PAPER – OPEN ACCESS

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DOI : 10.32734/lwsa.v8i1.2384
Electronic ISSN : 2654-7066
Print ISSN : 2654-7058

Volume 8 Issue 2 – 2025 TALENTA Conference Series: Local Wisdom, Social, and Arts (LWSA)

LWSA Conference Series 08 (2025)
TALENTA Conference Series
Available online at https://talentaconfseries.usu.ac.id

Analysis Of Economic Growth Convergence Among Districts/Cities In North Sumatera

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Abstract

Differences in economic growth, geographical conditions, and potential between regions cause development inequality. Therefore, there is a need for inter-regional convergence. The convergence will explain the equality of economic growth between regions. The concept of convergence occurs when areas with poor economies tend to grow faster than areas with a rich economy. North Sumatera Province has 33 district/cities with different economic characteristics and inequality. The purpose of this study was to determine the convergence in district/cities in North Sumatera based on the concept by Barro & Sala-i-Martin (2004) then the model spesification in answering research objectives are absolute beta convergence, and conditional beta convergence. This research was conducted using panel data regression analysis techniques. The result of this study confirms that there is existence of absolute beta convergence, and conditional beta convergence between district/cities in North Sumatera 2013-2022. The estimation results show that in terms absolute beta convergense, the convergence speed reaches 17,19 % and, conditional beta convergence reaches 27,88%. Conditional convergence have a higher speed than the absolute convergence. This indicates that the independent variable has a great influence in increasing the speed of convergence of economic growth in the district/cities in North Sumatera. In addition, there is a positive and significant correlation between length of study, and labor, but there is no significant relationship between roads, and regional income.

Keywords: Economic Growth; Convergence; Absolute Beta Convergence; Conditional Beta Convergence

1. Introduction

The implementation of development in Indonesia has been ongoing for some time. One of the challenges is regional disparity. North Sumatera is one of the provinces with a high endownment factor, with 33 districts and cities that are diverse across regions. Despite the abundance of endowment factors, these natural factors are not distributed evenly throughout the region, and each region's potential varies, resulting in regional disparities. This demonstrates that development efforts in North Sumatera are still inefficient and lead to complex problems.

There are differences in growth rates in North Sumatera where the highest growth rate in 2022 is Labuhan Batu while the lowest is in Nias Barat district. Based on this, it is known that there is a development disparity that includes differences in the rate of the growth between district and cities and is accomanied by the development of inequality in income expenditures in North Sumatera. Therefore, we need an approach that can predict equality of economic growth between regions. One approriate approach is the convergence approach. Convergence is the hope of poor regions to catch up with rich regions [1]. Convergence conditions are achieved at different speeds [2]. This research was conducted in North Sumatera because North Sumatra, after Riau, is the second-largest contributor to Sumatra's economic structure. The research period ran from 2013 to 2022 in order to describe the dynamics of development outcome characteristics and meet the requirements for observations using an econometric model.

Selection and peer-review under responsibility of Event of Young Researcher and Economics Students (EVEREST) VIII
p-ISSN: 2654-7058, e-ISSN: 2654-7066, DOI: 10.32734/lwsa.v8i1.2384

Table 1. Economic Growth Rate districts/cities in Sumatera Utara 2013-2022

Kabupaten Kota	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Sumatera Utara	6.08	5.23	5.10	5.18	5.12	5.18	5.22	-1.07	2.61	4.73
Nias	6.35	5.47	5.43	5.03	5.01	4.95	5.04	-1.80	2.21	3.06
Mandailing Natal	6.35	6.54	6.22	6.18	6.09	5.79	5.30	-0.94	3.20	4.34
Tapanuli Selatan	17.43	4.41	5.02	5.12	5.21	5.19	5.23	-0.39	3.24	4.78
Tapanuli Tengah	5.17	5.04	5.08	5.12	5.24	5.20	5.18	-0.76	2.56	4.18
Tapanuli Utara	5.28	5.12	4.81	4.12	4.15	4.35	4.62	-1.50	3.54	4.25
Toba	4.48	4.24	4.55	4.76	4.90	4.96	4.88	-0.27	2.92	4.24
Labuhan Batu	5.99	5.22	5.04	5.06	5.00	5.06	5.07	-0.09	3.85	4.80
Asahan	5.79	5.88	5.57	5.62	5.48	5.61	5.64	-0.21	3.73	4.66
Simalungun	5.26	5.33	5.24	5.40	5.13	5.18	5.20	-1.01	3.70	4.68
Dairi	5.05	5.03	5.04	5.07	4.93	5.01	4.82	-0.94	2.05	4.21
Karo	4.98	5.18	5.01	5.17	5.21	4.55	4.60	-0.80	2.25	4.22
Deli Serdang	9.22	7.67	5.25	5.32	5.10	5.15	5.18	-1.78	2.23	4.70
Langkat	5.59	5.12	5.03	4.98	5.05	5.02	5.07	-0.86	3.08	4.69
Nias Selatan	4.66	4.32	4.46	4.41	4.56	5.02	5.03	-0.61	2.02	3.08
Humbang Hasundutan	5.79	5.30	5.24	5.00	5.02	5.04	4.94	-0.13	2.02	4.21
Pakpak Bharat	5.91	5.91	5.93	5.97	5.94	5.85	5.87	-0.18	2.54	4.27
Samosir	6.08	5.95	5.77	5.27	5.35	5.58	5.70	-0.59	2.65	4.48
Serdang Bedagai	5.80	5.12	5.05	5.14	5.16	5.17	5.28	-0.44	2.87	4.46
Batu Bara	4.23	4.20	4.11	4.44	4.11	4.38	4.35	-0.31	2.35	4.07
Padang Lawas Utara	6.15	6.12	5.94	5.96	5.54	5.58	5.61	-1.14	3.26	4.12
Padang Lawas	6.14	6.01	5.74	6.06	5.71	5.96	5.64	-1.18	3.83	4.61
Labuhanbatu Selatan	6.05	5.33	5.13	5.19	5.09	5.27	5.35	-0.80	3.82	4.74
Labuanbatu Utara	6.29	5.40	5.18	5.21	5.11	5.20	5.15	-0.27	3.83	4.62
Nias Utara	6.34	5.27	5.49	4.59	4.43	4.42	4.65	-1.58	2.02	3.03
Nias Barat	5.17	5.12	4.87	4.83	4.81	4.77	4.82	-1.66	2.26	3.01
Sibolga	5.93	5.89	5.65	5.15	5.27	5.25	5.20	-1.36	2.10	4.15
Tanjungbalai	5.94	5.78	5.58	5.76	5.51	5.77	5.79	-0.47	2.35	3.94
Pematangsiantar	5.75	6.37	5.24	4.86	4.41	4.80	4.82	-1.89	1.25	3.47
Tebing Tinggi	6.01	5.44	4.86	5.11	5.14	5.17	5.15	-0.70	2.51	4.01
Medan	5.36	6.05	5.74	6.27	5.81	5.92	5.93	-1.98	2.62	4.71
Binjai	6.01	5.83	5.40	5.54	5.39	5.46	5.51	-1.83	2.23	4.18
Padangsidimpuan	5.67	5.02	5.04	5.29	5.32	5.45	5.51	-0.73	2.75	4.77
Gunungsitoli	6.22	6.11	5.39	6.03	6.01	6.03	6.05	-0.38	2.25	3.11

Source: Badan Pusat Statistik

2. Literature Review

2.1. Economic Growth

Economic growth is an effort to increase production capacity in order to produce more output, as measured by gross domestic product (GDP) and gross regional domestic product (GRDP) [3]. According to Simon Kuznets, economic growth is defined as an increase in a country's long-term capacity to provide various economic goods to its population. This increase in capacity is enabled by technological, institutional, and ideological advances or changes to existing conditions.

2.2. Convergence

Numerous studies have been conducted to evaluate income convergence following Barro's seminal paper [4]. The goal of these studies is not only to conduct global convergence analyses across countries, but also to look for evidence of convergence at the regional and within-country levels. In general, convergence studies are based on the neoclassical growth model's standard proposition: in the long run, economies will move to a common steady state given the condition of shared preferences and technologies across economies. There are two approaches to estimating convergence in the literature. First, we'll look at sigma (σ) and beta (β) convergence. While the primary analysis of sigma convergence is on the decreasing or increasing income Beta convergence examines whether lower-income economies grow faster than higher-income economies over time.

2.3. Regional Income

According to Law No. 23 of 2014, the definition of regional original income (PAD) is income obtained by the region that is collected based on regional regulations and statutory regulations. Original Regional Income is a tool for measuring a region's ability to extract resources. Original regional income is also the foundation of regional financing; thus, the ability to implement the economy is measured by the size of the original regional income contribution to the regional income and expenditure budget. The greater the contribution made, the less reliant on central government assistance.

2.4. Road Infrastructure

According to Hulten and Schwab's theory, infrastructure has a significant impact on the economy. This theory includes infrastructure as an input that influences aggregate output. Aside from that, technological progress serves as an externality of infrastructure development. Infrastructure provision can generate business opportunities and raise people's incomes by increasing production capacity.

2.5. Labor Force

Labor is defined as the population of working age (aged 15 to 64), or the total number of residents in a country who can produce goods and services if there is a demand for their labor and they are willing to participate in these activities [6]. Chapter 1, paragraph 2 of Law Number 13 of 2003 concerning Labor defines labor as any person who is able to carry out work to produce goods and/or services for their own or the community's benefit.

2.6. Average Length of Study

The average number of years of schooling (Length of study) describes how long people aged 15 and up spend in formal education. Because education is becoming more accessible to a wider range of people, the literacy component is thought to be overly simplistic in measuring educational attainment. These two factors are appropriate for assessing the quality of a person's education. The average length of schooling can accurately describe the quality of a person's education. For instance, elementary school graduates and doctoral graduates have distinct abilities that impact productivity.

3. Research Methods

The type of data used is secondary data, came from publications published by the North Sumatera Bureau of Statistic (BPS) that supports this research. Secondary data used is a combination of time series from 2013-2022 and cross section as much as 33 data representing 10 years as much as 33 data representing provinces of North Sumatera. This study uses one variable dependent variable and four independent variables. The dependent variable in this study is Economic Growth (Y), while the independent variables in this study are Regional Income (PAD), Road Infrastructure (ROAD), Labor (TK) and, Length Of Study (RLS). By adopting the model Barro & Sala-i-Martin then the model specification in answering research objectives are:

Absolute Convergence

$$\text{Log Y} = 0 + 1\text{Logyit} - 1 + \text{i}$$

Conditional Convergence

$$\text{lnyi,t} = 0+0+1\text{PADit}+2\text{ROADit}+3\text{TKit}++5\text{RLSit}++\text{ilnyit0}+1\text{PADit}+2\text{ROADit}+3\text{TKit}+5\text{RLSit}+\text{i}$$

The development of Barro's conditional convergence is influenced by economic development policies. If positive means divergence and negative means convergence [7]. Moreover, the convergence velocity denoted by $\boldsymbol{s}$ can be obtained by the equation $s = -\ln(1 + 1/T$, where T denotes the number of years beginning and ending the study period. The equation $\tau = \ln(2)/\ln(1 + 1)$, τ shows that it takes half the time to eliminate half of income imbalances at the beginning of the period. The Chow and Hausman tests were used to determine the best model. The chow Test compares common and fixed data, while hausman test compares the fixed and random characteristic data.

4. Results and Discussion

4.1. Absolute Beta Convergence

The results of the Chow test and the Hausman test show that the fixed effects model is the best estimated model. Absolute convergence is a natural convergence that occurs without the intervention of policies or growth factors. This means that regions with low initial per capita incomes have high economic growth and can catch up with those with high initial per capita incomes.

Estimated value (1+β) is 0.820871. Convergence requires a β value between zero and -1. A β value between 0 and 1 indicates economic convergence between districts and cities in North Sumatra. When (1+β) = 0.820871, β = 0.820871-1, resulting in the result -0.179129. As a result, the GRDP of districts and cities in North Sumatra in 2013-2022, shows a convergence of economic growth.

The value of β determines the speed of economic growth convergence. As the value of β approaches -1, convergence speed increases. The estimation results show that the β value is -0.179129, indicating an absolute convergence speed of 17.91%. This means that in one year, 17.91% of the GDP gap can be closed.The equation t=-ln(0,5)0,179129 or t=ln(2)0,179129 yields a half-life of 3.8695, indicating that covering half of the total inequality takes 3.8 years and covering the entire inequality takes approximately 7.7 years.

4.2. Conditional Beta Convergence

Conditional convergence is calculated by including variables that are thought to influence the GRDP. Thus, conditional convergence is calculated by combining the variables Original Regional Income (PAD), Road Infrastructure, Labor Force, and average length of study.

After applying the Chow test followed by the Hausman test, it determined that the fixed effect model is the best model. The estimated value (1+β) corresponds to the previous year's GDP coefficient of 0.721145. Therefore, the value of β is -0.27885. With values ranging from -1 to 0, it is possible to conclude that the North Sumatra district or city's economic growth is subject to a conditional convergence process. The β value indicates a 27.88% rate of convergence in North Sumatra districts and cities, indicating a faster convergence process under certain conditions. The equation t=-ln(0,5)0,179129 or yields a middle time or half life of 2.4861. This means that covering half of the total inequality takes approximately 2.48 years, and covering all inequality takes 4,97 years.

Conditional convergence occurs faster than absolute convergence; thus, the presence of determinant factors such as original regional income, roads infrastructure, workforce, and average length of schooling speeds up convergence.

5. Conclusions

This research estimates the convergence of economic growth in districts and cities in North Sumatra. The data used is panel data collected from 33 districts and cities in the province of North Sumatra over a 10-year period, from 2013 to 2022. According to panel data regression estimates, there is absolute convergence of economic growth in 33 districts and cities in North Sumatra, as well as conditional beta convergence.

Conditional beta convergence occurred in the economic growth of 33 districts and cities in North Sumatra from 2013 to 2022, as evidenced by panel data regression estimates. According to the results of the conditional beta estimation, two variables accelerate the convergence of economic growth in North Sumatra: 1) labor and 2) average length of school. The variables that do not have a significant effect are: 1) road length in good condition; and 2) regional original income.

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