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Analysis Of The Effect Of Fluctuations In The Price Of Cayenne Pepper And Shallots On Inflation In South Sulawesi Province

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Abstract

This study aims to analyze the fluctuations in the price of cayenne pepper and shallots in South Sulawesi Province and to analyze the effect of fluctuations in the price of chili peppers and shallots on inflation in South Sulawesi Province. The method used is a quantitative method with a descriptive approach with an analysis tool using Vector Autoregression (VAR).The results of the study conclude that the development of cayenne pepper and onion commodity prices in the period 2020-2024 can be said to tend to fluctuate, Based on the results of the Impulse Response Function (IRF) analysis, it can be concluded that the shocks that occur in the variables of cayenne pepper prices, onion prices and inflation only have an effect in the short term. Based on the results of the FEVD test for the next 12 periods, it can be concluded that inflation is still the most dominant factor in explaining inflation variations, with a contribution of around 73.62% in the final period. However, the price of cayenne pepper has a slightly greater influence (13.51%) compared to shallots (12.87%) on changes in inflation.

Keywords: Inflation, Cayenne Pepper and shallots

INTRODUCTION

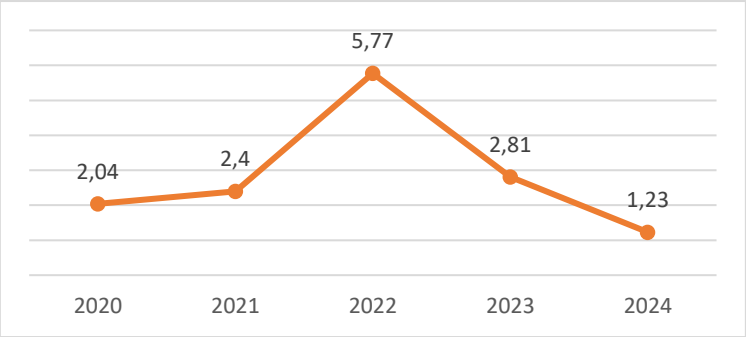
Indonesia is an agricultural country with a rich diversity of flora and fauna, which has the potential to meet its food needs independently. Indonesia's geographical location, which straddles the equator, also contributes to favorable weather conditions for agriculture, and a relatively high population of farmers.

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One of Indonesia's frequent economic challenges is inflation (Rizaldy, 2017). Inflation can be used to measure a country's economic stability (Silvia et al., 2013). Inflation can be defined as a persistent increase in the prices of goods and services in a country. A price increase for one or two goods cannot be considered inflation unless it also leads to increases in other goods and services (Utomo, 2013).

According to data from the Central Statistics Agency (BPS South Sulawesi), year-on-year inflation of 1.23 percent occurred in 2024. This indicates that the overall price of goods and services increased by 1.23 percent throughout 2024. The year-on-year inflation rate in 2024 was the lowest in the last five years, with the highest being 5.77 percent in 2022. The following is the inflation data for South Sulawesi province for 2020-2024.



Source: Central Statistics Agency of South Sulawesi Province

Throughout 2024, year-on-year inflation in South Sulawesi showed a significant downward trend. The year began with relatively high figures, but declined consistently until the end. Inflation peaked in February at 2.93 percent. The lowest point was reached in December at 1.23%, indicating increasing price stability towards the end of the year.

One agricultural product that can impact inflation in a region is cayenne pepper and shallots, due to their volatile prices. Increases in the prices of cayenne pepper and shallots can trigger increases in the prices of other goods and services, thereby reducing people's purchasing power.

Cayenne pepper and shallots are included in the food and beverage category, one of the eleven expenditure groups used as a reference for calculating inflation in a region.

Based on the above background, the author is interested in conducting a study entitled "Analysis of the Effect of Price Fluctuations in Cayenne Pepper and Red Onions

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on Inflation in South Sulawesi Province". This study also aims to analyze price fluctuations in cayenne pepper and red onions in South Sulawesi Province and analyze the effect of price fluctuations in chili and red onions on inflation in South Sulawesi Province.

RESEARCH METHODS

This research was conducted in South Sulawesi Province. The location was chosen purposively, as South Sulawesi Province has diverse regions, with some areas serving as producer centers and others as consumer centers. The study period was November 2025 to December 2026. This study used secondary time series data obtained from the South Sulawesi Provincial Statistics Agency (BPS), the Strategic Food Price Information Center (PIHPS), and the South Sulawesi Provincial Agriculture Office. The data used in this study were monthly, from January 2020 to December 2024, consisting of consumer food price data in South Sulawesi Province and monthly inflation data for South Sulawesi Province.

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The method used is a quantitative method with a descriptive approach, using Vector Autoregression (VAR) as an analytical tool, a model used to analyze interrelated relationships between economic variables that can be estimated without involving exogenous variables. In this method, all variables used are considered endogenous (Ariefianto, 2012). The data used is secondary time series data from January 2020 to December 2024. The VAR model was constructed using a theory-minimizing approach with the aim of accurately capturing economic phenomena. The VAR model is also known as a non-structural or non-theoretical model (Juanda and Junaidi, 2012).

There are several stages in conducting a VAR analysis, namely:

1. Data stationarity test

Data stationarity test is crucial if the data used is in time series format. This is because time series data generally contains a unit root, and the mean and variance values change over time.

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2. Determining the Optimal Lag

Another important aspect of VAR is determining the lag. Optimal lag is necessary to capture the influence of each variable on other variables in the VAR system. Optimal lag can be determined using various criteria, namely: Likelihood Ratio (LR), Akaike Information Criterion (AIC), Schwarz Criterion (SC), Final Prediction Error (FPE), and Hannan-Quinn Criterion (HQ) (Juanda and Junaidi, 2012).

3. Model Stability Test

VAR stability testing is performed by calculating the roots of the polynomial function. If the absolute value is <1, the VAR model is considered stable, so the resulting Impulse Response Function (IRF) and Forecast Error Variance Decomposition (FEVD) are considered valid (Firdaus, 2011).

4. Impulse Response Function (IRF) Analysis

Since individual coefficients in a VAR model are difficult to interpret, impulse response analysis is used. IRF analysis tracks the response of endogenous variables in a VAR system due to shocks or changes in the error variable (Widarjono, 2004). Juanda and Junaidi (2012) explain that the VAR model can be used to dynamically assess the impact of changes in one variable in the system on other variables. This is done by applying a shock to one of the endogenous variables. The shock is typically one standard deviation of that variable.

5. Forecast Error Variance Decomposition (FEVD) Analysis

Forecast Error Variance Decomposition (FEVD) analysis in a VAR model aims to predict the percentage contribution of variance to each variable due to changes in a particular variable in the VAR system. This method can also reveal the strengths and weaknesses of each variable in influencing other variables over a long period of time (Juanda and Junaidi, 2012).

RESULTS AND DISCUSSION

The effect of price fluctuations in cayenne pepper and shallots on inflation in South Sulawesi province was analyzed using Vector Autoregression (VAR). The first step in conducting a VAR analysis is to test for data stationarity, determine the optimum lag, test the stability of the VAR model, and analyze the Impulse Response Function (IRF), and Forecast Error Variance Decomposition (FEVD). The data processing

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process used eViews. The following is an analysis of the effect of price fluctuations in cayenne pepper and shallots on inflation in South Sulawesi province:

a. Data Stationarity Test

The initial step in analyzing the effect of price fluctuations in cayenne pepper and shallots on inflation is to conduct a data stationarity test. This test determines whether the model has a unit root. This test aims to determine whether a coefficient in an estimated autoregressive model has a value of one.

To test for data stationarity, a unit root test based on the Augmented Dickey-Fuller (ADF) test is used. This test was performed on all variables used in the model: inflation (INFL), cayenne pepper price (HCRW), and shallot price (HBWM).

The following are the results of the data stationarity test using the Augmented Dickey-Fuller (ADF) test.

Variabel	ADF Statistik	Mackinnon critical value			Probabilitas	Keterangan
		1%	5%	10%		
INFL	-6,97874	-3,5461	-2,91173	-2,59355	0,0000	Stasioner
HCBR	-4,569804	-3,55502	-2,915522	-2,59557	0,0005	Stasioner
HBWM	-6,830203	-3,55502	-2,915522	-2,59557	0,0000	Stasioner

Source: Secondary Data Processed Using e-views12, 2026

Based on the table above, the results of the Augmented Dickey-Fuller stationarity test, with the levels presented in Table 1, indicate that all variables in inflation, cayenne pepper, and shallots are stationary. The stationary results for all variables have probability values smaller than the 0.05 significance level, thus passing the stationarity test at the level level.

b. Determining the Optimum Lag

After all variables are stationary, the next step is to determine the optimum lag using the Akaike Information Criterion (AIC). The results of determining the optimal lag are shown in the following table:

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Lag	LogL	LR	FPE	AIC	SC	HQ
0	-451.7611	NA	77544.68	19.77222	19.89148*	19.81690
1	-435.2885	30.08032*	56107.03*	19.44733*	19.92436	19.62603*
2	-429.2304	10.27242	64135.40	19.57524	20.41005	19.88796
3	-424.9173	6.750930	79740.54	19.77901	20.97161	20.22577
4	-419.8174	7.317275	96992.52	19.94858	21.49895	20.52936

Source: Secondary Data After processing using e-views12, 2026

The table above shows the results of the optimal lag test. In VAR estimation, before conducting the cointegration test, the optimal lag is first tested. The optimal lag is determined based on the Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hannan-Quinn Criterion (HO) (Juanda & Junaidi, 2012). The optimal lag can be determined by the highest number of stars for each criterion. The optimal lag is 1, as seen in the table. After determining the optimal lag, the next step is to test the stability of the VAR model.

c. Var model stability test

This test is performed to determine whether the data is stable. This test is considered stable if the results for all roots have a modulus <1.

Root	Modulus
0.506851	0.506851
0.362445	0.362445
-0.283365	0.283365

Source: Secondary Data After processing using e-views12, 2026

Based on the figure above, it is proven that the modulus value is less than one, indicating that the VAR estimate is stable. The next step is to analyze the Impulse Response Function (IRF) and Forecast Error Variance Decomposition (FEVD) analysis, which are also declared stable and valid.

d. Granger Causality Test

The causality test is conducted to determine whether an endogenous variable can be treated as an exogenous variable. This begins with the unknown influence between the variables. We can confirm the causal relationship between each variable by examining their probability values. There is a causal relationship between the variables

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when the probability value (prob <0.05); conversely, there is no causal relationship when the probability value is greater than the significance value. (Hanani, 2019).

The Granger Causality Test can indicate whether a variable has a two-way or one-way relationship by including the element of time. The existence of a two-way or one-way relationship can be determined by comparing the probability with the critical value used. If the Granger causality test results show a probability < the critical value, then a causal relationship exists, meaning mutual causation exists (Gujarati, 2003).

The following are the results of the Granger causality test for the tested variables:

Pairwise Granger Causality Tests
Date: 06/25/26 Time: 19:45
Sample: 2020M01 2024M12
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
HCBR does not Granger Cause HBWM	55	0.31212	0.5788
HBWM does not Granger Cause HCBR		0.02172	0.8834
INFL does not Granger Cause HBWM	55	8.29023	0.0058
HBWM does not Granger Cause INFL		6.83699	0.0117
INFL does not Granger Cause HCBR	55	0.23875	0.6272
HCBR does not Granger Cause INFL		5.58359	0.0219

Source: Secondary Data After processing using e-views12, 2026.

Based on the figure above, it can be seen that three causal relationships exist with probability values less than 0.05: inflation affects the price of shallots, and vice versa, the price of shallots affects inflation, and the price of cayenne pepper affects inflation. The other values have higher probability values, indicating no causal relationship between the variables.

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e. Var Model Estimation

In the VAR estimation results, significance testing is performed by comparing the calculated t-value and the t-table value. If the calculated t-value is greater than the t-table value at the 5% significance level, it is known that there is a significant effect on the variable. If the calculated t-value is less than the t-table value, it is stated that the variable does not have a significant effect. The t-table value obtained is 1.973771337. The following are the results of the Var model estimation:

Vector Autoregression Estimates
Date: 06/25/26 Time: 19:38
Sample (adjusted): 2020M02 2024M12
Included observations: 55 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	HBWM	HCBR	INFL
HBWM(-1)	0.121733	-0.002986	0.002526
	(0.13212)	(0.04757)	(0.00105)
	[0.92135]	[-0.06276]	[2.40203]
HCBR(-1)	-0.162560	0.415745	0.006343
	(0.37314)	(0.13435)	(0.00297)
	[-0.43566]	[3.09442]	[2.13550]
INFL(-1)	47.81806	2.834436	0.048453
	(16.9097)	(6.08855)	(0.13461)
	[2.82785]	[0.46554]	[0.35995]
C	29.16967	20.64436	-0.120013
	(15.0885)	(5.43281)	(0.12011)
	[1.93324]	[3.79994]	[-0.99915]
R-squared	0.144029	0.194767	0.197287
Adj. R-squared	0.093678	0.147400	0.150069
Sum sq. resids	93888.98	12172.27	5.949927
S.E. equation	42.90642	15.44901	0.341563
F-statistic	2.860496	4.111889	4.178181
Log likelihood	-282.7113	-226.5301	-16.88288
Akaike AIC	10.42587	8.382914	0.759377
Schwarz SC	10.57185	8.528902	0.905365
Mean dependent	39.24545	37.08364	0.233636
S.D. dependent	45.06932	16.73123	0.370492
Determinant resid covariance (dof adj.)		45831.89	
Determinant resid covariance		36541.82	
Log likelihood		-523.0457	
Akaike information criterion		19.45621	
Schwarz criterion		19.89417	
Number of coefficients		12	

Source: Secondary Data Processed using e-views12, 2026.

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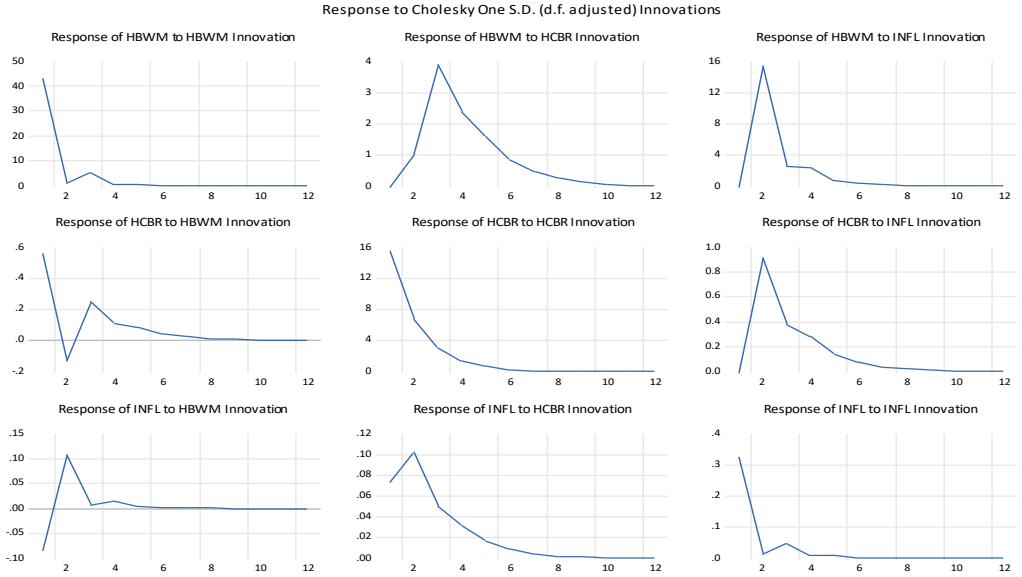
The Var estimation table above shows a reciprocal relationship between inflation and food commodity prices. Inflation has been shown to influence shallot prices, while shallot and cayenne pepper prices have been shown to influence inflation. This finding suggests that fluctuations in shallot and cayenne pepper prices play a significant role in shaping inflation. Conversely, cayenne pepper prices are more influenced by previous period prices than by inflation or shallot prices. In other words, it can be concluded that the variables that influence each other include shallot prices (HBWM) influencing inflation (INFL), cayenne pepper prices (HCBR) influencing cayenne pepper prices, cayenne pepper prices (HCBR) influencing inflation (INFL), and inflation (INFL) influencing shallot prices (HBWM).

f. Impulse Response Function (IRF)

IRF analysis is necessary to understand how the influence exerted on a variable affects the variable itself and all variables in the system. The IRF also shows how shocks affect other variables, allowing us to determine how long the impact of shocks on other variables is felt and which variables respond most to the shocks.

The purpose of the impulse response function (IRF) is to examine the effect of shocks on variables on the present and future values of the observed model (Widarjono, 2018).

The following is the result of the Impulse Response Function (IRF) analysis:



Source: Secondary Data Processed using e-views12, 2026.

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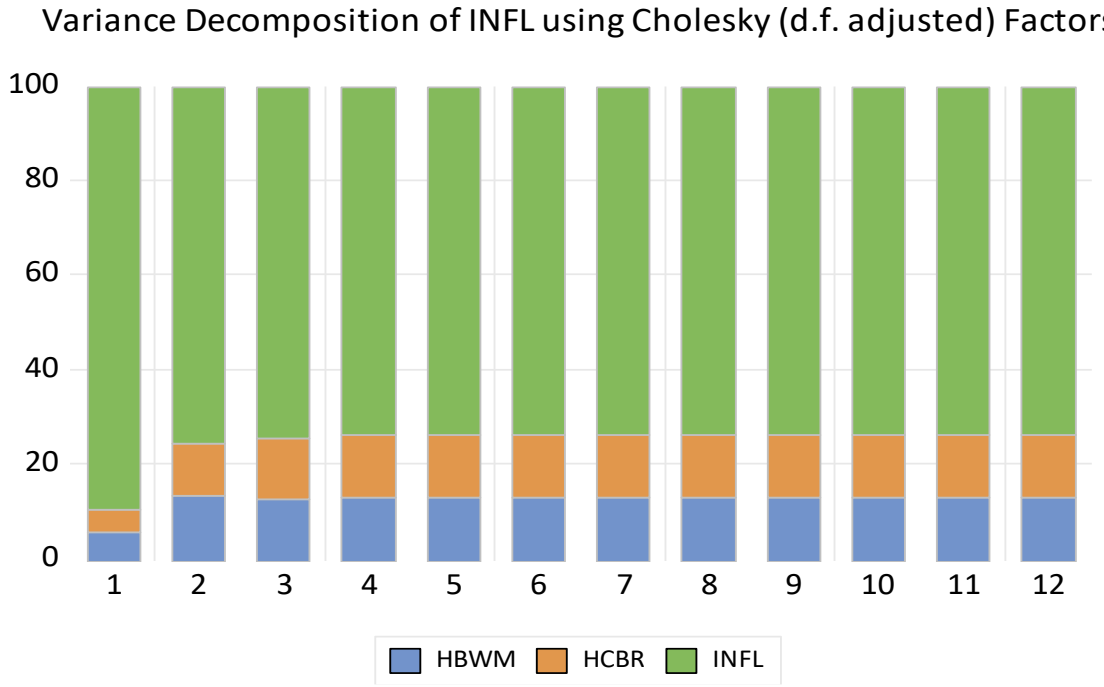
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The figure above shows that the IRF analysis results for the next 12 periods indicate that shocks to each variable produce different responses to other variables. However, in general, the largest response occurs in the initial period, around periods 1 to 3, then gradually decreases until approaching equilibrium in periods 6 to 8. It remains stable until period 12. This indicates that the impact of the shock is only temporary, thus the VAR system used is considered stable.

g. Forecast Error Variance Decomposition Test

In VAR analysis, Forecast Error Variance Decomposition (FEVD) helps obtain previous analysis results. FEVD shows how much a variable influences itself and changes other variables in the future, and its value is measured as a percentage. This method allows us to determine which variables are predicted to have the greatest influence on a particular variable.

The results of the Forecast Error Variance Decomposition (FEVD) analysis can determine the percentage contribution of each food commodity's variance due to shocks from the studied price changes in explaining the variation in inflation (Widarjono, 2018). The following are the results of the Forecast Error Variance Decomposition (FEVD) test:



Source: Secondary Data Processed using e-views12, 2026.

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The figure above shows that for the next 12 periods, it can be concluded that in the first period, inflation itself explains 89% of the variation in inflation, and is also beginning to be explained by other variables, such as the price of shallots (5%) and the price of cayenne pepper (4%). In the second period, the effect of inflation on inflation itself is 75%, while the price of shallots increases by 13% and cayenne pepper by 11%.

In the third period, the effect of inflation on inflation itself decreases to 74%, and the price of shallots also decreases to 12%. Unlike shallots, the effect of cayenne pepper prices remains at 12%. In the 4th period, the influence of inflation on inflation itself experienced a decline again to 73% and was stable at 73% until the 12th period, while the price of shallots was stable at 12% until the 12th period and the influence of the price of cayenne pepper still experienced an increase to 13% and was stable at 13% until the 12th period.

CONCLUSION

Based on the results of the Impulse Response Function (IRF) analysis, it can be concluded that shocks to the prices of cayenne pepper, shallots, and inflation only have a short-term impact. All responses tend to return to the equilibrium point before period 12, indicating that the VAR model is stable and that there is no permanent impact of the shock on the system.

Based on the FEVD results for the next 12 periods, it can be concluded that inflation remains the most dominant factor explaining inflation variation, contributing approximately 73.62% in the final period. However, the price of cayenne pepper has a slightly larger impact (13.51%) than that of shallots (12.87%) on changes in inflation. This indicates that price fluctuations for these two food commodities also influence inflation dynamics, although the effect is still smaller than the effect of inflation itself.

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