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Forecasting Economic Growth: Energy Export and Macroeconomic Instruments

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Abstract — The economic growth of an area leads more to quantitative changes with measuring instruments using Gross Regional Domestic Product (GRDP). Oil and gas exports, Inflation, and Investment are also taken the main role in impacting Economic Growth Rate in Jawa Timur Province, Indonesia. The success of economic growth can be known by the economic forecasting model. The results of this study are simultaneously the variable of oil and gas exports, inflation, and Investment have a significant effect on the economic growth in Jawa Timur. The results showed that Oil and Gas Exports, Investment, and Inflation had a considerable influence on the economic growth of Jawa Timur by 89.18 percent. Hence, to increase economic growth in oil and gas exports, the government must be wise in exporting, especially oil and gas.
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Keywords *— GRDP; Oil and Gas Exports; Investment; Inflation.*

1. Introduction

Successful development is one of the goals of each region. The success can be known from several indicators, one of which is economic growth. By knowing economic growth, regions can determine strategies and regional development planning by paying attention to the economic sector from year to year. The economic growth of an area leads more to quantitative changes with measuring instruments using Gross Regional Domestic Product (GRDP). In Table 1, it can be known that during the last 5 years, namely 2017-2021, it can be seen from all provinces in Java, Jawa Timur has a gross regional domestic product value in the 2nd highest category of DKI Jakarta Province. Jawa Timur Province has various advantages from other provinces in Java, so, it is one of the factors Jawa Timur has the 2nd highest value in Java Island.

Table 1. Gross Regional Domestic Product by Province in Java Island (in Billion Rupiah), 2017-2021

No	Province	2017	2018	2019	2020	2021
1	DKI Jakarta	1 454 564	1 539 917	1 635 359	1 736 291	1 838 501
2	Jawa Barat	1 207 232	1 275 619	1 343 662	1 419 689	1 491 706
3	Jawa Tengah	806 765	849 099	893 750	941 164	992 106
4	Yogyakarta	83 474	87 686	92 300	98 024	104 490
5	Jawa Timur	1 331 376	1 405 564	1 482 300	1 563 769	1 650 143
6	Banten	368 377	387 835	410 137	434015	458023

Table 2. Gross Regional Product Growth Rate by Province in Java Island (in percentage) 2017-2021

No	Province	2017	2018	2019	2020	2021
1	DKI Jakarta	5.91	5.87	6.20	6.17	5.89
2	Jawa Barat	5.05	5.66	5.33	5.66	5.07
3	Jawa Tengah	5.47	5.25	5.26	5.31	5.41
4	Yogyakarta	4.95	5.05	5.26	6.20	6.60
5	Jawa Timur	5.44	5.57	5.46	5.50	5.52
6	Banten	5.45	5.28	5.75	5.82	5.53

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In the Jawa Timur GRDP Growth Rate seen in Table 2 shows that economic growth in Jawa Timur Province is moving unstably. Jawa Timur's GRDP Growth Rate continued to decline from 2018 to 2021 and there was an increase in 2018 and 2021 with the highest value in 2018 of 5.75. In Keynes's theory there are certain factors of economic success as measured by aggregate expenditures, namely household consumption expenditures, capital accumulation, government expenditures and exports. Export activities can affect the output of an area which will affect revenues. Apart from foreign exchange contributors, exports can also expand the domestic market to foreign markets and bring benefits in increasing economic growth in one region.

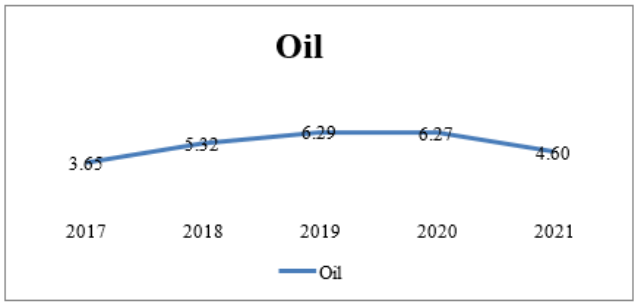

Fig. 1: Oil and gas exports in Jawa Timur (percentage) in 2017-2021

Special natural resources of oil and gas can benefit areas that have oil and gas because it can be a source of regional income. In the graph above, it can be known that the value of Jawa Timur oil and gas exports in the last 5 years, namely 2017-2021, has fluctuated.

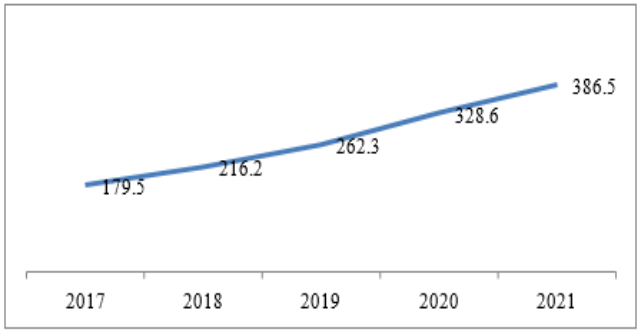

Fig. 2: Investment in Jawa Timur (in Trillion IDR), 2017-2021

Table 3. Jawa Timur Inflation Rate (percentage) in 2017-2021

Year	2017	2018	2019	2020	2021
Inflation	3.08	2.72	4.04	2.86	2.12

Apart from oil and gas exports in increasing economic growth which is one of the other factors is Investment. Basically, every development process in one area is expressed because of its own ability (*self-reliant development*) by continuing to increase all potential resources owned by the region. The rise and fall of economic growth are also based on inflation. Inflation is the tendency of prices to rise thoroughly and continuously (Boediono, 2000). Inflation in several trade and non-trade sectors in Jawa Timur can be evidenced by the inflation rate during 2017 to 2021 which experienced fluctuating every year.

2. Literature Review

Manullang et al., (2020) with quantitative research and using secondary data obtained from data from the Central Statistics Agency data. Research methods are quantitative descriptive using Multicollinearity test, Autocorrelation Test, Normality Test, Linearity Test, Heteroskedasticity Test, Multiple Linear Regression with t test, f test and determination test. The results of this study are simultaneous exports, inflation and Investment affecting economic growth in Jawa timur Province.

Razak & Jaya, (2014) research with multiple regression analysis with research objects was in Indonesia in time brackets 2008-2012. The result of this study is that oil and gas and non-oil and gas exports both have a significant effect on economic growth in Indonesia. However, oil and gas exports do not have a statistical effect on economic growth while non-oil and gas exports have a positive effect on economic growth and are statistically very significant.

The same research is carried out by Daniel (2018) using quantitative approaches and research methods of simple linear regression analysis and the cohesion of people used to look at the influence and variables of inflation relations against economic growth. The results of this study show that inflation has a negative effect on economic growth.

Muritala, (2011) by using the model Econometrics confuses the Ordinary Least Square (OLS) technique. Regression results from this study show that the inflation coefficient is negative and significant at 10% while in Investment s marked positive and significant.

Hurri et al., (2020) using the Generalized Method of Moments (GMM) approach. The results of this study found that oil and gas exports no longer make a positive contribution to the economy of the growth area. The differences between non-oil and gas exports contributes positively to the economic growth area. Therefore, to encourage Regional economic reefs, regions must focus on expanding and creating added value and diversifying non-oil and gas commodities.

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Keynes suggested that economic activity depends on demand, that is, it depends on aggregate expenditures made in the economy at any given time (Utomo, 2021; Wildan, 2021). The aggregate expenditure in question is the expenditures made to buy goods and services produced by an economy in a certain period (measured for a certain year). The greater the aggregate expenditure carried out in the economy, the higher the level of economic activity achieved.

3. Method

In this research, the type of data used is quantitative descriptive in the form of secondary data by calculating the gross regional domestic product data in Jawa Timur Province. There is a scope of this research conducted in Jawa Timur Province from 2000 to 2021. The object of research is the focus of research to obtain data with a specific purpose about something objective (Sugiono, 2010). The object of research that researchers conducted was about the influence of oil and gas exports, Investment, and inflation on the economic growth of Jawa Timur province. the types of variables to be studied, which aim to explain the meaning of the variables used for research indicators. The definition of each variable is:

Dependent Variables (Y), Dependent variables are bound variables that are affected by independent variables, in this study included in the dependent variables are: Economic Growth (Y) To measure provincial economic growth then use Gross Regional Domestic Product (GRDP) based on constant prices in 2000 - 2021 which is expressed in the form of percent (%) which has been in log. Sourced from central statistics.

Independent Variables (X), Independent variable is a free variable that affects dependent variables, in this study there are (3) independent variables, namely: First, Oil and Gas Export (X1). Export is a trade activity (trade) where there is a sale of goods from within the country to abroad while import is the activity of entering goods into the region. customs. Oil and gas exports are international trade in the form of oil and gas transactions. Data in percent form (%) which has previously been logged from the multiplication between oil and gas exports (US Dollar) and exchange rates in that year, namely 2000 - 2021 sourced from central statistics.

Second independent variable is Investment (X2). The data used in this study is data in the form of percent (%) in logs from 2000 - 2021 sourced from Indonesian Investment Board. Third is inflation (X3). The inflation data used in this study is inflation data from 2000 to 2021 obtained from central statistics. The data presented is in the form of percent (%).

The type of data in this study is secondary data obtained from institutions or agencies that are directly related to the object of research. The data used is the Data of Gross Regional Domestic Product based on constant prices, Oil and Gas Exports, Investment, and Inflation in Jawa Timur Province. The data source from this study was obtained from the central statistics and Indonesian Investment Board of Jawa Timur Province. The analysis method used in this study is a double linear regression analysis with time-series data for the 2000-2021 period. Testing or processing data in this study using statistics software eviews12. This study uses multiple linear regression analysis methods based on previous studies that use multiple linear regression research methods. Here is a model of the multiple linear regression analysis with the time-series data used in the study.

$$LogY = \beta 0 + \beta 1\, LogX1 + \beta 2\, LogX2 + \beta 3\, LogX3 + e$$

Description:
Y = Economic Growth (GRDP) (Log)
β0 = Interception
β1 = Coefficient of oil and gas export variable
β2 = Coefficient of Investment variable
β3 = Coefficient of Inflation variable
X1 = Oil and Gas Export Variable (Log)
X2 = Investment Variable (Log)
X3 = Inflation Variable (Log)
e = Standard Error

4. Research Results

4.1. Data Analysis - Jaque Test – Bera

The Jaque bera test has an excellent ability to detect normality in residuals. In the test criteria used, the P-value > 0.05. From figure 3 it can be known that the P-Value value is 0.784480 and it can be assumed that normality and residual are fulfilled.

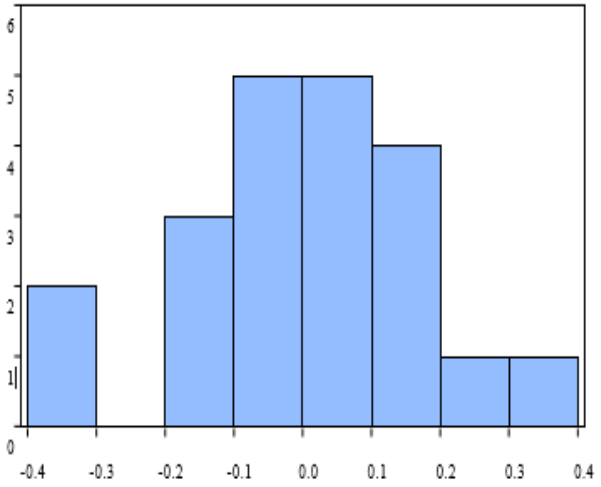

Fig.3: Jarque Test – Bera

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Series: Residuals Sample 2017 2021
Observation; 20

Mean -2.36e-15
Median 0.008019
Maximum 0.380804
Minimum -0.377652
Std. Dev. 0.169673
Skewness -0.204470
Kurtosis 3.622566

Jarque-Bera 0.485467
Probability 0.784480

4.1.1 Multicollinearity

From table 4 estimates in auxiliary regression models, it can be known that the coefficient of auxiliary determination in the oil and gas export variable as X1, Investment as X2, Inflation as X3 is smaller than the coefficient of determination in the main model, namely Economic Growth as varibel Y. By therefore it can be said that there is no multicollinearity in this data. Here are the estimated results of the Auxiliary Regression model:

Table 4. Results of Auxiliary Regression Model Estimates

Variable	R-Squared
GRDP (Y)	0.891835
Oil and Gas Export (X1)	0.557896
Investment (X2)	0.462833
Inflation (X3)	0.274952

4.1.2 Non – Heteroskedasticity

In this study, researchers used the Harvey Test as a consideration of Non Heteroskedasticity assumptions with the criteria Prob Ch > α (0.05). So based on table 5 it can be concluded that Non Heteroskedasticity is acceptable, or the test can overcome Heteroskedasticity.

Table 5. Non-Heteroskedasticity Test Results

Non-Heteroskedasticity	Prob. Chi-Square
Harvey Test	0.1095

4.1.3 Autocorrelation

Autocorrelation testing is to test the correlation between one observation and another and remain in the same variable. In classical assumptions, autocorrelation is the correlation between errors of one observation. Here are the results of research on autocorrelation using the Durbin Watson test.

DW	= 2.176132
k	= 3
n	= 20
Dl	= 0.9976
Du	= 1.6694
4-dL	= 3.0024
4-dU	= 2.3306

Hence, a Durbin Watson value of 2.176132 was obtained which was in the area, which means there is no autocorrelation in the data.

4.2 Multiple Linear Regression Analysis Results

4.2.1 Partial Test (t-Test)

The results of multiple linear regression tests are as intermediate:

Table 6. Multiple Linear Regression Test Results

Variable	Coefficient	St. Error	Prob F-Statistics	Prob t-Statistics	Information
C	3.359158	1.02168	0.000000	0.0061	Significant
Oil and Gas Exports	0.06117	0.01774	0.000000	0.0032	Significant
Investment	0.624249	0.07836	0.000000	0.0001	Significant
Inflation	-0.002135	0.01182	0.000000	0.0021	Significant

In Table 6 of the oil and gas export variables and Investment have a Prob t-Statistics value smaller than α (0.05) which means that the variables of Oil and Gas Export, Investment and inflation have a significant effect on economic growth reviewed from the GRDP at constant prices.

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4.2.2 F-test

From the results of the Multiple Linear Regression analysis, the value of Prob F-Statistics = 0.0000<α (0.05) so that it can be decided to reject H0. So, it can be concluded that at least one of the largest oil and gas exports, Investment and inflation is significant and affects economic growth.

4.2.3 R-Square

Refer to table 4, the determination testing (R-Square) was used because the study used three variables and the R-Square result was 0.891835 or 89.18%. So, it can be concluded that the variables of oil and gas exports, Investment and inflation can explain the economic growth of Jawa Timur by 89.18%.

4.3 Effect of Oil and Gas Exports on Economic Growth

Based on table 6 Oil and Gas Exports have a Prob t-Statistic value of 0.0032 which means that the value is smaller α (0.05) thus it can be concluded that Oil and Gas Exports have a significant positive effect on economic growth. This research is in accordance with research from (Fahriza & Hartono, 2018) that oil and gas exports also have a significant effect on economic growth. But in research (Razak & Jaya, 2014) and (Hurri et al., 2020) is different that is Oil and gas exports have no statistical effect and have a positive effect on economic growth.

Uncertain world oil price factors and Indonesia's poor energy efficiency levels exacerbate this situation. However, in contrast to this study, significant results can occur because the natural resources of oil and gas have become a boon for the province of Jawa Timur which has succeeded in encouraging sectors outside oil and gas. To grow faster than other provinces.

4.4 The Effect of Investment on Economic Growth

Investment is an investment in a region for one or more assets owned and usually timed lama in the hope of making a profit in the future (Sunariyah, 2010). The Investment variable used as a Control variable. Based on table 6, the value of Prob t- Statistics of 0.0001 means that the value of Investment is smaller than α (0.05) so it rejects H0. Thus, it can be concluded that Investment has a significant positive effect on economic growth. The theory of classical flow economic growth, Harrod - Domar, states that Investment is the key to increasing economic growth where foreign Investment or Investment acts as a capital enhancer so that it can grow a country's economy. This study shows the significant impact of foreign Investment on economic growth, so it is in line with studies (Manullang et al., 2020; Bakari, 2019; Sutawijaya, 2010).

4.5 Effect of Inflation on Economic Growth

An increase that occurs only once (even with a large enough percentage) is not inflation. (Nopirin, 2009). In inflation testing has a Prob t-Statistics value of 0.021 which means that the value is smaller α (0.05) so that it can rejects H0 thus it can be concluded that Inflation is Significant and negatively affect economic growth. This is in line with research from (Daniel, 2018), (Muritala, 2011), and (Hussain & Malik, 2011) which states that inflation has a significant negative effect on economic growth. In some conditions (soft inflation conditions), inflation can encourage economic growth and can encourage entrepreneurs to expand their production (Indriyani, 2018; Akinsola & Odhiambo, 2019).

5. Conclusion

This study examined the impact of Oil and Gas Exports, Investment, and Inflation on economic growth by using GRDP at constant prices using quantitative descriptive approaches and linear regression analysis beganda with annual data from 2000 to 2021. Based on the results of research discussion on Oil and Gas Exports, Investment and Inflation as independent variables to economic growth as dependent variable in Jawa Timur province, the author can conclude that Oil and Gas Exports, Investment and Inflation have a considerable influence on the economy of Jawa Timur, which is 0.891 or 89,18 percent influenced by oil and gas exports, Investment and inflation and the rest of the 13.32 percent is disrupted by other factors outside the model.

The influence of Oil and Gas Exports and Investment on Jawa Timur's economic growth has a significant positive effect where it can be seen from the Prob t-Statistics of Oil and Gas Exports of 0.0032 and Investment of 0.0000. Variables of Oil and Gas Export and Investment have a Prob t-Statistics Value smaller than α (0.05) which means export variables. Oil and gas and Investment have a significant effect on economic growth reviewed from the GRDP at constant prices. While in the inflation variable of 0.5277 the value of Prob t-Statistics is greater than α (0.05) which means that the inflation variable is insignificant and has a negative effect on the GRDP.

6. Suggestion

After a series of tests and discussions on the influence of Oil and Gas Exports, Investment, and Inflation on economic growth by using GRDP based on constant prices in 2017-2021 Jawa Timur Province. Hence, to increase economic growth in oil and gas exports, the government must be wise in exporting, especially oil and gas. Because it is known that oil and gas is a natural

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resources that cannot be renewed. The formation of oil and gas on earth requires a process that takes up to millions of years. This has implications for the availability of rare oil and gas SDA. Therefore, the government must ensure that the oil and gas sector, therefore the government can encourage economic growth over a long period of time by making policies. The community can help the problem of inflation by investing in the country because the increase in Investment will increase the production of goods and services in the market so that people's needs can be met, and prices can be controlled within reasonable limits so that inflation can be reduced. This research is expected to provide insights and references for the next research related to Oil and Gas Exports, Investment, and Inflation to economic growth reviewed from the GRDP.

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