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The Effect of Food Commodity Availability on Volatile Food Inflation in Nusa Tenggara Barat Province

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***Abstract*—**One of the main sources of inflation is volatility in food prices. This study aims to analyze the effect of food commodity availability on volatile foods inflation in Nusa Tenggara Barat province. Food commodities analyzed in this study include chili, rice, and chicken meat. We use the linear regression model to analyze the relationship between volatile food inflation as the dependent variable and as the independent variable are the availability of rice, chili, and chicken meat. We define availability as a gap between supply and demand for certain commodities. The data used are time series data at the provincial level from 2009 to 2018, derived from strategic food statistics for food availability and from Bank Indonesia for inflation data. The results showed that none of the food commodities in this study significantly influence the volatile food inflation.

***Keywords*—**volatile food inflation, food commodity availability

I. INTRODUCTION

Bank Indonesia classified CPI inflation in Indonesia into two disaggregation based on their determinant factor. *First*, core inflation which is the persistent component of inflation caused by fundamental factor such as supply-demand interactions, exchange rate, international commodity prices, inflation of trading partners, and inflation expectations. *Second*, non-core inflation is the inflation component with high volatility due to non-fundamental factors. Non-core inflation consists of: 1) volatile food inflation, which caused by shock in food supply, natural disaster, or volatility of domestic and international commodity prices; 2) administered prices inflation, which caused by shock in pricing policy by government for certain commodities (Bank Indonesia).

This disaggregation is part of a structuralist theory or post Keynesian theory which argues that inflation is not merely a monetary phenomenon because of the interaction of supply and demand for money, but also a structural phenomenon. Boediono called it a long-term inflation theory, because inflation is attributed to economic structural factors that are fundamental and will only change gradually in the long run [1]. The theory represents the inflation phenomenon in developing countries, as there are more structural problems in these countries, such as production rigidity, external debt, exchange rate, crop failure, and term of trade [2].

Figure 1 shows that inflationary pressures in Indonesia much affected by shocks, especially supply shock and food distribution (volatile foods) and strategic policies from the government (administered prices). We also see that volatile food inflation are higher that CPI in most of the periods. This represent the importance of food prices and food supply to inflation.

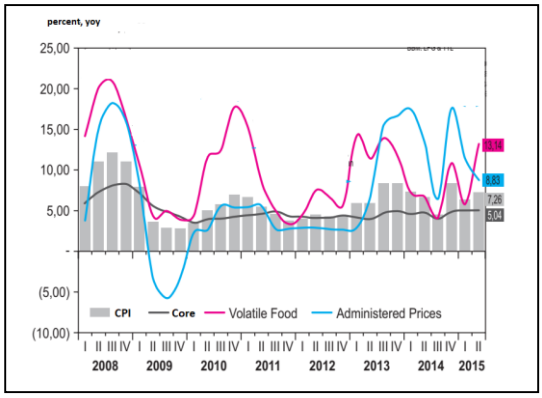

Fig. 1. Indonesia CPI Inflation, 2008-2015 [2]

An Empirical research shows that food commodity prices are one of the main factors of high inflation rates in developing countries such as China, India, and Indonesia [3]. The ability to control food commodity prices will be one of the main factors to control inflation. According to Furlog, fluctuations in food commodity prices can be used as an indicator of inflation rate because they have the ability to respond quickly to various economic shocks, such as supply and demand shocks [4].

Another empirical research on 5 volatile food commodities in Indonesia: chili, meat, rice, sugar, and cooking oil, shows that price pressure for these commodities are triggered by supply shortages due to cropping cycles, bad weather, pest attacks, and distribution problem [5]. Moreover, as most of the agricultural commodities are perishable, they cannot be stored for a long time and highly vulnerable to supply shock. On the other side, demand for preserved perishable commodity products, such as dried or frozen product, is still low. As a result, the price and the availability of these commodities mostly affected by cropping cycles and weather. Shortage of supply and high demand for certain commodities, which is not followed by increase in production will cause volatility in commodity prices and eventually lead to inflation. This is simply a result of demand and supply interaction for those commodities.

Kusmutiarani's research analyze the impact of price volatility of three volatile food commodities in Pangkalpinang: rice, shallot, and chicken meat. the result shows that in the short run, rice and shallot have significant effect to inflation, while in the long run rice and chicken meat that affect inflation [6].

Food commodities that often experience price fluctuations are rice, corn, soy flour, sugar, cooking oil, onions, chilies, eggs, meat and milk [7]. These commodities are among the main contributor for inflation rate in Indonesia. Specifically, for NTB Province there are four out of five commodities that contribute hugely to inflation: rice, chili, garlic, and chicken meat (Bank Indonesia, 2015).

Based on the background above, this research's purpose is to analyze availability of food commodity on volatile food inflation. We choose three commodities: rice, chili, and chicken meat, as the previous research and data show the role of these commodities in inflation formation.

II. Research Method

A. Data

Based on data from Bank Indonesia, there are 4 out of 5 main commodities which contribute hugely on inflation in NTB Province: rice, chili, garlic, and chicken meat. For each commodity we have to collect all production and consumption data from 2009 to 2018. And because of the unavailability data for garlic, in this study, we use only data of production and consumption of chili, rice and chicken meat.

Production data as the proxy for commodities supply, while consumption data as the proxy for demand. We then, calculate the availability of a commodity as the gap between supply and demand. The value of availability could be either positive or negative, which represents a condition of excess supply or excess demand respectively.

Production and consumption data of chili, rice, and chicken meat are collected from Central Statistics Agency (BPS), NTB Provincial Food Security Service, NTB Provincial Agriculture and Plantation Service and NTB Provincial Animal Husbandry Service.

While inflation data from Bank Indonesia. We specifically use only one of inflation component: volatile food.

B. Model

In our analysis, volatile food inflation as a dependent variable, while availability of chili, rice, and chicken meat as independent variables. To analyze these variables, we use linear regression model as follow:

$$LnVFI_{\ t} = \beta_0 + \beta_1 LnChili_t + \beta_1 LnRice_t + \beta_1 LnChicken_t + u_t$$

Where:

VFI : Volatile Food Inflation (%)

Chili : Availability of chili (tons)

Rice : Availability of rice (tons)

Chicken : Availability of chicken meat (tons)

t=2009,…,2018

We use data in natural logarithm form as the original data showed violence to normality assumption. Natural logarithm data can be interpreted as percentage. So, if availability of chili increases 1%, volatile food inflation will increase as much as β_1 percent (not percentage point).

Our model hypothesis as follow: the null hypothesis states that the variables of commodity availability have no significant effect on volatile food inflation. While the alternative hypothesis states the existence of effect of commodity availability on volatile food inflation.

We also did tests to examine the compliance of the model and data to other classical assumptions: multicollinearity, autocorrelation, as well as heteroscedasticity.

III. Results

A. Descriptive Statistics

Table I shows the descriptive statistics of the data in the natural logarithm form. As we can see that chicken meat and chili have a large standard deviation, which is represents the large fluctuation of the availability of chili and chicken meat. This fluctuation much affected by large fluctuation in the production side. While rice has a low standard deviation, this because, the production and consumption of rice tend to be stable over the last 10 years.

TABLE I. Descriptive Statistics

Var	obs	min	max	mean	Std. Dev.
VF Inflation	10	-1.17	3.08	1.41	1.21
Chili	10	9.41	11.47	10.46	0.71
Rice	10	13.11	13.63	13.35	0.18
Chicken Meat	10	8.12	11.09	9.97	0.84

Moreover, volatile food inflation in NTB also has a large standard deviation. In nominal value, it reached the lowest was -0.31% in 2012 (deflation), and the highest inflation was 21.75% in 2010.

B. Classical Assumption Examination

We conducted several tests to make sure the model and data comply with the classical assumption of OLS. For normatility test, we use Shapiro-Wilk W tests. The result shown in Table II below. As the value of prob > Z are more than 0.05 in all variables and residual, we can conclude that the data consistent with the normality assumption.

TABLE II. Shapiro-Wilk W Test for Normality

Var	obs	W	V	Z	Prob > Z
VF Inflation	10	0.91	1.38	0.56	0.28248
Chili	10	0.95	0.81	-0.35	0.63721
Rice	10	0.92	1.24	0.38	0.35362
Chicken Meat	10	0.91	1.33	0.51	0.30942
Residual	10	0.89	1.70	0.96	0.16796

As for multicollinearity test, we use partial correlation between variables as shown in Table III. The variables will have multicollinearity if the correlation value more than 0.8. Since all variables have correlation value less than 0.8, we can conclude that there is no multicollinearity between variables.

TABLE III. PARTIAL CORRELATION

	VF Inflation	Chili	Rice	Chicken Meat
VF Inflation	1.0000			
Chili	-0.4027	1.0000		
Rice	-0.2794	0.7412	1.0000	
Chicken Meat	0.0904	-0.6189	-0.5074	1.0000

Another test for multicollinearity is Variance Inflating Factor (VIF). Table IV below shows the result of VIF for variables in this research. VIF value for all variables are less than 10, so we can confirm that there is no multicollinearity.

TABLE IV. VARIANCE INFLATING FACTOR

Variable	VIF	1 / VIF
Chili	2.69	0.371163
Rice	2.24	0.446732
Chicken Meat	1.63	0.611722
Mean VIF	2.19	

Moreover, we use Breusch-Pagan / Cook-Weisberg test for heteroskedasticity. The result of the test is Prob > chi2 = 0.8267. With confidence interval 95%, we can confirm that the model has shown no heteroscedasticity, or in other word, the model is homoscedasticity.

The final test, we examine if there is autocorrelation in the model using Durbin Watson test. From the test, we get the value of DW d-statistic = 2.645632, dL = 0.69715, and dU = 1.64134. Since DW > dU, and less than (4 – dL), we can confirm there is no autocorrelation in the model.

C. Regression Analysis

The result of estimation of the linear regression model in this research shown in Table V below.

TABLE V. REGRESSION RESULT

Variable	Coef.	Std. Error	t	p-value
Constant	14.0082	45.8695	0.31	0.770
Chili	-0.9810	1.0255	-0.96	0.376
Rice	0.1012	3.7430	0.03	0.979
Chicken Meat	-0.3689	0.6708	-0.55	0.960
R^2	0.2031			
Adjusted R^2	-0.1953			
F	0.51			
Prob > F	0.6900			

N = 10 observations
*p<0.01; **p<0.05; ***p<0.1

From the regression result, we can construct a complete model as follow:

$$LnVFI_t = \beta_0 - 0.9810\ LnChili_t + 0.1012\ LnRice_t - 0.3689\ LnChicken_t + u_t$$

Chili has a regression coefficient of -0.9810, with negative sign means that the increase in availability of chili 1% will lead to decrease of volatile food inflation by 0.98%. increase of food availability means the increase of excess supply or decrease of excess demand, which could be come from the increase of production or decrease in consumption. The more of the production of the commodity, the more the supply, and will cause prices to fall. And eventually lead to decrease in inflation.

Chicken meat also has a negative regression coefficient of -0.368904, which means the increase of the availability of chicken meat as much as 1% will decrease volatile food inflation by 0.37%. This is consistent with the theory where the increase of supply will lead to fall in price. While rice has a positive regression coefficient of 0.101251, which means the increase of the availability of rice by 1% will also increase volatile food inflation by 0.10%. This result is not quite consistent with the theory.

Important to note, as the nominal value of volatile food inflation is in a percentage while we use a natural logarithm form in our regression model, the interpretation of a regression coefficient will lead to a percentage change of the dependent variable, volatile food inflation. For example, if the initial VFI is 5%, then if the VFI increase by 10%, it means the VFI will change as much as 10% from 5%, or equal to 0,05% percentage point.

To analyze the inference of the estimator, we look at the value of t distribution or the p-values (P > |t|) for each variable. For all independent variables in this research, none of their p-value are less than 0.10 or 10% of significant level. So, our hypothesis tests are not statistically significant for all variables, as we cannot reject of null hypothesis that a regression coefficient are equal to zero. It means that despite the value and the sign of the regression coefficient, the availability of chili, rice, and chicken meat have no effect statistically to the variation of volatile food inflation. We also have a quite large standard error, especially for availability of rice and chili. A standard error represents magnitude and the precision of the estimated effect. The larger the standard error, the larger the confidence interval will be and it means the lower the accuracy of the estimator.

Moreover, the model has low level of goodness of fit, as represented by a low value of coefficient determination R-squared and Adjusted R-squared. R-squared equal to 0.2031 means that only 20.31% of variance in the volatile food inflation that is predictable and could be explained by variable of availability of chili, rice, and chicken meat, while another 79.69% variance come from other variables not in the model.

IV. CONCLUSION

The purpose of this research is to analyze the effect of the availability of food commodities in Nusa Tenggara Barat, especially chili, rice and chicken meat on the volatile food inflation. We use NTB 's strategic food availability data from relevant agencies for production and consumption data, and from Bank Indonesia for inflation data for foods (volatile

foods). In this study, we use annual data (time series) from 2009 to 2018.

We analyze the data using ordinary least square method of a linear regression model. Our regression result shows that none of the estimator or regression coefficient are statistically significant. Which means that the availability of chili, rice, and chicken have no effect on volatile food inflation.

REFERENCES

[1] Boediono, "Ekonomi Moneter. Seri Sinopsis Pengantar Ilmu Ekonomi," in *2*, 1994.

[2] G. A. D. Utari, R. Cristina, and S. Pambudi, "Inflasi di Indonesia : Karakteristik dan Pengendaliannya," *Inflasi di Indones.*, 2015.

[3] H. H. Lee and C. Y. Park, "International transmission of food prices and volatilities: A panel analysis," *ADB Econ. Work. Pap. Ser.*, 2013.

[4] A. F. Setiawan and A. Hadianto, "FLUKTUASI HARGA KOMODITAS PANGAN DAN DAMPAKNYA TERHADAP INFLASI DI PROVINSI BANTEN," *J. Agric. Resour. Environ. Econ.*, 2014.

[5] Y. Prastowo, Nugroho Joko; Yanuarti, Tri dan Depari, "Pengaruh Distribusi Dalam Pembentukan Harga Komoditas dan Implikasinya Terhadap Inflasi," *Work. Pap. Bank Indones.*, 2008.

[6] A. W. Kusmutiarani, "Dampak Fluktuasi Harga Tiga Komoditas Volatile Food Terhadap Inflasi Di Kota Pangkalpinang," *J. Ekon. Pertan. dan Agribisnis*, 2018.

[7] N. Sumaryanto, "Analisis Volatilitas Harga Eceran Beberapa Komoditas Pangan Utama dengan Model ARCH/GARCH," *J. Agro Ekon.*, 2016.