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Bangka Belitung economic growth analysis with solow theory

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ABSTRACT

This research discusses the effect of installed power, Gross Fixed Capital Formation (GFCF), the number of workers on the Gross Domestic Product (GDP) of the Province of the Bangka Belitung Islands. The approach used by the researcher is descriptive quantitative. The data analysis technique used in this study is multiple linear regression using secondary data sourced from the Central Statistics Agency, namely panel data for the 2010-2019 period in the Province of the Bangka Belitung Islands. The results showed that the best model in panel data regression analysis of the factors that influence the GRDP of the Bangka Belitung Islands Province in this study was the Random Effect Model. Capital Per Worker, Life Expectancy, Average Length of Schooling, and Expected Length of Schooling are able to explain the GDP of 56.69 percent. Capital Per Worker, Life Expectancy, Average Length of Schooling, and Expected Length of School together have a significant effect on GDP. Partially, capital per worker has an insignificant negative effect on GDP, while life expectancy and average length of schooling have a significant positive effect on GDP. Expectations for the school year have a positive but not significant effect on GDP.

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Introduction

Economic growth is one of the main indicators in evaluating economic performance. The government is one of the economic actors whose role is increasingly important in the modern economy. Economic activities carried out by the government are indicated for changes in the economic structure by fiscal policy through the determination of the state budget plan for revenues and expenditures (Sari et al., 2016). The economic growth of a region is obtained from the increase in gross regional domestic product at constant prices which reflects the increase in the production of goods and services from year to year (Hoeriyah et al., 2019). The increase in economic capacity is indicated by progress or technological, institutional (institutional) and ideological adjustments to various existing conditions. In line with Arifin and Todaro, Sukirno (2004) in Retno (2013) defines economic growth as the development of activities in the economy that causes goods and services produced in society to increase. The country's ability to produce goods and services increases in each period. This increase is caused by production factors which are always increasing in quantity and quality (Rahim, 2016). Investment can increase the amount of capital goods while technology continues to develop according to the progress of the times (Nasarudin, 2014). The workforce is always increasing due to population growth supported by work experience and education.

The production function of Cobb Douglas explains the important role of technology, capital and labor in an effort to increase economic growth. According to Amalia (2014), the Cobb-Douglas function is a function or equation showing the effect of the input used with the desired output. According to Soekartawi (2002) in Andriyanto et al. (2014), the Cobb-Douglas function is a variable where one variable is called the dependent variable, which is explained (Y), and the other is called the independent variable, which explains (X). The development of technology, especially information technology and advanced science, is due to the development of human resources who are able to take advantage of advances in technology and science in accordance with their economic potential. Investment activities generate investments that will continue to increase the capital stock. An increase in the capital stock will increase productivity as well as production capacity and quality, which in turn can encourage economic growth and increase employment (Arsad, 2002). Then there are various policies that the government has in an effort to improve people's living standards by expanding employment opportunities and directing the distribution of income evenly (Sukirno, 2012). The following below describes the development of Gross Regional Domestic Product, Gross Fixed Capital Formation, Labor Force and Technology in the Province of the Bangka Belitung Islands.

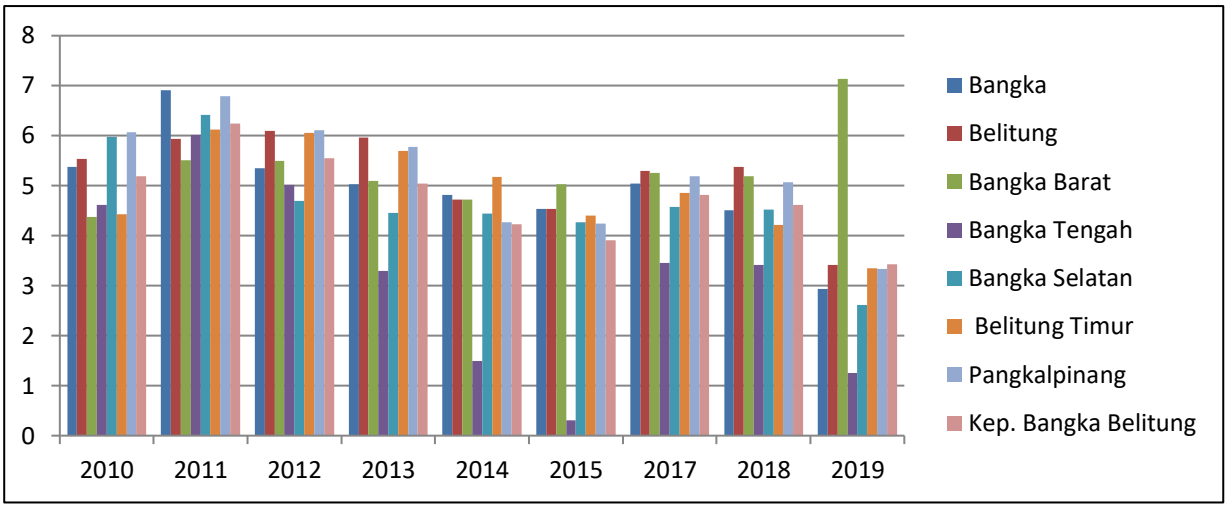

Figure 1. Development of GDP Growth Rate in Bangka Belitung Province on the Basis of Constant Prices in 2010-2019.
Source: Central Bureau of Statistics of the Bangka Belitung Islands Province, 2021

It can be seen from Figure 1.1 the development of the GDP Growth Rate in District/Cities in the Province of the Bangka Belitung Islands fluctuates in each District/City. In 2010 the percentage of the highest GDP growth rate was in the Pangkalpinang District/City Area of 6.07 percent. In 2019 the percentage of the total GDP Growth Rate in the Pangkalpinang District/City Area decreased by 3.34 percent, and the average percentage of the total GDP Growth Rate in the Pangkalpinang District/City Area in 2010 to 2019 was 13.27 percent. While in 2010 the lowest percentage of the total GDP Growth Rate was in the Central Bangka District/City Area of 0.31 percent. In 2019 in the East Belitung District/City Area, the percentage of the total GDP Growth Rate increased by 1.25 percent and the average percentage of The growth rate of GDP in the Central Bangka Regency Region from 2010 to 2019 is 3.78 percent. Overall the Economic Growth Rate in the Province of the Bangka Belitung Islands with the highest average is in the Pangkalpinang City Regency. The increase occurred because Pangkalpinang City is the capital city of Bangka Belitung so that the added value of the final goods and services produced in the Pangkalpinang City Region is greater.

According to Smith Todaro (2006), the economic progress of a region shows the success of a development although it is not the only indicator of development success (Widada et al., 2019). The Solow-Swan model uses elements of population growth, capital accumulation, technological progress (exogenous), and the amount of output that interacts with each other (Dhani, 2016). Economic growth is a process of increasing the amount of production of goods and services continuously over a long period of time. There are several theories that examine economic growth, one of which is the Solow-Swan theory. This theory states that there are three factors that influence economic growth, namely growth in the number of workers, capital accumulation, and technological progress (K. Amalia et al., 2016). In Dhani (2016) The results of this study analyze how to increase economic growth in Demak Regency, using the "Solow-Swan" growth theory approach and show that labor and investment capital variables have a positive influence on it will increase economic growth in Demak Regency.

Meanwhile, the savings variable in the case of this study does not have a significant effect, because the savings in the Demak district are still small in value.economic growth in Demak Regency. This means that if there is an increase in labor and investment capital, The output of a region which will later be used in measuring economic growth in the region is influenced by many factors, both from within the region itself, and from outside the region. In neoclassical growth theory, one of which was developed by Robert Solow, the rate of output growth depends on the level of accumulation/capital formation, the amount of use of labor and technology (Lubis & Kodoatie, 2013).

Method

This study discusses the influence of installed power, GFCF, the number of workers on the GDP of the Province of the Bangka Belitung Islands. The approach used by the researcher is descriptive quantitative. Descriptive research is research conducted by collecting data techniques which are then tested on hypotheses regarding the research subject. Quantitative research is research that uses statistical procedures or measurements in the form of numbers (Sugiyono, 2016). This research is the adoption of Cobb Douglas theory and translated in empirical form. Technological progress is proxied as electricity consumption with the consideration that most machines that support production require energy that can be driven by electricity. Capital is proxied in the form of GFCF where GFCF is additional capital that enters the economy and is used to increase production capacity. While the labor indicator is used using data on the number of available workers in the Province of the Bangka Belitung Islands. The empirical form of Cobb Douglas is Soekartawi (2003) in (Andriyanto et al., 2014).

The study took seven regencies/cities in the Province of the Bangka Belitung Islands, namely Bangka, Belitung, West Bangka, Central Bangka, South Bangka, East Belitung, and Pangkalpinang City. The source of data in this study is secondary data. Secondary data is data obtained from various secondary sources that are relevant to the object of research. The data comes from the BPS for the Province of the Bangka Belitung Islands and other literature related to this research. The data collection technique used is secondary data if the researcher will collect information from data that has been processed by other parties (Sugiyono, 2016). The secondary data used in this study were obtained from books, journals and web pages related to related data (Ibrahim, 2015) .

Table 1. Operational Definitions and Measurement of Variables

Variable Name	Concept	Measure	Scale
Human Development Index	Human Development Index is an important indicator to measure success in efforts to build the quality of human life (Central Bureau of Statistics). The HDI in this study is seen from the HDI value in the Regency/City of the Bangka Belitung Islands Province	Year	Ratio
Capital Per Worker	Capital Per Worker can be measured by dividing the GFCF value which is defined as the addition and subtraction of fixed assets in a production unit, within a certain period of time (Central Bureau of Statistics, 2020) with the number of workers in the same period.	Rupiah	Nominal
GDP	Gross Domestic Product is the amount of added value generated for all business units in an area or is the entire value of final goods and services produced by all economic units in a region (Central Bureau of Statistics, 2017).	Rupiah	Nominal

Source: Processed by Researchers, 2021

The data analysis technique used in this study is multiple linear regression using panel data. The panel data in this study is a combination of cross section and time series with the research data period from 2010 to 2019 in the Province of the Bangka Belitung Islands. Panel data is a combination of time series and cross section data or some of the objects and time collected. Time series data is one object in a period of time, while cross section data is the time cross of some objects (Nuryanto dan Pambuko, 2018). There are several advantages of panel data, that is : (1) involves several individuals at a time with higher heterogeneity. (2) the data provided is more informative, varied, and has a small degree of colliarity, because the data panel combines cross section and time series data. (3) is a dynamic change study by repeating cross section (series) data. In addition to these advantages, panel data can also detect and measure impacts in a better direction, which cannot be done with cross section or time series methods. Operational variables are used to explain the terms used in the study, so

that misunderstanding of the problems that will be discussed in the study can be avoided. Operational definitions used in this study include (Table 1).

Results and Discussions

This study uses regression analysis with panel data to display the results of the estimated influence of the Human Development Index (HDI) including life expectancy, average length of schooling, and school year expectations and capital per worker on Gross Regional Domestic Product (GDP) at Constant Prices. regencies/cities in the Province of the Bangka Belitung Islands. The test uses annual data from 2010-2019 with a total of 70 observations. Before estimating panel data, the appropriate model is selected, namely CEM, FEM, and REM. The selection of the best and appropriate model is known through a series of Chow tests, Hausman tests, and Lagrange Multiplier tests. A series of best model testing through Chow, Hausman test, and Lagrange Multiplier test can be seen that the model that can provide the best estimation results is the Random Effect Model (REM). Following are the estimation results of the Random Effect Model:

Table 2. Random Effect Model Estimation Results

Dependent Variable: GDP
Method: Panel EGLS (Cross-section random effects)
Date: 10/26/21 Time: 06:36
Sample: 2010 2019
Periods included: 10
Cross-sections included: 7
Total panel (balanced) observations: 70
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-43596146	8651748.	-5.038999	0.0000
MP	-877.4948	15340.63	-0.057201	0.9546
AH	597238.1	129558.2	4.609807	0.0000
RLS	939927.3	193337.8	4.861579	0.0000
HLS	100867.3	62124.41	1.623633	0.1093
Effects Specification			**S.D.**	**Rho**
Cross-section random			2132959.	0.9267
Idiosyncratic random			599833.5	0.0733
		Weighted Statistics		
R-squared	0.566935	Mean dependent var		566904.4
Adjusted R-squared	0.540285	S.D. dependent var		902805.6
S.E. of regression	612123.2	Sum squared resid		2.44E+13
F-statistic	21.27321	Durbin-Watson stat		0.769449
Prob(F-statistic)	0.000000			

Source: Processed by Researchers, 2021

The results show that Capital Per Worker, life expectancy, average length of schooling, and expected length of schooling are able to explain changes in GDP by 56.69 percent, while the remaining 43.31 percent is explained by models outside of this study. Here's an explanation of the model:

$$\widehat{\mathbf{PDRB}} = -\mathbf{43} - \mathbf{87\ MA} + \mathbf{59\ AH} + \mathbf{93\ RLS} + \mathbf{10\ HLS} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \textbf{(3)}$$

The model above explains that an increase in Capital Per Worker of 1 percent will reduce the value of GDP by 87 points, thus capital per worker has a negative impact on GDP. The life expectancy has a positive impact on GDP, if the life expectancy increases by 1 percent, the GDP will increase by 59 points. The average length of schooling also has a positive impact on GDP, an increase in the average length of schooling by 1 percent will increase GDP by 93 points. Furthermore, the expectation of the length of schooling has a positive impact on GDP, the expectation of an increase in the length of schooling by 1 percent will increase the GDP by 10 points. Then the next step is to test the regression parameters, namely the F test and t test. Based on table 4.1 the results of the prob. (F-statistics) = 0.000 <0.05, so it can be concluded that together Capital Per Worker, life expectancy, average length of schooling, and school year expectations have a significant effect on

GDP. The test was conducted to determine the effect of the independent variable partially on the dependent variable.

The results of the t-test test in table 4.1 show that Capital Per Worker has a probability of 0.95>0.05 with a negative t statistic. This shows that Capital Per Worker has a negative impact on GDP. An increase in each Capital Per Worker will cause GDP to decrease, but this impact does not have a significant impact on GDP. Life expectancy and average length of schooling have a probability of 0.000<0.05 with a positive t statistic. These results indicate that life expectancy and the average length of schooling have a significant positive effect on GDP. Furthermore, the expected length of schooling has a positive t statistic with a probability of 0.10. Expectations for years of schooling have a positive impact on changes in GDP, if expectations for years of schooling increase, then GDP will also increase, but GDP does not experience significant changes.

Conclusions

Based on the results and materials that have been described, this study can be concluded as follows. The results of the Chow test, Hausman test, and Lagrange Multiplier test, the best model in panel data regression analysis on the factors that affect GRDP in the Province of the Bangka Belitung Islands in this study are Random Effect Models. Capital Per Worker, Life Expectancy, Average Length of Schooling, and Expected Length of Schooling are able to explain the GRDP of 56.69 percent. Capital Per Worker, Life Expectancy, Average Length of Schooling, and Expected Length of Schooling together have a significant effect on GDP. Partially, capital per worker is negative and has no significant effect on GDP. Life expectancy and average length of schooling have a significant positive effect on GDP. Expectations for the school year have a positive but not significant effect on GDP.

References

Amalia, F. (2014). Analisis Fungsi Produksi Cobb-Douglas Pada Kegiatan Sektor Usaha Mikro Di Lingkungan Uin Syarif Hidayatullah Jakarta. Signifikan: Jurnal Ilmu Ekonomi, 3(1).

Amalia, K., Kiftiah, M., & Sulistianingsih, E. (2016). Penerapan Teori Solow-Swan Pada Pertumbuhan Ekonomi. Bimaster: Buletin Ilmiah Matematika, Statistika Dan Terapannya, 5(01).

Andriyanto, F., Efani, A., & Riniwati, H. (2014). Analisis Faktor-Faktor Produksi Usaha Pembesaran Udang Vanname (Litopenaeus Vannamei) Di Kecamatan Paciran Kabupaten Lamongan Jawa Timur; Pendekatan Fungsi Cobb-Douglass. Ecsofim (Economic And Social Of Fisheries And Marine Journal), 1(1).

Arsad, L. (2002). Pengantar Perencanaan Pembangunan Ekonomi Daerah. Bpfe Yogyakarta.

Dhani, T. P. T. N. H. (2016). Penerapan Model Solow-Swan Untuk Memacu Pertumbuhan Ekonomi Kabupaten Demak. Media Ekonomi Dan Manajemen, 30(1).

Hoeriyah, L., Suhendra, I., & Arifin, S. (2019). Faktor Ekonomi Yang Mempengaruhi Capital Flight Di Negara Berkembang Anggota Asean. Jurnal Ekonomi-Qu, 9(2).

Ibrahim, M. A. (2015). Metodologi Penelitian Kualitatif. Bandung: Alfabeta.

Lubis, R., & Kodoatie, J. M. (2013). Pengaruh Teknologi Terhadap Produk Domestik Regional Bruto (Pdrb) Provinsi Dki Jakarta. Diponegoro Journal Of Economics, 2(1), 185–195.

Nasarudin, M. I. (2014). Aspek Hukum Pasar Modal Indonesia. Kencana.

Nuryanto Dan Pambuko, Z. B. (2018). Eview For Basic Econometric Analysis: App Interpretation. Unimma Press.

Rahim, A. (2016). Landasan Teori Ekonomi Dengan Model Fungsi Persamaan (Telaah Kasus Penelitian). Carabaca.

Retno, E. K. (2013). Pengaruh Pendidikan Dan Kemiskinan Terhadap Pertumbuhan Ekonomi Di Indonesia. Jurnal Pendidikan Ekonomi (Jupe), 1(3).

Sari, M., Syechalad, M. N., & Majid, S. A. (2016). Pengaruh Investasi, Tenaga Kerja Dan Pengeluaran Pemerintah Terhadap Pertumbuhan Ekonomi Di Indonesia. Jurnal Ekonomi Dan Kebijakan Publik Indonesia, 3(2), 109–115.

Sugiyono. (2016). Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, Dan R&D. Alfabeta.

Sukirno, S. (2012). Teori Pengantar Ekonomi Makro Edisi Ketiga. Karunika, Jakarta.

Widada, R., Hakim, D. B., & Mulatsih, S. (2019). Analisis Pertumbuhan Ekonomi Kabupaten/Kota Hasil Pemekaran Di Indonesia. Jurnal Manajemen Pembangunan Daerah, 6(2), 1–15. Https://Doi.Org/10.29244/Jurnal_Mpd.V6i2.25095