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The Tendency of Economic Convergence Among Regions in Banten Province

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ABSTRACT

Banten Province, as one of the developing regions on the island of Java, is expected to be the main driver for economic growth in other provinces. However, even though Banten's economy is showing good performance, income distribution in its various regions is still uneven. This inequality is shown by the Williamson Index which shows significant inequality. However, there is hope that underdeveloped regions can catch up with the progress of more developed regions, so that the income gap between regions can be reduced, which is known as economic convergence. This research aims to explore whether economic convergence is occurring in Banten Province and analyze the factors that influence economic growth that can encourage convergence, using the panel data regression method. The research results show signs of economic convergence in Banten, with variables such as the number of poor people, the Human Development Index (HDI), and the open unemployment rate playing an important role in this process.

1. Introduction

It is important to understand that development has many dimensions. Apart from focusing on high economic growth, development policies must also aim to reduce poverty, unemployment and disparities between regions. Each region must strive to achieve balanced economic growth and improve income distribution so that disparities between regions can be minimized.

Banten Province has an important role in the national economy, marked by a GRDP of IDR 487.67 trillion in 2022. Even though it has high economic growth, income distribution between districts/cities is still uneven. This income inequality is a serious problem in development in Banten Province, even though the Williamson Index value shows a decreasing trend every year.

The high income inequality between districts/cities in Banten Province is caused by several factors, one of which is the significant concentration of economic activity in Tangerang City. However, economic convergence theory suggests that economically lagging regions have the potential to grow faster and catch up with more developed regions, thereby reducing inequality between regions.

Initially, signs of economic convergence could be seen from the fact that regions that were lagging behind tended to experience more rapid economic growth compared to more advanced regions. For example, although Serang Regency's GDP per capita is lower than Tangerang City, its economic growth rate is higher. This shows the potential for economic convergence in Banten Province.

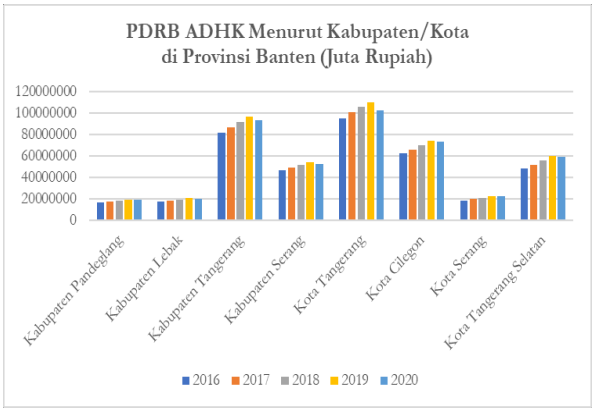

Figure 1.

GRDP by Regency/City in Banten Province, 2016-2021 (Million IDR)

Source: BPS Banten Province

Differences in economic growth and development between regions can cause greater income inequality. However, with initial indications of economic convergence in Banten Province, there is an opportunity to reduce this inequality. The phenomenon of economic convergence in Banten Province needs further research.

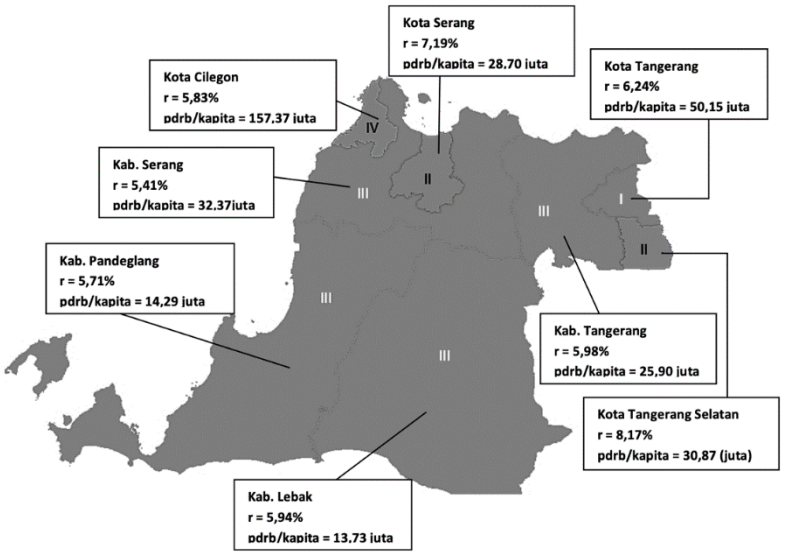

Figure 2.

Regency/City Klassen Typology in Banten Province 2010-2016.

Source: BPS Banten Province,

Convergence occurs when regions with lower incomes are able to experience faster growth than regions with higher incomes, so that in the end income levels between regions tend to approach equality (Firdaus & Yusop, 2009). This economic convergence can be achieved directly without conditions (absolute convergence), or requires additional factors to achieve it (conditional convergence).

However, differences in characteristics between regions often make absolute convergence difficult to achieve (Pebriani & Sukadana, 2010). Research by Gömleksiz, (2017) also shows that conditional convergence is more realistic to realize because it involves the role of other variables, including government policy.

Conditional economic convergence analysis generally focuses on identifying variables that influence economic growth. The aim is for underdeveloped regions to pay more attention to these variables in formulating development policies, so that they can accelerate growth and catch up. According to Okun's Law, there is a negative relationship between the unemployment rate and economic growth (Mankiw, 2012).

To see whether income between districts/cities in Banten Province tends to become more equal or more unequal, further

analysis is needed that examines economic convergence conditionally through a panel data regression approach. In this analysis, the control variables used include the Human Development Index (HDI), the open unemployment rate, and the number of poor people. These variables help determine whether there is a trend of economic convergence in Banten Province.

2. Method

This research focuses on the time period 2012 to 2022 and involves 8 districts/cities in Banten Province. The selection of this period was based on its ability to describe the current economic conditions of Banten Province, including regional expansion that occurred before 2012. The data used in this research is secondary data obtained from various sources, namely:

1. Data on real GRDP per capita and economic growth come from the Subdirectorate of Consolidated Regional Statistical Accounts, BPS.
2. Data on the number of poor people was obtained from the Subdirectorate of Regional Financial Statistics, BPS.
3. Human development index (HDI) data was obtained from the Human Development Index publication, BPS.
4. Open unemployment rate (TPT) data was obtained from the Subdirectorate of Employment Statistics, BPS.

In this research, the type of analysis used is inferential analysis. Inferential analysis uses panel data regression methods using software Eviews 9.0. The data used is panel data which combines

time series data from 2012 to 2022 and data cross section from 8 districts/cities in Banten Province. Panel data has the advantage of accommodating serial correlation, heterogeneity between individuals, and increasing degrees of freedom to increase the precision of estimates. Panel data regression analysis is used to analyze data dynamics and measure effects that cannot be captured by the data cross section or pure time series.

Panel Data Regression Method

When estimating using the panel data regression method, there are three models that can be used, including (Baltagi, 2005):

1. ***Common Effects Model (CEM)***

The Common Effects Model (CEM), also known as Pooled Least Squares (PLS), is the simplest panel data model. In this approach, CEM assumes no individual or time-specific effects, meaning it disregards variations across entities (cross-section) and over time. Consequently, the model presumes uniform behavior across all individuals over different periods.

The main characteristic of CEM is that the intercept value (α\alphaα) is assumed to be identical for all cross-sectional units. This approach is suitable when the panel data exhibits high homogeneity across individuals and time. However, if significant heterogeneity exists, the model may produce biased and inefficient estimates.

CEM is often used as a baseline or preliminary model in panel data analysis, before deciding whether the Fixed Effects Model (FEM) or the Random Effects Model (REM) better fits the data. While it is

computationally efficient due to its simplicity, the model's primary limitation is its inability to account for individual-specific or time-specific variations, potentially leading to the omission of crucial information.

Regression Equation in CEM

The regression equation for the Common Effects Model is represented as (Widarjono, 2007 in Melliana & Zain, 2013).:

$$Yit = \alpha + \beta X'it + \varepsilon it$$

Because the model does not account for individual (iii) or temporal (ttt) variations, it is essential to perform preliminary tests, such as the Lagrange Multiplier (LM) Test, to determine whether the Random Effects Model (REM) is more appropriate than CEM.

Advantages and Disadvantages of CEM

Advantages:

- Simple and easy to implement.
- Requires fewer assumptions compared to more complex models.
- Suitable for datasets with high homogeneity across individuals and time.

Disadvantages:

- Ignores heterogeneity across individuals or time, making it less flexible.
- Unsuitable for panel data with significant variation.
- May produce biased and inefficient estimates if the homogeneity assumption is violated.

Applications of CEM

CEM is commonly applied when the dataset does not exhibit significant individual or temporal effects. It is often used in situations where pooling the data (ignoring individual and time differences) provides sufficient explanatory power for the research question. Examples include early-stage exploratory analysis or contexts with limited observations.

2. *Fixed Effects Model (FEM)*

The Fixed Effects Model (FEM) is one of the primary approaches in panel data analysis. FEM assumes that differences between individuals exist and can be captured by allowing each individual to have its own intercept. These differences are treated as fixed and constant over time for each entity (time-invariant). This is particularly useful when individual-specific characteristics that are unobservable or omitted from the model are correlated with the independent variables. The FEM regression equation is written as follows:

$$Yit = \alpha i + X'it\beta + \varepsilon it$$

The index i on the intercept (αi) shows that each individual has a different intercept, but the individual intercept remains the same over time (time invariant). The FEM approach is more often used if there is a correlation between the independent variable (Xit) and individual characteristics (αi).

Advantages and Disadvantages of FEM

Advantages:

- Controls for Omitted Variable Bias: By accounting for individual-specific effects, FEM controls for unobservable characteristics that could bias the estimates.
- Handles Correlation: Appropriate when independent variables are correlated with individual-specific effects.
- Focus on Within-Individual Variation: Highlights how changes within individuals over time affect the dependent variable.

Disadvantages:

- Loss of Time-Invariant Variables: FEM cannot estimate the effects of variables that do not vary over time.
- Inefficiency with Homogeneous Data: If individual effects (αi\alpha_iαi) are not significantly different, FEM may not be appropriate, leading to inefficiency.
- Large Number of Parameters: For datasets with many individuals, FEM requires estimating a large number of individual intercepts, which may reduce model parsimony.

Applications of FEM

FEM is widely used in scenarios where individual-specific heterogeneity is critical, and unobservable factors vary between individuals but remain constant over time. Common applications include:

- Economics: Examining the impact of policies or economic shocks on individuals or firms.
- Social Sciences: Studying changes in behavior or outcomes within specific groups.

- Education: Analyzing student performance across schools with unique characteristics.

3. *Random Effects Model (REM)*

REM accommodates differences in individual characteristics into model error. This model is also known as error component model (ECM). The REM regression equation can be written in two forms:

$$Yit = \alpha + X'it\beta + (\varepsilon it + ui)$$

atau

$$Yit = \alpha + X'it\beta + wit$$

In selecting the most appropriate model, two tests that are commonly carried out are the Chow test and the Hausman test:

1. Uji Chow

The Chow test is used to compare the suitability between the Fixed Effects Model (FEM) and the Common Effects Model (CEM). Chow's test hypothesis is:

H0: CEM is more suitable than FEM

H1: FEM is more suitable than CEM

If the F statistical value is greater than the critical value of F and the p-value is smaller than the significance level (α), then there is sufficient evidence to reject the null hypothesis. In other words, FEM is more suitable than CEM.

2. Uji Hausman

The Hausman test is used to compare the suitability between the Fixed Effects Model (FEM) and the Random Effects Model (REM). Hausman's test hypothesis is:

H0: REM is more suitables than FEM

H1: FEM is more suitables than REM

If the Hausman test statistical value is greater than the critical chi-square value and the p-value is smaller than the significance level (α), then there is sufficient evidence to reject the null hypothesis. In other words, FEM is more suitable than REM.

In evaluating a regression model, there are several criteria to consider:

1. Coefficient of Determination (R-squared)

The coefficient of determination is used to assess how well the regression line fits the data. The R-squared value ranges from 0 to 1. The closer it is to 1, the better the model is at explaining variations in the dependent variable and the independent variable. However, the R-squared value can be influenced by adding independent variables, so adjusted R-squared is also used to take into account the effect of adding independent variables.

2. Pengujian Koefisien Regresi Secara Simultan (Uji F)

The F test is carried out to test whether the independent variables together have a significant influence on the dependent variable. Hypothesis used:

H0: There is no significant simultaneous influence of the independent variable on the dependent variable.

H1: There is at least one independent variable that has a significant influence simultaneously on the dependent variable.

The null hypothesis is rejected if the F statistic value is greater than the critical value of F.

3. Partial Regression Coefficient Testing (t Test)

The t test was carried out to test the significance of individual (partial) regression coefficients. Hypothesis used:

H0: There is no significant influence of the independent variable on the partially dependent variable.

H1: There is a significant influence of the independent variable on the partially dependent variable.

The null hypothesis is rejected if the t-statistic value is greater than the critical value of t.

The research model used is a logarithmic regression model as follows:

$$Ln(y_{i,t} / y_{i,t-1}) = \alpha + \theta ln(y_{i,t-1}) + \beta_1 ln(PM_{i,t}) + \beta_3 ln(IPM_{i,t}) + \beta_4 TPT_{i,t} + \varepsilon_{i,t}$$

In that Model:

- $y_{i,t}$ is the per capita income of the i-th district/city in the t-th year,
- $y_{i,t-1}$ is the per capita income of the i-th district/city in the t-1 year,
- $PM_{i,t}$ is the number of poor people in the i-th district/city in the t-th year,

- IPMi,t is the human development index of the i-th district/city in the t-th year,
- TPTi,t is the open unemployment rate of the i-th district/city in the t-th year,
- α is the intercept,
- θ is the convergence coefficient,
- εi,t is the residual,
- i are districts and cities in Banten Province,
- t is 2012, ..., 2022.

Convergence rate (θ) is an important parameter in this model. According to Kharisma and Saleh (2013), convergence occurs when the coefficient $\theta < 1$ and is significant at a certain α level. The level of convergence is expressed by $\ln(\theta+1)$, which describes how much inequality can be covered in a certain time period (Kharisma & S, 2013).

The formula for calculating the time needed to close half of the initial gap (half-life of convergence) is $H = \ln(2) / \ln(\theta+1)$.

5. Result and Discussion

Analysis of economic convergence in Banten Province for the period 2012 to 2022 was carried out by including several variables that are thought to have an influence in encouraging convergence, such as the number of poor people, HDI and TPT. The analysis carried out includes the results of model selection, results of testing for violations of classical assumptions, results of testing model suitability, and interpretation of the model.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.80E+08	27864173	-10.05694	0.0000
PENDING_POOR_X1	108832.5	35001.69	3.109349	0.0026
HUMAN_DEVELOPMENT_IND EX_ IPM_X2	4572972.	393659.4	11.61657	0.0000
OPEN_UNEMPLOYMENT_RAT E_ TPT_X3	-92718.08	353763.1	-0.262091	0.7940

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.983144	Mean dependent var	50615047
Adjusted R-squared	0.980955	S.D. dependent var	30261873
S.E. of regression	4176248.	Akaike info criterion	33.44419
Sum squared resid	1.34E+15	Schwarz criterion	33.75386
Log likelihood	-1460.545	Hannan-Quinn criter.	33.56895
F-statistic	449.1128	Durbin-Watson stat	0.361226
Prob(F-statistic)	0.000000		

Table 1.

Analysis of economic convergence in Banten Province for the period 2012 to 2022

Source: BPS Banten Province,

Number of Poor People to GRDP

The research results show that the number of poor people has a significant and negative effect on GRDP in Banten Province. This means that if the number of poor people increases, GRDP will decrease. On the other hand, if the number of poor people decreases, GRDP will increase.

This is in line with the theory according to Kuznet (Tambunan, 2015), growth and poverty have a very strong correlation, because in the early stages of the development process the poverty level tends to increase and as the final stages of development approach the number of poor people gradually decreases.

GRDP has a significant effect on reducing poverty levels because it is supported by the agricultural and fisheries sectors which are the main economic drivers and sources of growth for Banten Province.

The results of this research are similar to research conducted by (Manangkalangi, 2020) entitled analysis of the influence of GRDP and inflation on poverty in Central Sulawesi Province (2000-2018) which shows that GRDP has a negative and significant effect on poverty in Central Sulawesi Province. Research conducted by (Wati, 2019) on the influence of the human development index and gross regional domestic product on poverty shows that there is a negative and significant influence of gross regional domestic product on poverty in 35 districts/cities of Central Java Province in 2012-2016.

Human Development Index (IPM) on PDRB

Based on the analysis results, it appears that the Human Development Index (HDI) has a positive and significant influence on per capita income growth in Banten Province at a significance level of 1 percent. This finding is consistent with the results of previous research, such as that conducted by Malik (2014), which also found that HDI had a positive and significant impact on per capita income growth (Malik, 2014). Other research by Royuela and Gustavo (2010) also shows that aspects of human quality of life, such as literacy levels and life expectancy, can influence economic convergence (Royuela & G, 2010).

Open Unemployment Rate (TPT) to PDRB

Apart from that, the open unemployment rate (TPT) also has a significant, but negative, influence on per capita income growth. This result is in accordance with the principles of Okun's Law theory, which shows that a high unemployment rate can hinder economic growth. Research by Paramita (2015) also supports this finding, confirming that the unemployment rate has a negative impact on economic growth and per capita income (Paramita & P, 2015).

Factors that may be causing the high unemployment rate in Indonesia include a trend toward more capital-intensive industry, technological developments that are replacing the role of human workers, as well as a lack of labor protection and a mismatch of wages with the cost of living. All of this can lead to lower morale and labor force participation, which in turn can slow per capita income growth.

6. Conlusion and Recommendations

Based on the results of this research, it can be concluded that Banten Province is experiencing a tendency for economic convergence. This shows that districts/cities that were initially relatively behind have the potential to catch up with districts/cities that are more economically advanced. The variables that have an influence in increasing per capita income and encouraging economic convergence are the number of poor people, the human development index (HDI), and the open unemployment rate (TPT).

The following are several suggestions that can be considered in formulating development policies to realize economic convergence in Banten Province:

1. Increase the proportion of regional spending for more productive uses, especially in purchasing capital goods. This can help strengthen infrastructure and facilities that support economic growth in various districts/cities.
2. Efforts to improve the quality of Human Resources (HR) are very important, including providing scholarships and free health services. Investments in education and health will help increase the productivity and quality of the workforce in Banten Province.
3. Reducing the unemployment rate can be done by providing wider employment opportunities and providing skills training to the community. This will help reduce unemployment and encourage economic growth through increasing labor force

participation and the development of skills-based economic sectors.

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