



New Economic Geography Model Application to Indonesian Regencies and Cities 2016–2019

Recky H. E. Sendouw¹, Apeles Lexi Lonto², Nismawati³, Cahyadi Nugroho², V. P. Rantung⁴

¹ Public Administration Study Program, Faculty of Social Sciences and Law, Manado State University, Manado, Indonesia

² Civic Education Study Program, Faculty of Social Sciences and Law, Manado State University, Manado, Indonesia

³ Sociology Education Study Program, Faculty of Social Sciences and Law, Manado State University, Manado, Indonesia

⁴ Information Technology Study Program, Faculty of Engineering, Manado State University, Manado, Indonesia

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Abstract:

To encourage economic growth to reduce the gap between provinces, the Indonesian government has implemented a decentralization policy implemented since 2001. Decentralization in Indonesia has been carried out until 2019 and has changed the country's economic order. Researchers suspect that the development of the policy will impact the gap in the level of welfare between regencies and provinces in Indonesia. Armstrong and Taylor (2000) argued that the gap in the level of welfare between provinces should get important attention because this phenomenon will cause dissatisfaction, disappointment, and even resistance from people living in poor areas. This study implements the NEG framework model in dealing with regional disparities in Indonesia at the regencies and city levels, consisting of 514 regions. By use of quantitative method, the analysis used panel data regression analysis. The data analyzed are GRP per capita as the dependent variable and the independent variables are Domestic Market Access, Foreign Market Access, Urbanization, and Human Capital in 2016–2019. The novelty of this work is the first attempt to discuss the NEG model using panel data from all regencies and cities in Indonesia from 2016–2019. The application of the New Economic Geography Model framework in responding to the GRP gap per capita at the regency and city levels in Indonesia shows that the role of Domestic Market Access, Foreign Market Access, and Urbanization has a substantive impact on the GRP per capita gap between regencies and cities in Indonesia.

Keywords: new economic geography, disparities, regions, regencies, cities, Indonesia.

将新经济地理模型应用于印度尼西亚县市，2016–2019

摘要：

为鼓励经济增长以缩小省际差距，印尼政府自 2001 年开始实施分权政策。印尼的分权一直进行到 2019 年，改变了该国的经济秩序。研究人员怀疑，该政策的制定将影响印度尼西亚各省和省之间福利水平的差距。阿姆斯特朗和泰勒（2000）认为，省际福利水平的差距应该引起重视，因为这种现象会引起贫困地区民众的不满、失望甚至抵制。本研究采用新经济地理框架模型处理印度尼西亚在县级和城市级的区域差异，该模型由 514 个区域组成。采用定量方法，分析采用面板数据回归分析。分析的数据是人均地区生产总值作为因变量，自变量是 2016–2019 年的国内市场准入、国外市场准入、城市化和人力资本。这项工作的新颖之处在于首次尝试使用 2016–2019 年印度尼西亚所有地区和城市的面板数据来讨论新经济地理模型。新经济地理模型框架在应对印尼县级和市级人均地区生产总值差距中的应用表明，国内市场准入、国外市场准入和城市化的作用对人均地区生产总值差距具有实质性影响 印度尼西亚的地区和城市之间。

关键词：新经济地理、差异、地区、地区、城市、印度尼西亚。

1. Introduction

The trend of the GRP per capita gap between provinces in Indonesia several decades ago starting from 1975 to 1993 tends decrease and continued until 1997 (Garcia & Soelistianingsih, 1998). However, in 1998, the trend of inequality was the opposite. Based on previous research (Nakamura & Sendouw, 2009), from 1975 to 1993, the trend of decreasing disparity between provinces was due to the strategy used by the government under Suharto (1967–1998) during the New Order era, it was said to be quite successful with the National Development Trilogy strategy, which was implemented for five years called REPELITA (Five-Year Development Plan) and the trend of returning experienced an increase after the Suharto leadership period, namely in 1998–2004. Of course, this appears to erase the development achievements achieved during the New Order era. To encourage economic growth to reduce the gap between provinces, the Indonesian government has implemented a decentralization policy implemented since 2001.

The decentralization policy in Indonesia in 2019 has given birth to 548 autonomous regions consisting of 416 regencies, 98 cities, and 34 provinces. The change in the government system to decentralization has changed the regional order in various provinces in Indonesia. Changes in the government system, according to Armstrong & Taylor (2000) affect the gap in the level of community welfare between regions. Researchers suspect that the development of the policy will impact the gap in the level of welfare between regencies and provinces in Indonesia. Armstrong and Taylor (2000) argued that the gap in the level of welfare between provinces should get important attention because this phenomenon will cause dissatisfaction, disappointment, and even resistance from people living in poor areas. An empirical study by Eko in Haboddin

(2017) states that the expansion areas have become pockets of poverty with very low levels of public services and several regions in Indonesia are not divided into new regions and are naturally poor due to economic backwardness, poor infrastructure, and there are allegations of negative findings in the new autonomous regions, namely, misappropriation of the development budget. The inequality in the welfare index that occurs between regions is a portrait of the welfare of the Indonesians. In 2012 the welfare index of Java-Bali Island reached 69.4 and 12.8 points, the difference is above the average of the six provinces in eastern Indonesia because the role of Java-Bali is very dominant in the national economy compared to the islands of Sumatra, Sulawesi, Kalimantan, Maluku, and Papua.

The problems that arise because of the disparity policy in terms of economics foster two opposing sides in their influence on the level of inter-provincial community welfare. The neoclassical school, which is the theory of public choice, has the opinion that the efficiency of resource allocation through better meeting the needs and preferences of local residents will increase due to decentralization. This efficiency advantage is supported by the mobility of the population who can choose to live in the area according to personal preferences (Oates, 1972). However, the Keynesian school of thought (Canaleta et al., 2004) believes that decentralization will reduce the capacity of the central government to use policies to reduce the effects of fluctuations in production and employment. Apparently, the greater the occurrence of decentralization, the lower the efficiency in determining macroeconomic goals, the increased the opportunity for diffusion in the use of policy instruments, and reduce the level of coordination between regions, Both of these views have certainly been proven by the results of

research that has been published in various places around the world and this view can claim that the theory they hold is true.

Several findings related to the gap in the level of welfare in various countries around the world suggest that in America, which is the largest democracy, three region-specific factors encourage economic growth, including capital, labor, and political factors (Okabe & Kam, 2017). From the perspective of regional disparities in China (Wang et al., 2021), urbanization has no relationship with economic growth in the central or western regions of China. At the provincial scale, researchers (Nakamura & Sendouw, 2009) have examined the market potential and regional differences in per capita GRP between provinces in Indonesia. We find that domestic market access, foreign market access, and human resources are central to the dynamics of the GRP per capita gap between provinces, while urbanization is the opposite due to excess labor.

Until now, there was no policy to address the gap in the level of community disparity between regencies and cities within a province. This triggers researchers to further explore which view is more appropriate to overcome the phenomena that occur in Indonesia so that this research becomes an important issue. This is because without knowing which view is appropriate to overcome the phenomenon of disparity in public welfare between provinces in Indonesia, it will be difficult for the government to formulate public policies. Nakamura and Sendouw (2009) explain that the trend of increasing disparity cannot be described well by neoclassical theory because it assumes that the constant returns to scale. With these assumptions, the New Economic Geography (NEG) model is considered able to better improve the phenomenon of increasing inequality. This theory modifies the neoclassical approach to trade and factor movement by allowing economies of scale to model agglomeration forces (Felbermayr et al., 2015). New Economic Geography (NEG) can provide a clear picture and is a fairly broad approach to explain large-scale spatial imbalances that can arise because of the process of increasing economic integration (Gaspar, 2020). Authors of this study will use data at the regency and city levels in Indonesia (514 regencies/cities) to get an overview of disparity trends, examine the influence of the factors that are assumed to be the root cause of the gap between regencies and cities in Indonesia and formulate policies that can be taken to reduce the gap between regencies and cities. Through this further research, it is hoped that it can be implemented for policymakers in reducing the gap in welfare levels between regencies and cities.

2. Literature Review

In economic geography, the main scope is the study of the migration flows of economic agents across geographic landscapes. Theorists such as Francois Perroux, Nigel Harris, and Gunnar Myrdal had

recognized that the scale of the economy is largely determined by the location of economic activity. This knowledge is not supported by a simple balanced model so it awaits development through contributions (Krugman, 1991a) and (Krugman, 1991b). However, the seeds of the NEG have been discovered (Krugman, 1979) where migration can be analyzed within the same framework as the New Trade Theory (NTT). Although economic geography was introduced in the early nineteenth century by Von Thunen, most economists pay little attention to the importance of spatial aspects, with the main reason being technical irregularities (Fujita et al., 1999). Then, Dixit & Stiglitz (1977) developed a model of monopolistic competition, which has become a bridge to deal with this idea which was explored in several articles by Krugman which were developed related to New Trade Theory and then New Economic Geography.

The NEG, which adopted the New Trade Theory framework, was first introduced by Krugman (1991a). Regional scientists were attracted to Krugman's article on the NEG model so it has now grown into a mature body of economic literature (Ottaviano & Pinelli, 2006). The NEG model takes the home market effect as the focus and uses it as a basis for explaining geographic groupings and agglomerations. These models are no longer considered the market as given. The process of cumulative causality will make regions with larger market sizes grow faster than smaller ones. Once a region gets a start and manufacturers start to cluster, they will enjoy the domestic market effect. This process will attract more workers to migrate to work in this region. This will stimulate the domestic market effect further and attract more companies to set up in the region (Fujita et al., 1999). Several empirical applications of New Economic Geography (NEG) in international and inter-regional scope. For example, Redding & Venables (2004) applied the theory of New Economic Geography (NEG) with data in various countries, Head & Mayer (2006) have also taken and applied it in all European Union countries, Ottaviano & Pinelli (2006) who took it and used it between regions within the scope of a country. Space and competition are two important building blocks in Tönu Puu's academic work. The NEG, spearheaded by Paul Krugman, brings space back into the focus of economic analysis, albeit in a separate form and does not continue to expand in two dimensions, as Tönu Puu has always advocated. This paradigm also rests on a certain market structure, which is modeled as Dixit-Stiglitz monopolistic competition with horizontally differentiated commodities.

3. Research Method

In this study, the data used are Regency and City data. The empirical analysis was conducted on the basis of panel data analysis from 2016 to 2019. Data were collected through the Indonesian Central Bureau of

Statistics (Badan Pusat Statistik, BPS) and the Central Bank of the Republic of Indonesia (Bank Indonesia, BI). In this study, we used real per capita GRP instead of wages. The GRP per capita differs from the wage per worker because the GRP includes the company's income. However, because data are not available, we apply the GRP per capita as a proxy for wages per worker. The same approach was also adopted by Redding & Venables (2004) and Ottaviano & Pinelli (2006). For the same reason as in Finland (Ottaviano & Pinelli, 2006), at the regional level, it is difficult to separate the effects of market access and supply access between regions. So we use the joint measures of market access and supply access in our estimates. However, unlike (Ottaviano Pinelli, 2006) that only investigates domestic market access, in this study, we try including foreign market access as well. Thus, the variables of domestic and foreign market access are defined as follows.

Domestic Market Access Variable (DMA) is calculated as the total GRP of region j divided by the distance (D) between regions i and j , so $DMA_i = \log(\sum_{j \neq i} \frac{GRP_j}{D_{ij}})$. To be precise, this measure in the traditional geographic literature is called market potential (Redding & Venables, 2004). This approach is called nominal market access (Head & Mayer, 2006) that resembles, for example, Au & Henderson (2006) applied at the level of Chinese cities. In line with the theory, we hypothesize that this variable will positively affect the GRP per capita. Foreign market access (FMA) is the sum of exports and imports from each region. It is therefore defined as $FMA_i = \log(\text{export}_i + \text{import}_i)$. In this measure, we use the actual value of foreign trade instead of potential data. Head and Mayer (2006) extend the NEG model as it relates to productivity and trade. They explain the difference in wages through market potential, which is an index of the company's export possibilities in a region or country. Frankle and Romer (1999); Alcalá & Ciccone (2004) investigated the relationship between per capita income and its growth with trade openness defined as the number of exports and imports of PDB. Due of the unavailability of disaggregated trade data between regions and countries, it is assumed that the trade is carried out between each region and one export-import partner country. Overseas market access is hypothesized to positively affect growth.

In Indonesia, there is a large pool of labor in rural areas (Sjoberg & Sjöholm, 2004). It also appears in the Indonesian statistical yearbook that the agricultural sector has the highest share of labor compared to other sectors, which is around 40 percent (BPS, 2004) and is evenly distributed throughout the region. Workers leave the agricultural sector and move to urban areas, we try capturing the effects of urbanization, using the share of the non-agricultural workforce to the total population in each region and enter the non-agricultural sector

(urbanization). This process has resulted in urban agglomeration. Urbanization is hypothesized to positively affect the per capita GRP. Several other agglomeration factors are not explained by the NEG theory (Amiti & Cameron, 2007; Head & Mayer, 2006). In estimation, we consider human capital as a control variable as done by (Head & Mayer, 2006). Some industries require certain educational skills or qualifications. Thus, they will tend to establish companies in areas that have an abundant quality workforce. That is the reason for including the human capital variable in the model. Data on the educational attainment of the workforce are not available at the local level. So we use the number of students enrolled in the school in the first year as a proxy for human resources. The reason for using initial grades is that in the following year, students will graduate and enter the labor market. This can increase the human resources in the region.

Theoretically, areas with abundant human resources attract companies. This results in an agglomeration economy and then results in disparities between regions. Due to Indonesia's nine-year compulsory education system, most regional variations involve senior secondary schools and universities. We define the human capital variable as the log of the number of students enrolled in high school and university in the first year. Students who graduate from high school and college are expected to have better skills than workers who do not graduate from high school and others. Thus, it is hoped that this variable will have a positive effect on GRP per capita. Therefore, in applying the New Economic Geography (NEG) model as a policy to reduce economic disparities between regencies/cities in Indonesia, GRP per capita regencies/cities are used as the dependent variable, and Domestic Market Access, Foreign Market Access, Urban Population and Human Capital as independent variables. Based on this explanation, the NEG model can be formulated below.

$$y_{it} = \alpha_1 + \alpha_2 DMA_{it-1} + \alpha_3 FMA_{it-1} + \alpha_4 UP_{it-1} + \alpha_5 HC_{i0} + \varepsilon_{it} \quad (1)$$

where i refers to the regency/city, t - the time, y_{it} - log of per capita GRP at t ; DMA_{it-1} - log of domestic market access at $t-1$; FMA_{it-1} - log of foreign market access at $t-1$; UP_{it-1} - an urban population at $t-1$; HC_{i0} - log human capital at the initial year; ε_{it} - error term.

Based on this theory, the regency/city GRP per capita data used are 2016–2019 data, Domestic Market Access data, Foreign Market Access, and Urban Population use year $t-1$ data, namely, 2016–2018, and for Human Capital data use initial year data, namely, data in 2016. These data are data collected and categorized based on 514 regencies/cities. The New Economic Geography (NEG) model was analyzed using panel data regression analysis using Eviews 12 software.

Panel data regression is performed because the data obtained are cross-section data and time series data. The advantage of this analysis according to Widarjono

(2007) is that it can provide more data to produce a greater degree of freedom. Additionally, this analysis can overcome problems that arise when there is a problem with committed variables. Panel data regression analysis can be used to minimize the bias that may arise from the aggregation of individual data so that the implication does not have to do the classical assumption test (Gujarati & Porter, 2009).

4. Result and Discussion

In this section, we try first describing the GRP per capita of regencies and cities in Indonesia in the form of a graphic map and then further elaborate on the application of the New Economic Geography model to obtain the right policy model to use in addressing the

gap in welfare levels between regencies and cities in Indonesia. Previous research (Nakamura & Sendouw, 2009) has applied the NEG Model in Indonesia at the provincial level. The results show that market access leads to differences in GRP per capita and further increases disparities between provinces. This study supports the results of previous research (Amiti & Cameron, 2007) that found that being closer to the market and access to supply led to wage disparities in Indonesia.

Before leading to the application of the NEG model, the researchers will describe the comparison of GRP per capita between regencies and cities in Indonesia in 2016 – 2019 which can be seen in Figure 1.

GRP Per Capita of Regencies and Cities in Indonesia, 2016



Figure 1. GRP Per capita of regencies and cities in Indonesia in 2016 and 2019

Figure 1 describes the comparison of GRP per capita of regencies and cities in Indonesia in 2016 and 2019. It can be seen that regencies and cities that had a GRP per capita above the average in 2016 amounted to 8.56% or 44 regencies and cities, while the GRP per capita below the average amounted to 91.44% or 470 regencies and cities. In 2019, the GRP per capita of regencies and cities that were above the average fell to 7.39% or 38 regencies and cities, while the GRP per capita below the average rose to 92.61% or 476 regencies and cities. The comparison of GRP per capita during 2016–2019 indicates that decentralization in Indonesia has not been able to properly trigger economic growth in all regencies and cities in Indonesia. This cannot be concluded quickly because several regions in Indonesia have just experienced expansion, so many regencies and cities experience dynamics in their GRP per capita. Of course, population growth factors affect regional

economic growth in regencies and cities in Indonesia. Seen on the islands of Sumatra, Kalimantan, Sulawesi Island, Papua Island, and small parts of Java, Bali, and Nusa Tenggara, which are green, the GRP per capita is above the average. The results of a previous study (Sendouw et al., 2022) found that through neoclassical growth theory or convergence theory, at the regency and city levels in Indonesia, inequality is getting better with decreasing graph analysis results. The distribution of regency and city GRP is generally evenly distributed and disparities can be reduced, but for a long time.

In applying the NEG model with panel data regression analysis, the estimated of this model is to perform a GRP per capita regression with domestic market access, foreign market access, urbanization, and human capital. The results of the application of the NEG model can be seen in Table 1.

Table 1. Regression analysis model for regency and city NEG panel data in Indonesia 2016–2019

Variable	Per Capita GRP			
	Regression Result			
	Coefficient	t-statistics	Coefficient	t-statistics
Constant	-2.747084	-8.871456	-2.760242	-8.884751
Domestic Market Access	0.573985	4.200333	0.582871	4.248990
Foreign Market Access	0.066593	12.01902	0.052892	8.394943
Urbanization	0.231071	2.570228	0.133177	1.365222
Human Capital	-0.001173	-0.075337	-0.002164	-0.136488
# of Obs. (Balanced)	514		514	
R ²	0.231263		0.881308	
Estimation	Panel (Random Effects)		Panel (Fixed Effect)	
Chow Test	P < 0.05 (Fixed Effect Model)			
Haussman Test	P < 0.05 (Fixed Effect Model)			

If described based on Table 1, the panel data regression model obtained is the Fixed Effect Model. This model is obtained from the Chow and Hausman tests by looking at the probability (P) value. The results of the Chow test showed that the P value < 0.05, so from the test results it can be verified that the correct model to use is the Fixed Effect Model. Likewise, the Hausman test shows a P value < 0.05 and from the results of the two tests, it is concluded that the Fixed Effect Model based on the NEG theory can be applied in policies to address the GRP gap per capita between regencies and cities in Indonesia. Overall, the factors of DMA, FMA, Urbanization, and Human Capital have a significant influence on the GRP per capita of regencies and cities in Indonesia. We have also previously investigated the factors that influence regional disparities using the post-decentralization NEG framework using three variables, namely DMA, FMA, and Urbanization, using data from the Central Statistics Agency for 2014 – 2018 at the provincial level (Sendouw et al., 2022). Currently, the research results obtained are more complex because they are at the regency and city levels. These results show that the role of Domestic Market Access, Foreign Market Access, and Urbanization has a critical impact on the GRP per capita gap between regencies and cities in Indonesia.

5. Conclusion

This is the first article to discuss the NEG model using panel data from all regencies and cities in Indonesia from 2016–2019. The main findings of this study are the application of the New Economic Geography Model framework in responding to the GRP gap per capita at the regency and city levels in Indonesia shows that the role of Domestic Market Access, Foreign Market Access, and Urbanization has a substantive impact on the GRP per capita gap between regencies and cities in Indonesia. The New Economic Geography theory suggests that two mutually supportive regions can show different results per capita income when agglomeration occurs in one of these regions. Compared to other studies, this findings in line with what has been done by Lovely et al. (2019) that the role of market access will affect the inequality of per capita income between regions. This is also supported

by Karlsson Westlund (2019) who considers the location of economic activity to also depend on resources and social capital. The implications of these findings in the case of Indonesia, the New Economic Geography model has illustrated that the role of the domestic market, foreign market, and urbanization is the key to the disparity of per capita income between regencies and cities in Indonesia. The strength of this study, as far as our known, this is the first study that uses regency and city-level data for the analysis. The limitation of this study is that the time span 2016–2019 is relatively short. For the future study, we will try collecting longer time span data and compare the results with this study.

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