Analysis of Inflation Rate and Its Impact on Economic Growth in Indonesia from 2011 to 2023

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Abstract - This article analyzes the relationship between the inflation rate and economic growth in Indonesia over the period 2011–2023. Inflation, influenced by both domestic and global factors, has shown significant fluctuations, while economic growth has also experienced varying dynamics. Recent data indicate moderate inflation in 2023 at approximately 2.28%, with economic growth projected to reach 5.0%. This study aims to understand the impact of inflation on economic growth and provide policy recommendations to support economic stability and sustainable growth.

Keywords—(inflation, economic growth, Indonesia, CPI, GDP, policy, stability).

I. INTRODUCTION

Inflation and economic growth are two critical indicators that are closely interconnected in the economic analysis of a country. Inflation, measured through the Consumer Price Index (CPI), reflects changes in the prices of goods and services in the economy. In Indonesia, inflation has been a primary focus for the government and Bank Indonesia, particularly in maintaining economic stability. As of 2023, the annual inflation rate was recorded at 2.28%, lower than the previous year's figure

of 4.14%. This decline highlights the effectiveness of monetary policies and the synergy between central and local governments in controlling inflation through various price stabilization programs.

Indonesia's economic growth has also demonstrated significant dynamics. In 2023, the economy grew by 5.0% year-on-year (y-o-y), driven by household consumption, which contributed 54.53% to the Gross Domestic Product (GDP). Increased public mobility and stable production activities have further strengthened this economic growth. However, challenges remain, particularly in balancing growth and inflation.

This study aims to explore the impact of inflation on economic growth in Indonesia from 2011 to 2023. Using time-series data, this analysis seeks to identify the relationship between these two variables and the policy implications required to support sustainable economic growth. The findings of this study are expected to provide valuable insights for policymakers in formulating effective strategies to address future economic challenges.

In a constantly evolving global context, understanding the interaction between inflation and economic growth is increasingly essential to ensure long-term stability and prosperity for the Indonesian people.

II. LITERATURE REVIEW

The relationship between inflation and economic growth is a critical area of study in understanding Indonesia's economic dynamics. Inflation, measured through the Consumer Price Index (CPI), has shown fluctuations influenced by domestic and global factors. In 2023, inflation moderated to 2.28%, down from 4.14% in 2022, reflecting the effectiveness of monetary policies implemented by Bank Indonesia. Meanwhile, Indonesia's economy grew by 5.0% year-on-year, driven primarily by household consumption, which contributed 54.53% to GDP. Increased public mobility and stable production activities further supported this growth. Research suggests that moderate inflation can stimulate economic growth by encouraging spending and investment, while high inflation may hinder long-term stability. Studies highlight the importance of balancing inflation and growth dynamics to ensure sustainable economic development. Effective monetary policies and collaboration between central and local governments have proven essential in managing inflation and supporting growth. Policymakers are encouraged to adopt strategies that balance short-term measures with long-term sustainability to navigate future economic challenges. Understanding this interplay remains crucial for ensuring Indonesia's long-term economic stability and prosperity.

III. METHOD

A. Data Collection

The data used in this study were obtained from Bank Indonesia (BI) and the Indonesian Central Bureau of Statistics (BPS). The dataset includes information on national inflation rates and economic growth in Indonesia for the period from Q1 2011 to Q4 2023. Inflation is measured as the percentage increase in the general prices of goods and services over a given period, while economic growth is calculated based on the percentage change in Gross Domestic Product (GDP) over the same period. Below is the data obtained from BI and BPS.

- Data Inflasi
  https://www.bi.go.id/id/statistik/indikator/data-inflasi.aspx

- Data Pertumbuhan Ekonomi
  https://www.bps.go.id/id/statistics-table/2/MTA0IzI=/pertumbuhan-ekonomi--triwulan-i-2024.html

Tahun	Triwulan	Inflasi	Pertumbuhan Ekonomi
2011	I	6,84	6,48
2011	II	5,89	6,27
2011	III	4,67	6,01
2011	IV	4,12	5,94
2012	I	3,73	6,11
2012	II	4,49	6,21
2012	III	4,48	5,94
2012	IV	4,41	5,87
2013	I	5,26	5,54
2013	II	5,65	5,59
2013	III	8,6	5,52
2013	IV	8,36	5,58
2014	I	7,76	5,12
2014	II	7,09	4,94
2014	III	4,35	4,93
2014	IV	6,47	5,05
2015	I	6,54	4,83
2015	II	7,07	4,74
2015	III	7,09	4,78
2015	IV	4,83	5,15
2016	I	4,34	4,94
2016	II	3,46	5,21
2016	III	3,02	5,03
2016	IV	3,3	4,94
2017	I	3,64	5,01
2017	II	4,29	5,01
2017	III	3,81	5,06
2017	IV	3,5	5,19
2018	I	3,28	5,07
2018	II	3,25	5,27
2018	III	3,09	5,17
2018	IV	3,17	5,18
2019	I	2,62	5,06
2019	II	2,81	5,05
2019	III	3,4	5,01
2019	IV	2,95	4,96
2020	I	2,87	2,97
2020	II	2,27	-5,32
2020	III	1,43	-3,49
2020	IV	1,57	-2,17
2021	I	1,43	-0,69
2021	II	1,48	7,08
2021	III	1,57	3,53
2021	IV	1,76	5,03
2022	I	2,29	5,02
2022	II	3,79	5,46
2022	III	5,19	5,73
2022	IV	5,55	5,01
2023	I	5,24	5,04
2023	II	3,95	5,17
2023	III	2,87	4,94
2023	IV	2,68	5,04

Figure 1. Inflation and Economic Growth

B. Methodology

Statistical analysis was conducted using a linear regression method to explore the relationship between the inflation rate (independent variable) and the economic growth rate (dependent variable). Linear regression was employed to determine the regression coefficients that indicate the strength and direction of the relationship between these two variables. Before performing the linear regression,

the data were examined to ensure that none of the regression assumptions were violated, such as homoscedasticity, normality, and multicollinearity of residuals. Hypotheses were tested using p-values to determine the statistical significance of the obtained regression coefficients. The analysis was performed using statistical software.

IV. RESULT AND ANALYSIS

A. Data Grouping Based on Inflation Rate

```
> median_inflasi <- median(data$Inflasi)
> data <- data %>%
+   mutate(InflasiGroup = if_else(Inflasi <= median_inflasi, "Rendah", "Tinggi"))
> # Tampilkan ringkasan per kelompok
> data %>%
+   group_by(InflasiGroup) %>%
+   summarise(
+     Rata2_Inflasi = mean(Inflasi),
+     Rata2_Pertumbuhan = mean(PertumbuhanEkonomi),
+     n = n()
+   )
# A tibble: 2 × 4
  InflasiGroup Rata2_Inflasi Rata2_Pertumbuhan     n
  <chr>                <dbl>             <dbl> <int>
1 Rendah                2.74              3.83    26
2 Tinggi                5.63              5.40    26
```

The data is grouped by inflation rate to assess its impact on economic growth. The median inflation is calculated and used as the grouping threshold, assigning labels of "Low" (inflation ≤ median) and "High" (inflation > median). The results of this grouping are summarized by category, with each group containing 26 observations. In the "Low" group, the average inflation rate is approximately 2.74%, with an average economic growth rate of 3.83%, while the "High" group shows an average inflation rate of around 5.63% and an average economic growth rate of 5.40%. This grouping serves as the basis for a two-sample t-test analysis and further comparative evaluations.

B. Descriptive Analysis

```
> summary(data)
     Tahun        Triwulan            Inflasi      PertumbuhanEkonomi   QuarterNum     YearQuarter
 Min.   :2011   Length:52         Min.   :1.430   Min.   :-5.320     Min.   :1.00   Min.   :2011
 1st Qu.:2014   Class :character  1st Qu.:2.930   1st Qu.: 4.940     1st Qu.:1.75   1st Qu.:2014
 Median :2017   Mode  :character  Median :3.800   Median : 5.055     Median :2.50   Median :2017
 Mean   :2017                     Mean   :4.184   Mean   : 4.617     Mean   :2.50   Mean   :2017
 3rd Qu.:2020                     3rd Qu.:5.245   3rd Qu.: 5.525     3rd Qu.:3.25   3rd Qu.:2021
 Max.   :2023                     Max.   :8.600   Max.   : 7.080     Max.   :4.00   Max.   :2024
 InflasiGroup
 Length:52
 Class :character
 Mode  :character

> str(data)
'data.frame':   52 obs. of  7 variables:
 $ Tahun             : int  2011 2011 2011 2011 2012 2012 2012 2012 2013 2013 ...
 $ Triwulan          : chr  "I" "II" "III" "IV" ...
 $ Inflasi           : num  6.84 5.89 4.67 4.12 3.73 4.49 4.48 4.41 5.26 5.65 ...
 $ PertumbuhanEkonomi: num  6.48 6.27 6.01 5.94 6.11 6.21 5.94 5.87 5.54 5.59 ...
 $ QuarterNum        : num  1 2 3 4 1 2 3 4 1 2 ...
 $ YearQuarter       : 'yearqtr' num  2011 Q1 2011 Q2 2011 Q3 2011 Q4 ...
 $ InflasiGroup      : chr  "Tinggi" "Tinggi" "Tinggi" "Tinggi" ...
```

Descriptive analysis was conducted to provide an overview of the data distribution. Using the `summary()` and `str()` functions, it was found that the inflation rate ranges from 1.43% to 8.60% (median: 3.80%), while economic growth ranges from -5.32% to 7.08% (median: approximately

5.055%). This information confirms that the data exhibits sufficient variability for further analysis and facilitates the interpretation of subsequent statistical analysis results in later stages.

C. Inflation Fluctuation
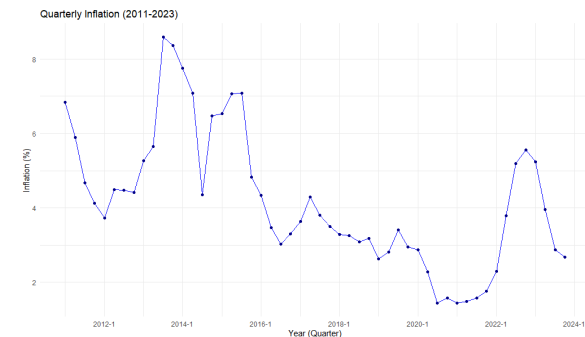
This graph displays quarterly inflation fluctuations and trends from 2011 to 2023 using lines and markers, facilitating the identification of seasonal patterns and long-term trends.

D. Economic Growth Fluctuation
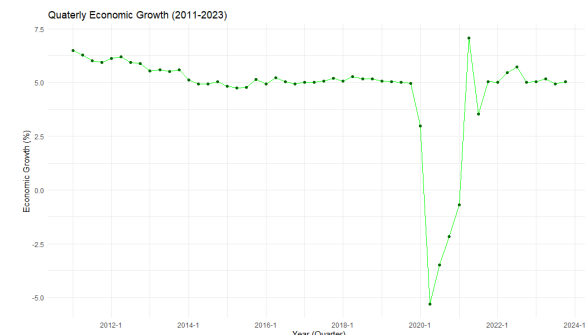
This graph is created to display the fluctuations in economic growth from 2011 to 2023, allowing for the observation of changes and volatility in economic growth over time.
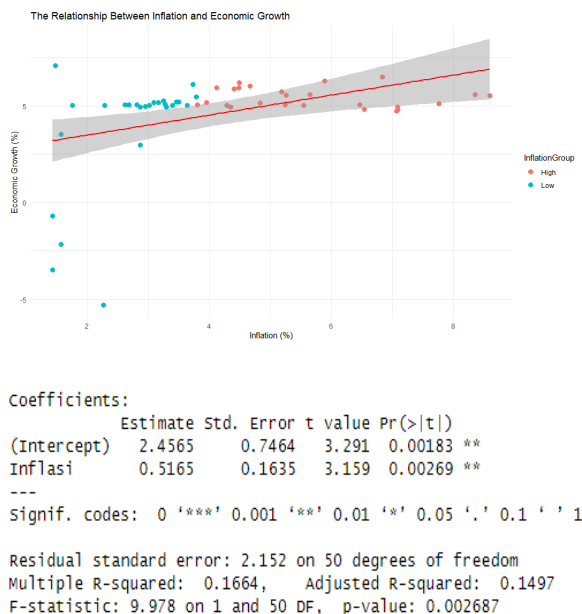
E. T-Test Result

```
        Welch Two Sample t-test

data:  PertumbuhanEkonomi by InflationGroup
t = 2.5508, df = 26.383, p-value = 0.01688
alternative hypothesis: true difference in means between group High and group Low is not equal to 0
95 percent confidence interval:
 0.3055143 2.8321780
sample estimates:
mean in group High  mean in group Low
          5.401923           3.833077
```

To examine whether differences in inflation rates affect economic growth, a two-sample t-test was conducted to compare the average economic growth between the "Low" and "High" groups. The hypotheses proposed for the t-test are: Null Hypothesis (H0): The average economic growth in the low inflation group is equal to that in the high inflation group. Alternative Hypothesis (H1): There is a difference in average economic growth between the two groups.

The t-test results show a t-value of -2.5508 with a p-value of approximately 0.01688, indicating a statistically significant difference between the groups. Specifically, the low inflation group had an average economic growth of around 3.83%, while the high inflation group achieved an average of approximately 5.40%. These findings suggest that inflation levels have an impact on economic growth, although this analysis does not directly determine the direction of the influence.

F. Regression Analysis

The Relationship Between Inflation and Economic Growth

```
Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   2.4565     0.7464   3.291  0.00183 **
Inflasi       0.5165     0.1635   3.159  0.00269 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 2.152 on 50 degrees of freedom
Multiple R-squared:  0.1664,    Adjusted R-squared:  0.1497
F-statistic: 9.978 on 1 and 50 DF,  p-value: 0.002687
```

The regression model constructed yields an intercept of 2.4565, indicating the value of economic growth when inflation is zero, and an inflation coefficient of 0.5165 (p-value 0.00269). This value suggests that every 1% increase in inflation is associated with an approximately 0.52% increase in economic growth, supporting the alternative hypothesis that the effect is positive and significant. However, the R-squared value of 0.1664 indicates that only about 16.64% of the variation in economic growth can be explained by the inflation variable, implying that other factors also play a role in determining economic growth.

G. Correlation Test

```
        Pearson's product-moment correlation

data:  data$Inflasi and data$PertumbuhanEkonomi
t = 3.1588, df = 50, p-value = 0.002687
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.1518761 0.6125858
sample estimates:
      cor
0.4078713
```

The correlation test results show a correlation coefficient of 0.4079 with a p-value of 0.002687, indicating a significant positive relationship between inflation and economic growth. This finding aligns with the regression analysis results, suggesting that an increase in inflation tends to be associated with an increase in economic growth.

V. CONCLUSION

Based on quarterly inflation and economic growth data from 2011 to 2023, the analysis reveals significant differences in economic growth between high and low inflation groups. By grouping the data based on the median inflation rate (3.80%), it was found that the average economic growth in the high inflation group (above the median) was 5.40%, while in the low inflation group (below the median), it was only 3.83%. This indicates that when inflation is higher, economic growth tends to be lower compared to periods of low inflation.

Next, a two-sample t-test was conducted to test the hypothesis of whether there is a significant effect of inflation on economic growth between the two groups. The t-test results show a t-value of 2.5508 with a p-value of 0.01688. Since the p-value is less than the significance level $\alpha = 0.05$, the null hypothesis (H0), which states that inflation does not have a positive and significant effect on economic growth, is rejected. Thus, there is statistical evidence

that the inflation rate affects economic growth. From the simple linear regression analysis, the following model was obtained: Economic Growth = 2.4565 + 0.5165 x Inflation

The inflation regression coefficient of 0.5165 indicates that for every 1% increase in inflation, economic growth increases by 0.5165%, assuming other factors remain constant. This result is statistically significant (p-value = 0.00269), meaning the relationship between inflation and economic growth is relatively strong. However, the R^2 value of 0.1664 indicates that only 16.64% of the variation in economic growth can be explained by inflation, while the remainder is influenced by other factors.

Additionally, the Pearson correlation test between inflation and economic growth yields a correlation coefficient of 0.4079, with a p-value of 0.00269. This indicates a moderate positive relationship between inflation and economic growth, meaning that as inflation increases, economic growth also tends to increase, although the relationship is not very strong.

Based on all these analyses, it can be concluded that there is a significant positive relationship between inflation and economic growth in Indonesia during the 2011–2023 period. However, since this relationship is not very strong (low R^2), other factors such as monetary policy, investment, and political stability likely play important roles in influencing economic growth. Therefore, while higher inflation may be associated with greater economic growth, it is important to note that excessively high inflation can have negative consequences, such as reduced purchasing power and increased economic uncertainty.

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