrastructure in the regions. As a study conducted by Kuncoro (2013) shows that the concentration of national income is still centered on the islands of Java and Sumatra, so that it encourages an increase in disparity. Therefore, efforts to strengthen infrastructure, especially in eastern Indonesia, are expected to be able to accelerate convergence. This can be done by the region by changing the orientation of public spending towards infrastructure development, so that it can be a stimulant in accelerating the development process in the region to accelerate the convergence process. The estimation results of the absolute convergence above are in line with the theory that convergence occurs when regions with relatively low income are able to grow faster than regions with relatively high income, so that the level of prosperity will tend to converge and in turn the gap in prosperity between regions gets smaller (Nurhamidah and Suhartini, 2014).

5 CONCLUSION

After the implementation of regional decentralization, namely in 2010-2018, sigma convergence has occurred between regencies / cities both in Java and Outside Java. In Java, this is indicated by a decrease in dispersion in per capita GRDP variables and government spending while PAD tends to increase. This means that GDP per capita and government spending in Java are more uniform, while the PAD is increasingly varied. Outside Java, GRDP per capita also experienced a decrease in dispersion, as did the PAD variable. Conversely, government spending variables tend to be more varied. At the national level, the GRDP variable and spending have almost the same fluctuation patterns. For both of these variables, the coefficient of variation tends to decrease since 2010 to reach its lowest point in 2014. This decrease indicates GRDP and government spending between districts / cities in Indonesia in general is increasingly homogeneous or evenly distributed and there is a convergence of sigma PDRB and government spending in the year 2010-2018. Likewise, the downward trend in the coefficient of variation is more pronounced in the PAD variable. In addition, it was found that

there were significant spatial autocorrelations in all three variables both in Java and Outside Java. This shows the stability of the spatial dependencies of the growth of each variable during the study period. This means that relations between regions in the GRDP, government spending, and PAD always occur. In the beta convergence analysis, there is a convergent tendency in GRDP because each region reaches a steady state, so that the increase in GRDP per capita growth tends to be constant or slow. However, the level of convergence in the Java region is higher than that of the Outer Islands, which means that the GRDP in Java is more steady. Java was found to have a speed of convergence of 0.55% per year while outside of Java 0.88% per year. The speed of convergence of government spending in Java is known to be 0.49% while outside Java is 0.91%. So on average the gap in government spending between districts / cities will fall faster in the Outer Java region compared to Java. This is in line with the level of convergence of spending in Java which is higher (more steady) than outside of Java. Finally, the speed of convergence of PAD in Java is 0.70%, indicating that the PAD gap between regencies / cities in Java will decrease with an average speed of 0.70% per year, while the speed of convergence of PAD outside Java is almost the same, namely 0 , 71% per year.

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