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The Role of Inflation and Interest Rates on Economic Growth in a Special Autonomy Province, Indonesia (1989-2018)

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This study aims to investigate the relationship between inflation, interest rates, and economic growth in Aceh Province, Indonesia. The method of data analysis is the Vector Error Correction Model (VECM) using the corpus Time Series from 1989 to 2018. Inflation has a negative impact on short-term and long-term economic growth. While the interest rates show impact, it is positively significant in the short term. Besides, there is no Granger relationship in the long run in Aceh Province, Indonesia. However, interest rates only affect economic growth in the long run.

Key words: *Inflation, interest rate, economic growth, Indonesia.*

Introduction

Inflationary pressures do not only have an impact on consumption but can also affect increased investment and decreased economic development. The development of interest rates will reduce inflation because of the small amount of money in circulation (Yodiatmaja, 2012). Conversely, increasing interest rates can reduce investment because capital costs from investors are greater so that they are unable to expand their business. The development of interest rates in 2016 to 5.98% (Bank Indonesia, 2016), with inflation in Aceh Province amounted to 5.21% of the economic growth of 4.31% (Aceh in number, 2016). Furthermore, the interest rate in 2017 was 4.75% (Bank Indonesia, 2017), with inflation developing at 4.25% and economic growth in Aceh Province reaching 4.19% (Aceh in number, 2017). This situation has an impact on reducing investment, reducing economic activity, decreasing consumption, and limiting employment opportunities.

Inflation tends to decline more in 2018 than in 2017, at a rate of 3.55% and an interest rate of 6% (Bank Indonesia, 2018). This encourages an increase in investment that can create jobs and increase the real sector so that it impacts on the economic growth rate of 4.49% in Aceh Province. However, in the last 10 years, there has been a phenomenon of rising interest rates, followed by rising inflation and decreasing investment that has had an impact on economic growth.

Several studies on inflation have been conducted, such as Ismail et al. (2010) on inflation significantly, which positively affects economic growth in general. However, inflation negatively affects economic growth in the short term. In the long run, inflation also negatively affects economic growth. Mallik and Chowdhury (2001) state that the low inflation has a positive correlation with economic growth in some countries; Gylfason (1999) explains that inflation can reduce GDP growth, and Lim (2004) indicates that inflation can achieve short-term stabilisation.

Furthermore, interest rates correlate with economic growth. In most monetary policy regimes, interest rates are used as policy instruments to achieve low inflation rates and stabilise the economy (Obansa et al., 2013). Sans (2006) states that low rates of savings and investment can influence the growth of the economy. Low interest rates would promote investment spending and developing economies (Odhiambo, 2008). Indriyani (2016) states that economic growth in Indonesia can be influenced by inflation and interest rates simultaneously.

Some of the studies mentioned above confirm that there is a strong relationship between economic growth, inflation, and interest rates. The objective of this paper is to examine the role of inflation and interest rates on the growth of the economy in the special autonomy province in Indonesia by using time-series data from 1989-2018.

Literature Review

Economic Growth

The success indicators of the economic development of a country can be seen from economic growth. Adam Smith from the Classical School of Economics argues that economic growth is caused by the influence of population growth, where the population increases, and the value of output increases (Sukirno, 1999). Schumpeter (1999) argues that economic growth occurs due to the influence of innovation in production or economic activity. Horrod-Domar argues that economic growth is caused by (1) achieving full capacity of capital goods, (2) increasing national savings, and (3) increasing a constant value of the capital-output ratio (Sukirno, 2008).

Robert M. Solow (1970) from the United States and T.W. Swan from Australia (1956) put forward the theory of neo-classical economic growth, which is mentioned by the Solow-Swan model, in that economic growth occurs when there is capital accumulation, technological progress, and the magnitude of the interaction of output. Arsyad (2010) states that the factors that can affect economic growth consist of; (1) capital accumulation, where economic growth occurs with increased investment; (2) population growth that can increase the number of workers; and (3) technological advances that can increase labour mobility and skills, as well as production factors in increasing output.

Inflation

There has been a debate between classical economics, neo-classical, Keynesian and monetarists about the factors that influence the causes of inflation in an economy, which consist of: (1) Demand Pull-Inflation is inflation caused more by an increase in demand, which cannot be followed by an increase in supply; (2) Cost push-inflation is inflation caused by an increase in production costs; (3) inflation caused by imports (Nopirin, 1992, Susanti et al, 1990, Denburg, 1994, Zakaria, 2009, Sukirno, 2013).

Monetarists argue that the cause of inflation is predominantly caused by excess demand from the public, while neo-Keynesians who support the monetarists say that the expansion of money supply and excess aggregate demand causes inflation (Nopirin, 1987; Susanti et al., 1990). Furthermore, the classification of inflation from pressure, according to Boediono (1995), is (1) mild inflation below 10% per year; (2) moderate inflation between 10-30% a year; (3) severe inflation between 30-100% a year and (4) hyper-inflation above 100% a year. Inflation also affects the rate of economic growth, where an increase in inflation impacts; (1) unequal income distribution; (2) the source of funds for investment decreases in line with the lack of state coffers; (3) deficit the trade balance and (4) the occurrence of political instability (Zakaria, 2009).

Interest Rate

Interest rates can play a role in increasing economic growth, whereby if interest rates decline it can reduce inflation and increase capital accumulation (investment), thereby encouraging economic growth. Sukirno (1994) explains that low-interest rates can stimulate the business world because it can expand investment. Furthermore, Sunariyah (2004) states that the function of interest rates consists of: (1) encouraging or stimulating savers to invest their funds; (2) controlling the money supply; (3) controlling and regulating the running of the money supply.

Methodology

To examine the effect of inflation and interest rates on economic growth in Aceh Province, this study uses secondary data in the form of time-series data from 1989 to 2018. The data regarding inflation and economic growth was obtained from Aceh Dalam Angka, 1989-2018, while the interest rate data was obtained from Bank Indonesia. Johansen's co-integration technique is used to find the relationships between the variables. The estimation model is below:

$EG = \alpha + \beta 1INF + \beta 2IR + e$

Where: EG is economic growth, INF is inflation, IR is the interest rate, α is a constant, β1, β2 is the regression coefficient, and e is a disturbance.

Unit Root Test

The unit root test uses the Augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1981). The ADF test is used statistically to determine the unit root test from time-series data; the unit root test equation is:

$$\Delta Y_t = \beta_1 + \beta_2 + \delta Y_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta Y_{t-1} + \varepsilon_t$$

ΔY_t is the first derivative of Yt time-series data (Yt - Yt-1. β1 ialah intercept, εt the error term and m is the lag length.

Counteraction Test

The counteraction test uses the Johansen and Juselius (1990) method, which is based on the maximum likelihood estimation and likelihood ratio statistical tests through the maximum Eigen test value or trace test. The two statistical values are the Statistic Trace Test:

$$\lambda_{trace}(\bar{r}) = -T \sum_{j=r+1}^{n} \ln(1 - \lambda_j)$$

Maximum Eigen Test Value Statistics:

$$\lambda_{max}(\bar{r}) = -T \ln(1 - \lambda_{r+1})$$

λtrace (r) is a trace statistic test and λmax (r) is a statistical test of the maximum eigenvalue, $\bar{r}$ is the rank of counteraction vector, T is the number of samples, and λi is the eigenvalue with a matrix ∏.

VECM Model

The VECM model assumes that short-term imbalances in a certain time series can be corrected in the next time series. Therefore, the VECM will measure the extent of the system that comes out of short-term balance. The VECM model is deviated from the VAR (Autoregressive Vector) model, as follows:

$$\Delta Y_t = \sum_{i=1}^{n} A_i \, \Delta Y_{t-1} + \sum_{i=1}^{t} \varsigma_i \, \Theta_{t-1} + v_t$$

Where;
Y_t = in the form of vector n x 1
A_t and ςi = estimated parameter
Δ = derivative operator
V_t = cause and effect vector that explains the unexpected movements in Y_t and Θ.

Therefore, VECM can measure a system, whether it gets out of short-term balance or not.

Results and Implications

The results of the study consist of the unit root test, counteraction test, and the vector error correction model test and their implications are :Unit Root Test The unit root test is used to avoid false regression from time-series data from 1989 to 2018. The unit root test results use the Augmented Dickey-Fuller (ADF) method, and the results are in the following table:

Table 1: ADF - Unit Root Estimation

Variables	**Unit Root Test**	**ADF Test Statistics**	**Critical Value 5%**	**Information**
EG	Level I (0)	-2.916500	-2.967767	Not stationer
	First Different I(I)	-6.634789	-2.971853	Stationer
INF	Level I (0)	-5.179833	-2.967767	Stationer
	First Different I(I)	-6.537146	-2.976263	Stationer
IR	Level I(0)	-3.064824	-2.967767	Stationer
	First Different I (I)	-8.436134	-2.971853	Stationer

Mark**(***) rejects H0 and shows significant stationary variables at 5% and 1%

Table 1 shows that EG, INF, and IR are not stationary at level I (0) because the critical value> ADF test value is significant at 5% and 1% levels. Therefore, it needs to be done on the first difference I (I). The stationary test of EG, INF, and IR on the first difference I (1) shows the ADF value> of the critical value at the levels of 5% and 1%. So, the three variables are stationary.

Cointegration Test

The Cointegration Test serves to show the long-term relationship (balance). The Johansen cointegration test uses the Trace statistical test (**λTrace**) and the Max statistical test (λ_{Max}), and both of the statistical test values are compared with the critical value of Oswald-Lenum (1992) at the 5% significance level.

Table 2: Cointegration Test Results (Model 2)

Hypothesised No. of CE(s)	λTrace	λMax	0.05 Critical value	0.05 Critical value
None *	34.87480	30.84756	24.27596	17.79730
At most 1	4.027247	3.145541	12.32090	11.22480
At most 2	0.881706	0.881706	4.129906	4.129906

* Significant at 5%. The critical value is obtained from Osterwald-Lenum (1992).

The cointegration test in table 2 shows a Statistical Trace with a vector equation that co-integrates at a 5% significance level and a max-eigenvalue statistic, as well as the results of a vector equation, cointegrated at a significant level of 5%. This shows the long-term relationship of PE, INF, and SB, where the null hypothesis is rejected with a statistical trace, and one vector equation co-integrates with the Max-Eigen statistical.

Table 3: The Results of Long-Term Relationship of VECM Model

Variables	Coefficient	t-statistic
C	-12.57091	
INF(-1)	-3.643530	-6.95896***
IR(-1)	3.874767	6.80655***

*** Significant at 1%.

The results based on Table 3 show that inflation has a significant negative effect on economic growth in the long run due to an increase in the cost of transporting capital goods and some

raw materials imported from North Sumatra. This shows that in the long-run inflation can reduce investment in the real sector, where the production costs of the real sector increase, namely the increase in the prices of raw materials and capital goods that have an impact on output decline. Furthermore, the results of research in Aceh province in Table 3 show that in the long-run interest rates have significantly positive effects on economic growth, where an inverse effect occurs, namely an increase in interest rates followed by an increase in inflation. This means interest rates go up, and the money supply also increases. This has caused an inability to increase investment in the real sector, where an increase in production costs and capital costs and investors are also stimulated to deposit their capital.

Table 4: The Results of Long-Term Relationship of VECM Model

Variable	Coefficient	t-statistic
ECTt-1	-0.071528	-1.54188
D(INF(-1))	-0.218323	-2.67583**
D(SB(-1))	0.206057	1.29750

** Significant at 5%.

The value of ECTt-1 based on the results of the study in Table 4 is not significant, where all the independent variables do not occur speed of adjustment or do not bear the burden of lagging long-term balance adjustment or the intangible Granger relationship. Furthermore, the results of the study in Table 4 show that inflation has a significant negative effect on economic growth in the short term in Aceh province. This means that an increase in inflation has an impact on rising prices for consumer goods and decreasing public consumption. This means that an increase in inflation has an impact on rising prices for consumer goods and decreasing public consumption. In the short term, there is a shock, and an increase in inflation can swallow an increase in economic growth. This means that an increase in economic growth occured but has not been able to improve the welfare of the community as a result of rising inflation in Aceh province.

Conclusion

This paper empirically investigates the role of inflation and interest rates on economic growth in a special autonomy province in Indonesia by using the Johansen Counteraction Technique in 1989-2018. The empirical results reveal that inflation influences negatively on economic growth in the long run. This is caused by an increase in the cost of transporting capital goods and raw materials from the province of North Sumatra. The increase in the price of capital goods and raw materials has an impact on the decline in output. Inflation can reduce investment in the real sector and increase production costs. Besides, interest rates have a positive effect on economic growth and an increase in inflation, and it can cause an increase in the amount of money in circulation. Investment cannot increase in the real sector due to an

increase in production costs and capital costs. This condition can stimulate investors to deposit their capital.

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