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The Effect of Fiscal Decentralization on Economic Convergence amongst Regions in Java Island (Spatial Econometric Approach)

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ABSTRAK

Dalam rangka menurunkan tingkat ketimpangan regional, diperlukan suatu mekanisme yang disebut konvergensi. Penelitian ini bertujuan untuk menguji eksistensi konvergensi ekonomi dan menganalisis pengaruh desentralisasi fiskal terhadap konvergensi ekonomi dengan pendekatan ekonometrika spasial. Untuk menunjukkan desentralisasi fiskal, pendapatan asli daerah, dana perimbangan, belanja pegawai, dan belanja modal digunakan. Dengan menggunakan analisis konvergensi dinamis, hasil penelitian menunjukkan bahwa terjadi konvergensi beta absolut dan kondisional pada kabupaten/kota di Pulau Jawa periode 2015-2019. Hasil estimasi menunjukkan bahwa dana perimbangan, belanja pegawai, dan pendapatan asli daerah (PAD) memiliki pengaruh yang signifikan terhadap peningkatan pendapatan per kapita, sementara belanja modal tidak cukup untuk mendorong pertumbuhan. Apabila indikator desentralisasi fiskal ditambahkan dan aspek spasial dipertimbangkan dalam model, maka akan menyebabkan peningkatan tingkat konvergensi. Peningkatan kualitas belanja menjadi kunci utama percepatan konvergensi.

ABSTRACT

Convergence mechanism is needed in order to reduce regional inequality. This study aimed to examine the existence of economic convergence and analyze the effect of fiscal decentralization on economic convergence with spatial econometric approach. Local own-source revenue, balance funds, personnel expenditure and capital expenditure as proxies for fiscal decentralization indicator. Using dynamic convergence analysis, the existence of beta absolute and conditional convergence are confirmed in this study. From the estimation result, local own-source revenue, balance funds, personnel expenditure have significant role on per capita income growth, while capital expenditure has not been effective in supporting growth. If fiscal decentralization indicators are added and spatial aspects are considered in the model, it will cause an increase in the convergence rate. Improving the quality of spending is the main key to accelerating convergence.

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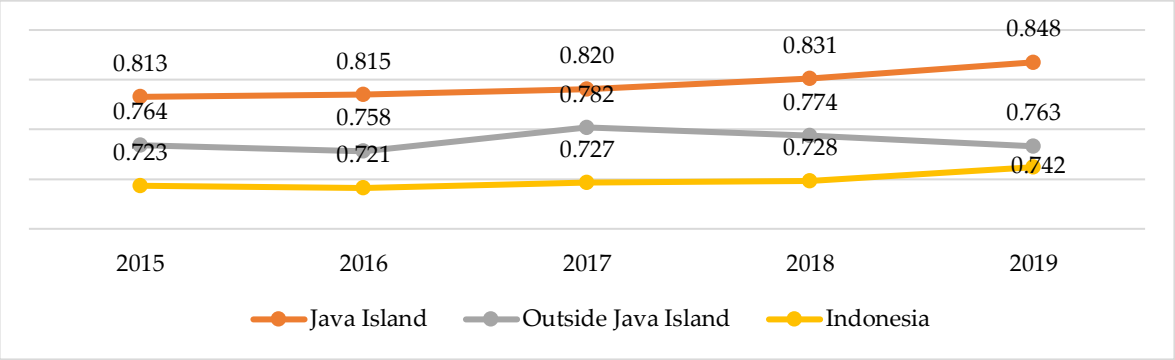
1. INTRODUCTION

Regional inequality is a fundamental problem that is often faced by developing countries, including Indonesia. Based on Williamson Index, Indonesia experienced a consistent increase in regional inequality in the 2015-2019 period. This is caused by the Indonesian economy which is still Java-centric. Java Island exerts significant dominance over the Indonesian economy, accounting for over 50% of Indonesia's Gross Domestic Product (GDP). Uniquely, with such a strong economy, Java Island still faces the problem of regional inequality, even with a more severe level of regional inequality compared to inequality outside Java and on a national scale, as presented at Figure 1.

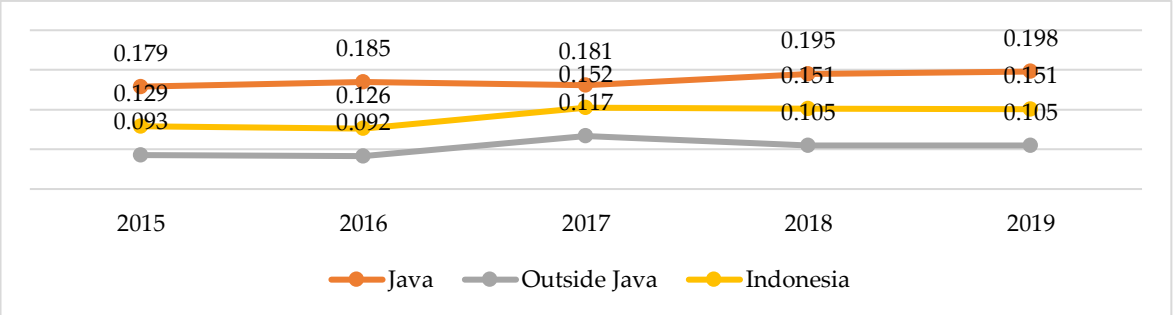
Figure 1. Williamson Index between Regencies/Municipalities in Java Island, Outside Java Island and Indonesia, 2015-2019



Source: Author's calculation, 2022

The issue of regional disparity became more prominent when fiscal decentralization was introduced in Indonesia. Fiscal decentralization is seen as a strategic approach to enhance fairness and mitigate disparities across regions. With the advantage of information, the Government is expected to be able to implement public services in accordance with the preferences and needs of the community at a more efficient cost. However, despite this advantage, there are concerns that the implementation of fiscal decentralization policies will actually increase regional inequality (Mahi, 2016). The absence of adequate preparation for the implementation of fiscal decentralization in Indonesia is the main reason behind the inability of regions to thrive under a decentralized system. This is primarily influenced by various factors, such as variations in the institutional capacity of local governments and the proficiency of local officials (Aginta et al., 2020).

Figure 2. Average Development of the LGR Ratio to Total Regional Income in Regencies/Municipalities on Java Island, Outside Java Island and Indonesia, 2015-2019



Source: Author's calculation, 2022

After two decades of implementing fiscal decentralization in Indonesia, the impact of fiscal decentralization on regional inequality still needs further research and study. The quality of fiscal decentralization from the revenue side can be seen through the ratio of locally-generated revenue (LGR) to total regional income. The development of the average ratio of locally-generated revenue

(LGR) to total regional income in Java Island, outside Java Island and Indonesia is presented in Figure 2. From the figure, it can be seen that the average ratio of locally-generated revenue (LGR) to total regional income in Java Island exceeds the average ratio of locally-generated revenue (LGR) to total regional income outside Java Island and on a national scale. This indicates that the ability of regencies/municipalities governments in Java Island to explore regional revenue sources is better than those outside Java Island.

The discussion on the influence of fiscal decentralization towards regional inequality continues on emphasizing whether economy tends to converge or diverge from time to time. The existence of economic convergence in a region is an indicator that measure the success of fiscal decentralization policy that has been implemented (Blöchliger et al., 2016). Several literatures show how the role of fiscal decentralization affects the economic convergence process. Most of the results from these studies indicate that fiscal decentralization plays a significant role in the growth of per capita income and accelerating the convergence of per capita income (Linn, 1980; Wibisono, 2003; Oates, 1993; Negara & Khoirunurrofik, 2021).

With the delegation of some authorities to the Regional Government, the provision of public services is more efficient so that in the long run it is expected to be able to increase economic growth (Oates, 1993), and people's welfare because the quality of public services is getting better and in accordance with the needs of the community. Besides public efficiency, fiscal decentralization also reduces budget deficits and allows regions to develop more according to the potential of each region (Bird, 1993). On the other hand, Saputra & Mahmudi (2012) found that fiscal decentralization has a negative effect on per capita income growth. According to Zhang & Zou (1998), fiscal decentralization actually exacerbates the level of inequality in developing countries due to differences in economic resources and the weak capability of local governments in managing the budget (Saputra, 2013). This causes instability in the macroeconomy which in turn hinders economic growth and convergence (Martinez-Vazquez & McNab, 2003).

Besides the varied research results, most of the similar studies have not paid attention to spatial dependency, while inter-regional linkages are an important part of the context of regional development. Spatial dependency in per capita income growth can be sourced from per capita income growth in surrounding areas (Aritenang, 2014), and shocks from surrounding areas (Resosudarmo & Vidyattama, 2006; Vidyattama, 2014). If there are variables that are spatially correlated, but spatial dependency factor is not considered, it will cause bias on estimation (Anselin, 1988; Aspiansyah & Damayanti, 2019). Therefore, spatial and neighborhood aspects are factors that must be considered in determining the economic conditions of a region. In addition, in several previous studies, most of the research used provincial-level units of analysis, while the basis for decentralization implemented in Indonesia is at the district/city level (Negara & Khoirunurrofik, 2021). According to this phenomenon, this study will focus on analyzing the influence of fiscal decentralization towards the convergence of per capita income in Java Island using a spatial econometric approach.

Based on the existing research, we have identified many research issues that build upon prior studies and provide further contributions to address: (i) Is there convergence in terms of per capita income among regions in Java Island? (ii) How does the influence of decentralization indicators impact per capita income growth and the speed of convergence? (iii) Is there any spatial dependence in the growth of per capita income among districts in Java Island?

2. METHODS

This research uses a quantitative method and involves 113 regencies/cities in Java Island in 2015 – 2019. DKI Jakarta is exluded as the research sample because DKI Jakarta is not an autonomous region, but a province. This research includes regencies which located on Madura Island, with the consideration that some of these regencies are administratively located in East Java Province.The data used in this study is obtained from Statistics Indonesia, Directorate General of Fiscal Balance in

Ministry of Finance, Geospatial Information Agency. To find indications of convergence in the regional economy in Java Island, this research used two kinds of convergence analysis, namely absolute beta convergence and conditional beta convergence. This research uses classic panel regression for examine beta convergence and conditional beta convergence and spatial panel regression for conditional beta convergence analysis. Local generated revenue (LGR), balance funds, personnel expenditure, and capital expenditure are used as fiscal decentralization indicators.

The equation used for absolute convergence using the model from Barro & Salai-martin (1992) with the equation that relates to the growth rate of income per capita to level initial per capita income:

$$\ln\frac{y_{i,t}}{y_{i,t-1}} = Y_{i,t} = \propto + \beta_0 \ln y_{i,t-1} + \varepsilon_{i,t}$$

While the equation used for conditional convergence as follows:

$$Y_{i,t} = \propto + \beta_0 \, ln \, y_{i,t-1} + \beta_1 LGR_{i,t} + \beta_2 BF_{i,t} + \beta_3 \, PE_{i,t} + \beta_4 \, CE_{i,t} + \varepsilon_{i,t}$$

Moran's I test is performed to detect spatial autocorrelation, and LISA analysis is added to explain spatial autocorrelation locally. There are two spatial model to analyze the existence of beta conditional convergence and the effect of fiscal decentralization on per capita income convergence, namely spatial autoregressive model (SAR) and spatial error model (SEM).

a. Spatial autoregressive model (SAR)

$$Y_{i,t} = \propto + \boldsymbol{\rho} \sum_{\boldsymbol{j=1}}^{\boldsymbol{N}} \boldsymbol{W_{ij} Y_{jt}} \beta_0 \, ln \, y_{i,t-1} + \beta_1 LGR_{i,t} + \beta_2 BF_{i,t} + \beta_3 \, PE_{i,t} + \beta_4 \, GE_{i,t} + \beta_5 \, CE_{i,t} + \beta_6 \, HDI_{i,t} + \beta_7 \, ROAD_{i,t} + \beta_8 \, MANPOWER_{i,t} + \varepsilon_{i,t}$$

b. Spatial error model (SEM)

$$Y_{i,t} = \propto + \beta_0 \, ln \, y_{i,t-1} + \beta_1 LGR_{i,t} + \beta_2 BF_{i,t} + \beta_3 \, PE_{i,t} + \beta_4 \, GE_{i,t} + \beta_5 \, CE_{i,t} + \beta_6 \, HDI_{i,t} + \beta_7 \, ROAD_{i,t} + \beta_8 \, MANPOWER_{i,t} + \varepsilon_{i,t} u_{it}$$

$$u_{it} = \lambda \sum_{j=1}^{N} W_{ij} u_{jt} + \varepsilon_{it}$$

where:

$Y_{i,t}$ = Growth of per capita income of regency/municipality i in period t
$y_{i,t}$ = GDP per capita regency/municipality i in period t
$y_{i,t-1}$ = GDP per capita regency/municipality i in previous period (t-1)
$LGR_{i,t}$ = Local Generated Revenue to total regional income ratio
$BF_{i,t}$ = Balance funds to total regional income ratio
$PE_{i,t}$ = Personnel expenditure to total regional spending ratio
$GE_{i,t}$ = Goods and Services expenditure to regional spending ratio
$CE_{i,t}$ = Personnel expenditure to total regional spending ratio
$HDI_{i,t}$ = Human Development Index of regency/municipality i in period t
$ROAD_{i,t}$ = The number of roads with good and moderate conditions to total road length ratio
$MANPOWER_{i,t}$ = The number of labor force included in the working category to total labor force ratio

λ = spatial autocorrelation coefficient
$\rho \sum_{j=1}^{N} W_{ij} Y_{jt}$ = spatial lag component
W = exogenous spatial weights

Furthermore, the convergence rate denoted by v can be obtained by the equation $\mathbf{v=-ln(\beta_0+1)/T}$ where T is the number of years beginning and end of the study period. While, the time it takes to close half of initial gap (*half-life convergence)*, $\boldsymbol{\tau}_{\text{half-life}}$, with the equation $\boldsymbol{\tau}_{\text{half-life}} \mathbf{=-ln2/v}$(Paas et al,2007). In determining the best model for classic panel regression, Chow test and Hausman test are conducted in this research, while Lagrange Multiplier (LM) test are conducted to determine the appropriate model for spatial regression.

3. RESULTS AND DISCUSSIONS

Absolute Beta Convergence Analysis

Based on Chow Test and Hausman Test result, the most appropriate method for absolute beta convergence analysis is fixed effect. The estimation results of the absolute convergence model using the robust fixed effect method are shown in table 1. From the estimation result of beta absolute convergence analysis, the coefficient of initial per capita income (β_0) has negative value equal to -0.560198 ($\beta_0 < 0$). Initial per capita income has negative significant effect to per capita income growth then it means that beta absolute convergence is occurred amongst regencies/municipalities in Java Island with convergence rate of 8.21% and time to eliminate half of initial gap equal to 8.4 years (the smaller growth gap over time so that the economy will move towards the steady state level). Regions with low initial per capita income tend to have high growth while regions with low per capita income tend to have slower per capita growth and thus convergence will be achieved.

Table 1. Absolute beta convergence regression results between districts/cities in Java Island, 2015-2019

Independent Variable	Dependent Variable = $\mathbf{ln}\frac{y_{i,t}}{y_{i,t-1}}$
Intial per capita income ($\boldsymbol{ln\, y_{i,t-1}}$)	-0.560198*** (0.0724217)
Intercept	5.734534*** (0.7341888)
Observations	565
Number of groups	113
R-squared	0.6324
v	8.21%
$\boldsymbol{\tau}_{\text{half-life}}$	8.4 years
Time	16.8 years

Note: *** p<0.01, ** p<0.05, * p<0.1
Source: Stata 17

Conditional Beta Convergence Analysis

Conditional beta convergence is a hypothesis that states the per capita growth of a region not only influenced only by income level but also need to consider other growth factors. The conditional beta convergence model that use classical panel regression (non-spatial) treats a region as closed and isolated economic units, ignoring the influence of spatial dependency. In fact, there is economic and social interaction between regions so that economic activity is not only influenced by factors within the region itself, but also by growth factors from neighboring regions. Based on Chow Test and

Hausman Test result, the most appropriate method for conditional beta convergence analysis is fixed effect.

The estimation results for non-spatial panel regression models and spatial panel regression are presented in Table 2. With fixed effect regression,the convergence coefficient is -0.7148778($\beta_0 < 0$), which means that condtional beta convergence occurred amongst regencies/municipalities in Java Island with convergence rate equal to 12,54%. It can be seen that there is a significant difference in the convergence coefficient between model that do not involve spatial effects and model that consider spatial effects. When spatial influences are included in the model, the convergence coefficient becomes -0.7983241 with convergence rate equal to 16.1% in SAR fixed effect and -0.7264789 with convergence rate approximately 12,94% in SEM fixed effect. It means that convergence analysis that consider several growth factors such as fiscal decentralization, human development index, infrastructure and manpower and include spatial effect can accelerate convergence rate and reduce the time needed to eliminate the gap between poor regions and rich regions.

Table 2. Conditional beta convergence regression results between districts/cities in Java Island, 2015-2019

Variables	Without spatial effect	With spatial effect	
	Fixed effect regression	SAR fixed effect	SEM fixed effect
Intial per capita income ($\boldsymbol{ln\, y_{i.t-1}}$)	-0.7148778*** (0.0276874)	-0.7983241*** (0.0476231)	-0.7264789*** (0.0366618)
Local Generated Revenue	0.1712574** (0.0749225)	0.1932582*** (0.0683782)	0.0347441 (0.0623659)
Balance Funds	0.0555098** (0.0225608)	0.0933464** (0.0224346)	0.0493406 (0.0439967)
Personnel Expenditure	-0.2549104*** (0.673264)	-0.203046*** (0.0596495)	-0.0069685 (0.0470482)
Goods and Services Expenditure	0.002950 (0.958563)	0.0327013 (0.0805247)	0.0165553 (0.0823299)
Capital Expenditure	-0.0737944 (0.0635971)	-0.0018931 (0.0591394)	-0.085819 (0.0527801)
Human Development Index	0.0504819*** (0.0040277)	0.0349297** (0.0040928)	0.0245734 (0.0042586)
Road Infrastructure	-0.0139482 (0.0106302)	-0.0060703 (0.0080506)	-0.0054799 (0.0083843)
Manpower	0.5876963*** (0.1647252)	0.5123667*** (0.1336616)	0.2258427* (0.1368005)
Intercept	5.262207*** (0.3086665)	3.4351272*** (0.0256125)	5.1894305*** (0.01618396)
Observations	565	565	565
Number of groups	113	113	113
R-squared	0.9272	0.9325	0.6321
v	12.54%	16.1%	12.94%
$\boldsymbol{\tau}_{\text{half-life}}$	5.5 years	4.3 years	5.3 years
Time	11 years	8.6 years	10.6 years

Note: *** p<0.01, ** p<0.05, * p<0.1
Source: Stata 17

The estimation results of the SAR fixed effect model show the same direction and significance as the parameter estimation results of the non-spatial panel regression model, but there is a difference in significance in the SEM fixed effect model. To select the best spatial model, the LM test was carried out. Based on the results of the LM test, both SAR and SEM have significant *p-values* (0.000 < 0.005), so that R squared is used to determine which model is best for this study. Based on

the results of the analysis, the R square in the SAR (0.9325) is larger than R-squared in the SEM (0.6321), so the model chosen is Spatial Autoregressive Model (SAR).

When the spatial aspect is ignored, several independent variables in the non-spatial panel regression model have larger coefficients. This is due to the influence of other variables that are not considered (in this case spatial linkages) in the non-spatial panel regression model. However, when the spatial linkage aspect has been controlled for in the SAR and SEM models, the independent variables are free from spatial effect.

Based on the results of the SAR fixed effect estimation, local generated revenue, balance funds, personnel expenditure, human development index, and manpower have a significant effect on per capita growth while capital expenditures, goods and services expenditures, and road infrastructure have no significant effect on per capita income growth. Local generated revenue and balance funds are able to contribute positively to growth in per capita income and accelerate convergence through their role as a source of government funds to carry out work programs to create people's welfare. Personnel expenditure has negative significant effect on per capita income growth because it is included in the category of consumptive expenditure, where if the portion is too large it will burden the local government budget (APBD) and erode the portion of productive expenditure. Capital expenditure has no significant effect on this study because the portion of capital expenditure is quite low and the research period is limited so that the impact has not been seen significantly. Human Development Index and manpower have the important role to per capita income growth. The higher the quality of human resources, the more qualified, competitive and innovative the goods and services produced so that this becomes one of the strategies in increasing per capita income. From manpower side, an increase in the labor force that is included in the working category will increase output and stimulate economic activity in the region so that it will have an impact on increasing per capita income growth, as presented in Table 3

Spatial Autocorrelation Analysis on Per capita Income Growth

The results of Moran's I test show that there is a spatial autocorrelation in the growth of income per capita, as presented in Table 3. Therefore, based on the global spatial autocorrelation test, per capita income growth in a region will provide a positive spillover (spread effect greater than the backwash effect) on per capita income growth in surrounding areas. This finding is in line with Yudistira & Sohibien (2020), Vidyattama (2014) and Dekiawan (2014).

Table 3. Results of Moran's I Test on the growth of income per capita at the Regency/City level in Java Island for the 2015-2019 period

Moran's I	**E(I)**	***Z-score***	***p-value***
0,8428	-0,9915	8,749	0,000***

Note: *** p<0.01, ** p<0.05, * p<0.1
Source: Stata 17

If global spatial autocorrelation can be explained by Moran's I, locally spatial autocorrelation is explained by Local Indicator of Spatial Association (LISA) analysis. The following is the result of LISA analysis on income per capita growth amongst regencies/municipalities in Java Island for 2015-2019 period.

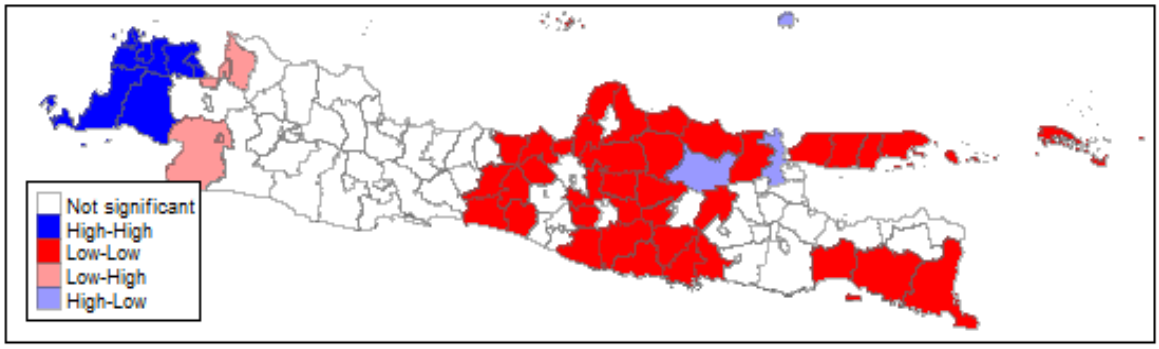


Figure 4. LISA Cluster Map 2015-2019
Source: Stata 17

In 2015-2019, LISA Cluster Map shows that the growth of income per capita amongst regencies/municipalities in Java Island has a pattern of clustering areas with the same characteristics. There are several regenciess/municipalities in Java that are statistically significant as shown in Figure 4. Regions belonging to the High-High quadrant (areas with high per capita income growth surrounded by areas with high per capita income growth) tend to be clustered and dominated by regencies/cities located in Banten Province or the western part of Java Island, such as Cilegon, Serang, Tangerang, South Tangerang, Lebak and Pandeglang, while areas that fall into the Low-Low category (areas with low per capita income growth surrounded by areas with low per capita income growth)) have a tendency to cluster in regencies/cities in the Madura region, such as Sampang, Bangkalan, Sumenep and Pamekasan, suburban areas of Central Java such as Kebumen, Purworej, Pati, Jepara and suburban areas of East Java such as Jember, Lumajang, Tuban, Trenggalek and Pacitan.

This is in line with the concept of core and periphery in the theory of New Economic Geography where regions with low per capita income growth tend to be in the periphery. An area with low per capita income growth that is also surrounded by areas with low per capita income growth has a low opportunity to transfer technology with its neighboring regions.

Regions included in the Low-High quadrant (areas with low per capita income growth surrounded by areas with high per capita income growth) are Depok City, Bekasi Regency, Bekasi City, Sukabumi City and Sukabumi Regency, while areas included in the High-Low quadrant, including Gresik and Bojonegoro.

Through the LISA Cluster Map, it can be indicated that Gresik gives backwash effect on its neighboring regions, where regions that are neighbors with Gresik have low per capita income growth. The existence of a negative spillover effect given by Gresik to the surrounding area occurs because of very strong agglomeration in Gresik Regency, so that resources in neighboring areas are absorbed into Gresik. Regencies/municipalities Minimum Wage (UMK) for Gresik in 2019 was the highest UMK compared to the UMK in the surrounding districts/cities. This has led to the depletion of hinterland resources (labor) by regions that are centers of growth, namely Gresik. There is a tendency for people to approach these potential areas resulting in increased disparities between regions.

Same with Gresik, Bojonegoro is also included in the High-Low category. Bojonegoro is one of the richest regency in Indonesia in terms of oil and gas. As a producing area, Bojonegoro Regency receives a very large natural resource revenue sharing fund (DBH SDA), while other regions in the vicinity receive a low revenue sharing fund. Thus, the amount of balancing funds from natural resource revenue-sharing funds received by Bojonegoro only affects its own region and does not really affect the surrounding areas.

Based on the current revenue sharing funds allocation regulations, other surrounding areas that are affected by natural resource exploration from producing areas but not in the same province, do not receive any distribution of Revenue Sharing Funds at all. This happened to oil exploration by

Exxon Mobile Cepu, Ltd which controls the Cepu block in Bojonegoro. The working area of the Cepu Block consists of the Bojonegoro and Blora, small part Tuban, while the location point for the oil exploration is in the Banyu Urip Field, Bojonegoro Regency. With the allocation policy for the revenue sharing funds for the results of oil mining, Blora and Central Java Province did not receive any funds for the results of oil mining from Exxon Mobille Cepu, Ltd. Eventhough the area is directly adjacent to Bojonegoro and get negative externalities from the oil exploration work area in the Cepu Block, such as road infrastructure in the area which is often badly damaged due to the frequent passage of vehicles carrying heavy equipment for drilling.

4. CONCLUSIONS

This chapter contains the conclusions of the paper and may include policy recommendations and suggestions. Conclusion presents from the description on the discussion. Conclusion is presented in essay form, not numerical. Suggestions are arranged based on conclusions and refer to practical actions, and further research.

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