VOLATILITY OF VOLUME IMPORTS OF MAJOR FOOD COMMODITIES IN INDONESIA

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Abstract

The purpose of this study is to determine the impact of an increase in the volume of imports and import tariff on domestic prices. The method used in this study are ARCH, GARCH, VECM, and OLS using the data of import volume of Indonesia and Indonesia's domestic market prices during the period June 2007 until March 2011. The result shows that there is an increasing volume of imports which might increase the price of rice, wheat, milk, and sugar in the domestic market. The paper also finds that an increase in import tariff on these commodities lowers prices in the domestic market.

Keywords: Volatility, import tariff, import volume
JEL classification numbers: F13, F14

Abstrak

Tujuan penelitian ini adalah untuk mengetahui dampak peningkatan volume impor dan tarif impor pada harga domestik. Metode yang digunakan adalah ARCH, GARCH, VECM, dan OLS menggunakan data volume impor Indonesia dan harga pasar domestik Indonesia selama periode Juni 2007 sampai Maret 2011. Hasil penelitian menunjukkan bahwa peningkatan volume impor dapat meningkatkan harga beras, gandum, susu, dan gula di pasar domestik. Penelitian ini juga menyatakan bahwa peningkatan tarif impor atas komoditas ini akan menurunkan harga di pasar domestik.

Kata kunci: Volatility, tariffs import, volume import
JEL classification numbers: F13, F14

INTRODUCTION

Research and discussion on commodity price volatility are becoming increasingly important when the oil crises, food crises and the financial crisis occurred in 2005-2010. Although the economic growth of emerging markets remains positive, but the economic crisis lowers the economy's endurance against external shocks, including the volatility of commodity prices in both the developed and developing countries. Volatility in international food commodity prices occurred since 2005 driven by growth in the price of cereals (FAO 2008) were caused by supply and demand factors. The causes of supply factors varies from crop failures and increasing energy prices to increased demand for biofuels and demand factors such as increased consumer demand and a weakening U.S. dollar.

Crop failures in Indonesia due to extreme climate change contribute to the

volatility of rice prices in Indonesia, so Indonesia conducts large-scale imports of the commodity rice. Food commodities is a volatile commodity that contribute significantly in the formation of inflation. To that end, the ability to mitigate price volatility of food commodities will be one of the keys to success in controlling inflation. Pressure group of volatile food price volatility is more driven by supply shocks, given the demand for the commodity is a basic requirement which generally tend to be stable. Group of volatile food price volatility is likely to increase in the period after the crisis in line with the reduced role of the government in controlling commodity prices. Currently, the government is only limited by Bulog rice price control through stock management (Prastowo et al., 2008).

Climate change has the potential to not only decrease average production, but also to make it more volatile. As a response, food price volatility will likely increase, even though some of the increased volatility will be buffered through higher storage levels (Berry et al., 2012). One interpretation views price fluctuations as a natural phenomenon in agricultural markets, related to the low elasticity of demand and supply in the short term and the weather-related shocks affecting supply. This inherent source of volatility in agricultural markets is something to be expected and is seen as a temporal phenomenon, to be corrected by the forces of the market. This "normal" volatility may be exacerbated by other short-term events and policy reactions resulting in "excessive" volatility, such as that experienced since 2007. While "normal" volatility is an essential component for an efficient functioning of markets, this may not be the case for "excessive" volatility as the "efficiency of the price system begins to break down when price movements become increasingly uncertain and precipitous" and society lacks the means to respond effectively to avoid human suffering and widespread adjustment costs (Prakash, 2011).

The interpretation of volatility finds explanations in geopolitical and overall macro-economic cycles. During the recent past the world has experienced a broad commodity boom and agricultural and food prices followed the same trend as other commodity sectors. For the agricultural sector this cyclical nature of commodity prices, has also been aggravated by the ups and downs of public and private investments in the sector. For example, between the 1970s and the end of the century there has been a continuous 'decapitalization' of agriculture in all regions, with the annual rate of growth in agricultural capital stock declining from 1.4 percent to 0.3 percent over this period (FAO, 2011). Growth in public expenditures on agricultural research followed this overall trend and has been much more pronounced in the case of Africa (McCalla, 2009).

Some research has been done regarding the volatility of the price of which is done by Pratamasari (2008) which indicate the presence of time varying volatility and leverage effect on the growth of soybean prices. However, the growth of international crude oil prices does not affect the growth of soybean prices. Jordaan et al., (2007) state that wheat and soybean have constant volatilities. Meanwhile, the volatility of the price of white maize, yellow maize and sunflower seed varies over time (time- varying). Further studies have revealed that white maize is the commodity with the highest level of volatilities. Asmara (2011) states that volatilities world oil prices and real interest rates tend to negatively impact the performance of the industry sector and macroeconomic Indonesia. Meanwhile, the export price volatility relative industry gives a different effect on macroeconomic variables. Cadot and

Tschop (2009) suggest that regionalism significantly reduce the volatility of agricultural goods trade policy.

Based on theoretical and empirical studies that exist, for food commodities with a high level of dependency on the import of the factors affecting the price is the exchange rate volatility, trade policies, and other policy measures (FAO, 2008). Meanwhile, for countries that do not rely heavily on imports, the price of the commodity will be determined by supply, demand and fiscal policies and incentives subsidy.

The number of population in Indonesia was about 241 million (2011) it will need more food. This large population causes food demand to increase but the food production was not enough to support the growth of population. Indonesia is currently in need of 53 million tons of rice, 12.5 million tons of corn and 3.0 million tons of soybeans. The efforts to increase domestic food production has faced reduce in productivity of food production as well the decrease in number of productive lands. As the consequences, import would be an option.

However, food imports influences domestic food prices. It will increase the domestic food supply. Relative price of imported food is cheaper than the domestic price. Domestic food prices tend to be higher than the imported ones, which might due to government policies. The policy of paddy floor price (HDG) was ineffective. One reason for this is that HDG was not based on economic rationality and that it does not consider the dynamics of international markets.

To protect the domestic rice market, Indonesia imposed import tariff. Indonesia, the largest importing country in ASEAN, apply tariffs of 30% of the maximum rate. However, it is still considered low compared to other countries. This paper analyses the volatility of import volume of rice, corn, wheat, soybeans, coffee, tea, milk, sugar, spices, and oranges in Indonesia, EU 27, Australia, China, India, Brazil, USA. It also analyses the price volatility domestic rice, corn, wheat, soybeans, coffee, tea, milk, sugar, spices, and oranges in Indonesia. The second goal of this paper is to determine the impact of an increase in the volume of imports and import tariff on domestic prices.

METHODS

Partial equilibrium analysis is the most appropriate analytical instruments to study the case of imposition of tariffs by a small country (the limited ability of the country concerned, so the country cannot affect world prices, and must accept the prices prevailing in international markets), as well as its association with the output domestic industry is also relatively small. Figure 1 shows that the imposition of import tariffs and domestic consumption will be reduced and the amount of imports will increase production domestic. Often the magnitude of the import tariff is not effective to protect domestic producers through an increase in domestic prices. So keep in mind how much the effective import tariff for domestic prices to restore normal levels.

This paper uses GARCH family models to answer the first and second goals. Meanwhile, to answer the third and fourth goals will be used the method VAR / VEM or Ordinary Least Square (OLS). The data sourced from Comtrade, Central Berau of Statistics/BPS (2010), Bank of Indonesia/BI (2009), Food and Agricultural Organization/FAO (2008), and International Monetary and Fund/IMF (2008).

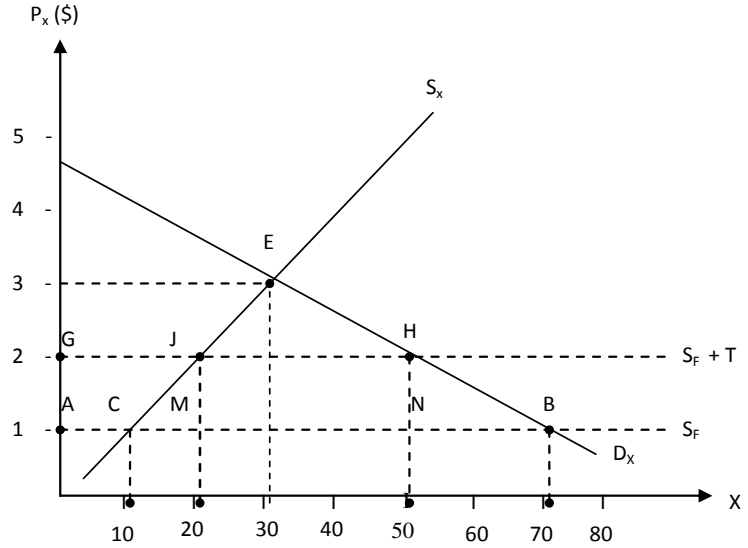


Figure 1: The Effects of Partial Equilibrium Result Enforcement Rates

Description: In the Beginning Condition Dx=Sx= demand curve and supply curve. Commodity prices (PX = 1 dollar per unit), consumption of 70x for State 2 (AB), the domestic production as much as 10X (AC), amounts to be imported by AB-AC is 60X. End If conditions imposed tariffs of 100% so that Px to 2 dollars per unit, level of domestic consumption to 50x (GH, domestic production of the state 2 to 20X (GJ). Amount to be imported from other countries amounted to GH-GJ is 30X.

ARCH-GARCH Methods

Application of ARCH-GARCH model in this study is intended to calculate the magnitude of the volatility of the variable volume and prices of major food imports. Volatility is reflected in the residual variance which does not meet the assumptions homoscedasticity (Firdaus, 2006). Volatility based on the ARCH model (*m*) assumes that the variance of the data is influenced by a number of previous fluctuations m data. ARCH models and then generalized to GARCH model. GARCH model (*r*,*m*) assumes that the variance of the fluctuation data impacted by a number 'm' of data previously fluctuations and volatility of the previous amount of data 'r'. To see the trend of economic variables analyzed data first analyzed the charts with a time series plot.

Ordinary Least Square (OLS) Methods

In the early stages of analysis will be performed analyzes to determine how the impact of volatility changes in import volume and import tariffs on domestic prices by using the OLS method. This method will be used if there is no cointegration among the variables analyzed. Regression analysis is a statistical technique that is useful to examine and model the relationships among the variables that will be used.

The completion of the research equation using least squares methods (Ordinary Least Square Method). Estimation of regression coefficients by the method of least squares (OLS) is shown to achieve good statistical conditions. In an effort to achieve these objectives, methods of OLS will yield a good estimate if the underlying assumptions are met, including: Test Multicolinear, Autocorrelation Test, Heteroscedasticity Test, Normality Test Error Term.

Vector Error Correction Model (VECM) Methods

VAR methods used in research as appropriate for time series data and appropriate to address issues that have been formulated above and the VECM method used to see the impact of long-term and short term. Stages in the VAR analysis as follows:

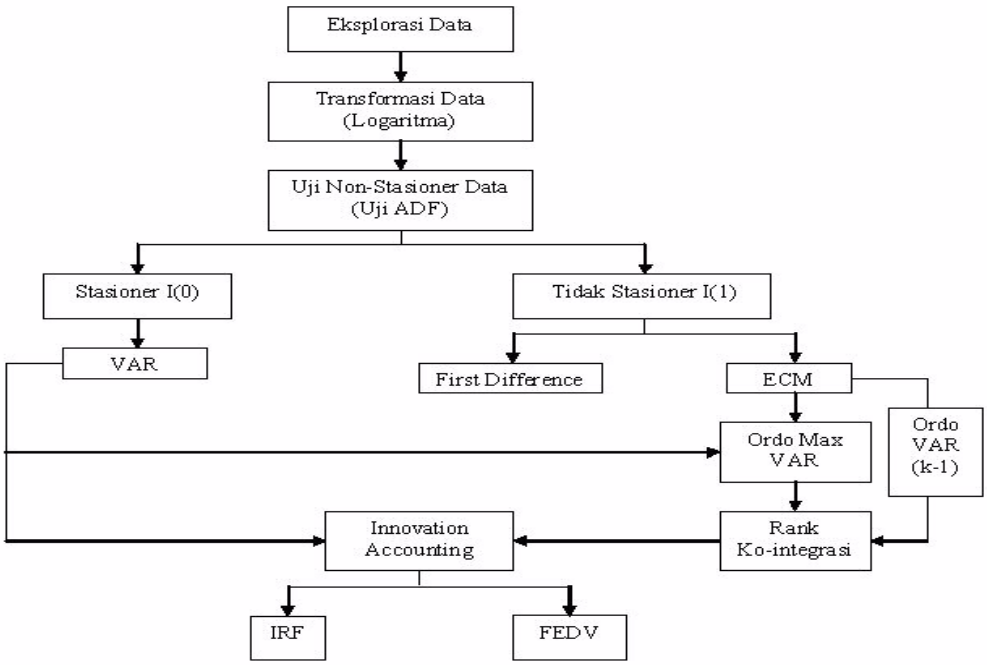


Figure 2: VAR Analysis

Granger Causality

Changes in the volume of imports will affect domestic prices, domestic prices and to restore it to its original level of import tariffs imposed. So need to know how the relationship between the volume of imports, domestic prices and import tariffs. To examine this it will be used cointegration analysis of Granger Causality. Having in mind that these three variables will be made cointegration regression analysis to determine the impact of changes in import volume of import prices and how much the rates needed to be able to restore domestic prices to normal levels.

Causality is a short term relationship between a specific group by using an econometric approach that includes also the interrelationships and functions that emerged from the analysis of the spectrum, particularly the full relationship between the spectrum and the partial relationship between the spectrum. From the perspective of econometrics, the main idea of causality is as follows First, if *X* affects *Y*, it means that past information of *X* can be helpful in predicting *Y*. In other words, by adding data to the regression of the past *X* might increase the explanatory power of the regression. Second, past data *Y* cannot help in predicting *X*, because if *X* can be helpful in predicting *Y* and *Y* can help predict *X*, then most likely there are other variables, say *Z*, which affects the *X* and *Y*.

Research model

This study aims to determine how much the price changes as a result of changes in import volume and the amount of the tariff rates to recover the price back to normal rate.

$$Pdom_t = \sum_{j=1}^{k} \alpha_j \; Pdom_{t-j} + \sum_{k} \beta_j \; Vol.impor_{t-j} + \epsilon_t Pdom_t = \sum_{j=1}^{k} \alpha_{ji} \; Pdom_{t-j} + \sum_{k} \beta_{ji} \; Tarifimpor_{t-j} + \epsilon_t$$

where $Pdom_t$ is volatility of domestic prices for rice, corn, wheat, soybeans, coffee, tea, milk,sugar ,spices ,and oranges in Indonesia, $Vol.import_j$ is volatility of domestic prices for each commodity in Indonesia, and $Tarifimport_j$ is import tariff protection level for each commodity

This paper analyzes the volatility of the import volume for the case of Indonesia, China, India, Brazil, USA Australia,

and EU27. As for the analysis of volatility in the domestic price, it is only for the case of Indonesian domestic market. Having known how the relationship between these variables which, if there is cointegration analysis it will be done by using the method of VAR/VECM. From the analysis of VAR/VECM it will get the amount of the coefficient that shows how much the change in domestic prices due to a change in import volume The magnitude of the coefficient indicates how much the change in domestic prices as a result of changes in import tariffs. It can be seen how effective import tariff rate is to restore prices to normal levels.

RESULTS DISCUSSION

Import Volume and Price Volatility Domestic Food Commodities

Commodity: Rice

Volatility in the volume of Indonesia's rice imports from the world total has increased in the period 2007:10 to 2008:4 and 2010:12. In addition to the volatility in that period the volume of imported rice is stable. The condition was supported by an increase in the volume of imports which caused the condition of the rice harvest in Indonesia has decreased. Erratic climatic conditions result in changes in rainfall patterns and intensity, this condition should be resolved by changing the rice planting season. But farmers often cannot predict climate change exists.

Indonesia's rice imports increased volatility common in certain periods due to the decision to import rice performed at 1 month prior to import. Bulog as an importer of rice in Indonesia can not predict the production, stock and rice import needs. If it is felt at the end of the stock owned is insufficient then the decision will be made so that the price of imported rice imports to be paid by Indonesia to be larger than the import in a few months earlier. Bulog to import rice on a regular basis that is intended to meet the demand for rice raskin. In Figure 4.1. can be seen that only the volume of rice imports from Indonesia and the EU 27 which have relatively high volatility, while the import volume of China's rice is stable.

Rice prices fluctuate in the domestic market in Indonesia over the period 2006:4 to 2011:6. In the early period, which is 2007:10 to 2010:7, the volatility of rice prices in Indonesia's domestic market move it's average. Then, there is a rise in volatility in the year 2010 in August to January of 2011, an increase in volatility is up to four standard deviations. After passing through that period, the volatility of price returns vary in the range of its average, even when the period of March 2011 the volatility of rice prices move below the average value.

In the previous period, the volatility of rice prices increased by over two standard deviations over the period January to July of 2007. Apart from the increase in certain periods, the volatility of rice prices move around the average. Implied volatilities peaked in August 2011 that reached more than four standard deviations. An increase in the value of the domestic rice price volatility in 2011 due to an increase in world rice prices is also significant in that period.

Commodity: Corn

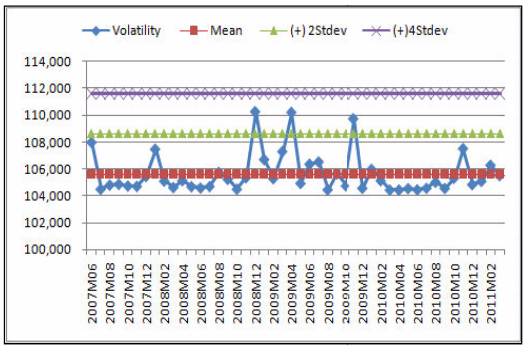
Indonesia corn imports volume volatility is relatively stable, except during the period of 2010:6. Volatility of the import volume is relatively higher than in other countries are analyzed. Indonesia corn imports volume volatility tends to be more stable when compared to the volatility of corn import volume of China. Decision of the large volume of imported maize in Indonesia related to the condition of the downstream industry, the animal feed industry and the chicken industry. If the industry is growing there will be increasing demand for corn. Meanwhile, corn production in the domestic needs will not be able to meet the demand for corn.

Volatility of corn prices in the domestic market in Indonesia moving average from January 2008 to June 2011. Whereas in the previous period, the volatility of corn prices fluctuate around two to four standard deviations. Peak, the domestic maize price

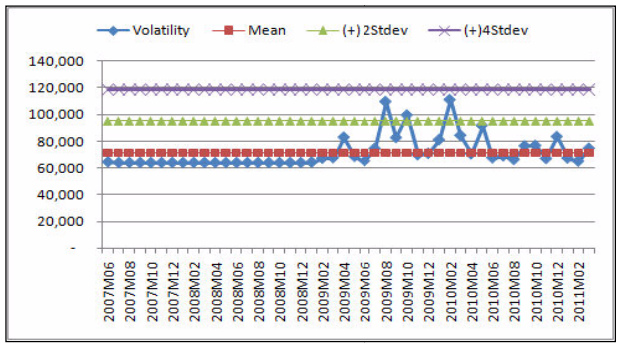
volatility occurred in January 2007 which went through four standard deviations.

Commodity: Wheat

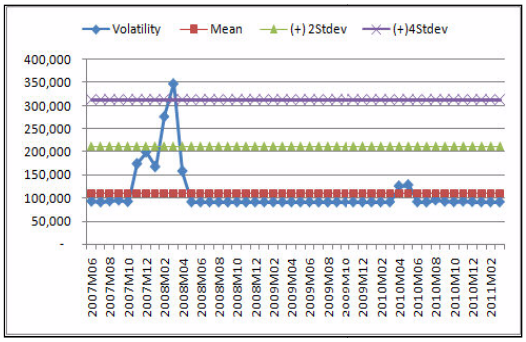
The volume of imports of wheat fluctuated throughout the study period, especially in countries India, Brazil, Indonesia, and China. It can be seen from the condition of the volatility of commodity import volume. Wheat is a strategic commodity that can be an alternative food for the rice.



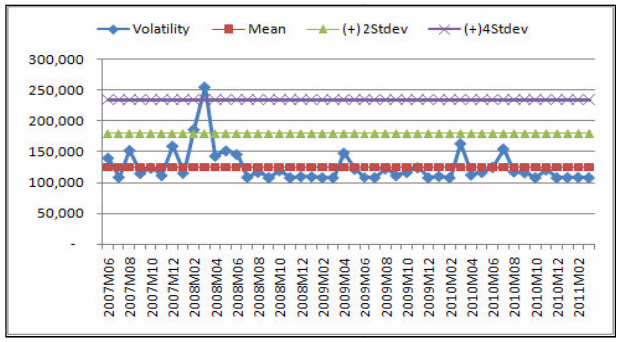
Indonesia



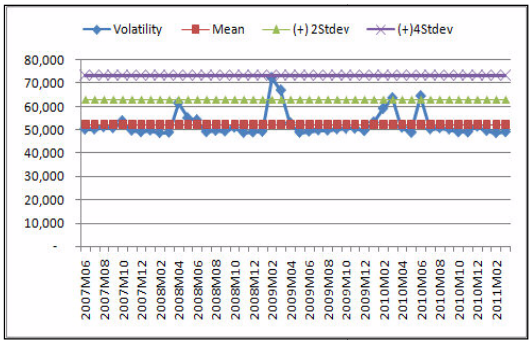
China



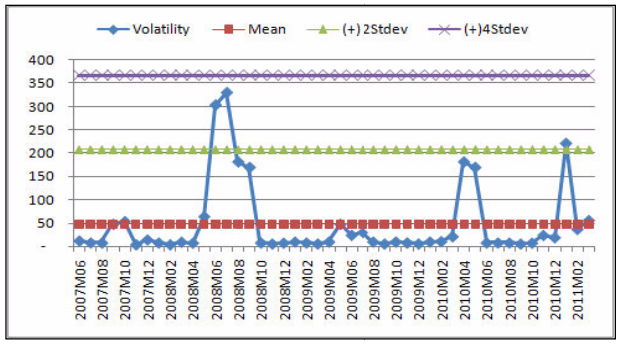
India



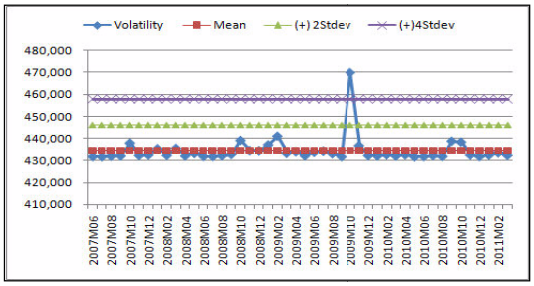
Brazil



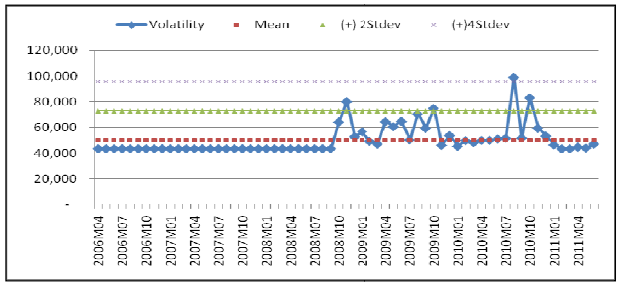
US



Australia



EU27



Domestic Price of Indonesia

Figure 5: Volatility in the volume of imports of Wheat Indonesia, China, India, Brazil, USA, Australia, EU27, and Domestic Price of Indonesia

Wheat consumption in Indonesia is increasing every year due to population growth and dietary changes society. Currently, to meet the needs of the domestic wheat Indonesia is still importing wheat. Indonesia is the fourth largest wheat importer in the world by volume of imports reached 4.9 million tons in 2008 (BPS, 2009). If the volume of wheat imports continue to rise then this will be further reduced foreign exchange.

As we all know that Indonesia has not even processed products of wheat grain is very well known by the people of Indonesia. Current grain processing industry in Indonesia has grown. Meanwhile, a processed grain corn imports. Since 2001 the government began to develop agribusiness local wheat and many studies have shown that wheat plants can be developed in Indonesia. Grain produced by Indonesia is known as local wheat.

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Since the period October 2008 through December 2011, the volatility of wheat prices in the domestic market reached two and four standard deviations. The peak increase in volatility in the period August 2010 to achieve the four standard deviations. While starting in the period December 2011, volatility started to decline even below average. It is the same as in the period before the surge, namely the period June 2006 until September 2008 when the volatility of the domestic price of wheat was under averages.

Volatility of soybean prices in the domestic market is relatively stable with increased volatility occurs only once during the analysis period is the period September 2006 to July 2007 only reached two standard deviations and standard deviation does not exceed four. Apart from that period, the volatility of soybean prices to be around the averages.

Commodity: Coffee

Indonesia as one of the coffee exporters in the world market also come into play as an importer of coffee, especially coffee coming from the USA and Brazil. Indonesia's coffee import volume volatility fluctuated throughout the study period. For Indonesia, coffee is one commodity that is expected to increase the export value of Indonesia. However, various problems that hinder the national coffee industry has been threatened Indonesia became a coffee importer.

Indonesia's coffee imports are from India, Vietnam, and Brazil with a cheaper price than the domestic price. Sumatra coffee prices in the local market reached Rp55.000 per kg. This price is considered to be too expensive and increasingly difficult for employers because the supply is very tight. Currently the coffee plant in Indonesia 80% of elderly with low productivity. Coupled with the already started to import coffee entry into Indonesia.

Vietnam has long been shifting the position of Indonesia as the largest producer of robusta. China is currently developing Arabica coffee on a large scale by doubling the productivity of Indonesia's Arabica. China has further expanded clearing arabikanya with productivity of coffee production is also quite high. Increase in acreage and production of China's coffee was to be anticipated. Anticipation that the assessed need for a national coffee production and quality instead of a downward trend due to old age and planting crops and harvesting of farmers has not been done correctly.

Coffee prices in the domestic market is relatively volatile as seen from the movement of the volatility of coffee prices surge a few times. In the period from April 2006 until February 2007, the period February 2008 to December 2008 there was an

increase in the volatility of coffee prices reached a four standard deviation in June of 2008. Meanwhile, in July of 2006, an increase in the volatility of only two standard deviations. Apart from that period, the movement of the volatility of coffee prices are under rataannya and started in January 2011, the volatility of coffee prices are above the averages

Commodity: Tea

The volume of imports of tea in the EU27, USA, and India is relatively volatile compared to Indonesia. As for Indonesia volatility tea import volume is quite low. Volatility increases the volume of imports of tea EU27 in the period 2007:10 to 2007:12, and the next period volatility is relatively stable. While the volatility in the USA began to increase during the period of 2010:4, whereas before it was relatively stable volatility. Demand for tea by the EU27 and the USA are affected by economic conditions that occurred in that country. For example, Europe and USA economic crisis threatens exports of cocoa and black tea from Indonesia. Indonesian black tea (particularly from North Sumatra) are widely consumed by European countries, so if there is a crisis in the country will reduce the demand for tea from Indonesia.

Increased volatility in the price of tea in the domestic market in Indonesia is only about two standard deviations over the period June 2006 until January 2008. Besides this period, the movement of price volatility around tea average value, even under the averages. This suggests that the condition of tea prices in the domestic market is relatively stable, although tea is still imported food commodities Indonesia.

Commodity: Milk

Volatility and the volume of imports of milk EU27 Brazil fluctuated throughout the period. While the volatility of the import volume of milk is relatively stable Indonesia. Dependence on imported dairy Indonesia reaches 50% of the total national consumption at this time so the value of imports of dairy Indonesia is high. Of the total consumption of milk per year to reach 2.7 million liters, about 75 percent of whom are still met from imports. While the new domestic production to meet 25 percent of the national milk. In 2011, milk consumption levels of Indonesian society has just reached 11.9 liters per capita per year. Much lower than India which has reached 42.8 liters per capita per year. Malaysia and Thailand that have achieved 22.1 liters per capita per year and 31.7 liters per capita per year.

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Commodity: Sugar

During the analysis period of this study it is known that the volatility of the volume of imports in each country is relatively large and fluctuating, with the greatest volatility fluctuations occur in the volume of imports of sugar in India. India sugar imports volume volatility is relatively large in the period 2010:4 to 2010:8 which peaked in the period 2010:6. India is of economic and demographic aspects have much in common with Indonesia a fairly intensive intervention against the sugar industry.

One of the legal basis for sugar policy in India is the inclusion of sugar in the Essential Commodities Acts of 1955. Pergulan policy in India is basically emphasized on the aspect of production - and distribution prices - the price. Government of India with a variety of supporting institutions such determine the base price of sugar for sugar mills that formed the basis for determining the price of sugar cane farmers (Pursell et al., 1997). Government of India also intervened significantly in the distribution through a combination of policy and the distribution of price differentiation (partial price control). Processors are required to allocate its sugar production between 30% - 60% for 'sold' to the Food Corporation of India (FCI), a type of BULOG in Indonesia. In the 1930s, Indonesia had become one of the world's largest sugar exporter. Now Indonesia is one of the largest importers (no. 4) in the world with a share of imports at about 3.5% of world sugar imports. In general, a rapid increase in sugar imports come from Indonesia which is the main factor decreased production and increased consumption are both also associated with a policy of domestic sugar industry and sugar policy in the international market. Production decline largely due to three main factors: decrease in acreage and an increase in the proportion of dry sugarcane acreage; decline in land productivity, and decrease in efficiency at the plant level. Increase in consumption is mainly related to two factors: population growth and increased earnings or economic growth. Study by Susila, WR and B. Sinaga (2005) states that because the sugar is still a necessity, the response of consumption to changes in sugar prices and GDP is inelastic, both short and long term.

During the analysis period, the volatility of sugar prices in the domestic market is just shaking twice in the period July 2009 to October 2009 (an increase volatility that reached the four standard deviation), and in the period November 2009 until January 2010, which fell far below the value of volatility its average.

Commodity: Spice

Based on the WTO trade statistics report, Indonesia occupied the 30th position in the order of the world's largest exporter of goods. Compared with the ASEAN countries, Indonesia ranks fourth in the Singapore (14), Malaysia (21), and Thailand (25). Indonesia so that the volume of imported spices are not too volatile when compared with other importing countries such as the EU27, India, and USA. The volume of imports by EU27 spices are very volatile especially in the period 2009:8 to 2010:2. European countries or the EU market is the second largest market for herbs, spices or herbs in the world.

Spices are the mainstay of Indonesia's export commodities to many countries, especially European countries a very high demand for the herb. Needs of domestic herbs and spices are also supplied by domestic production, so the volatility of prices of spices in the domestic market is relatively stable. This condition is supported by the results of calculations in which the volatility over the period, the movement of the price volatility of the herb to be around the average. Except, for the period January to October of 2008 that reached two standard deviations.

Commodity: Oranges

The volume of imports of oranges by the EU27 and China have fluctuated throughout the period of volatility. Although aware that China is a supplier of fruit (including citrus) are the primary to Indonesia. Images can be viewed at 4:11 one example of China's citrus imports into Indonesia.

Until now Indonesia, including the country's second largest importer of citrus ASEAN after Malaysia, the volume of imports, especially of 127 041 tonnes of oranges during the period 2005 to 2009 the average reached 25 408 tons per year, equivalent to U.S. $ 17.464.186/th The for this type of tangerine or mandarin, during the period 2005-2009 reached 504 063 tons or about

100 813 tonnes per year with a value of U.S. $ 80,569,300 (Source CBS, 2010).

Seeing these conditions, do not be surprised if a lot of imported oranges found in almost every department, including fruit vendors on the sidewalk. Increasing trend of different varieties of citrus imports indicates a segment of the market (consumers) that requires certain types of citrus fruit and excellent quality that can not be fulfilled domestic manufacturers. Consequently to meet consumer needs must be met by imports, mostly from Australia, China and Pakistan are in fact the condition is no more fresh citrus fruit from our citrus fruit for a long time kept in cool storage for 6 months-1 year.

Increased imports of citrus fruit can actually be a market opportunity and an opportunity tangerines our national development in line with consumer preferences will increase quality of citrus fruits. The amount of development opportunities tangerine is not separated from our potential, among others, many citrus production centers, the high diversity of genetic resources of citrus, tangerine varieties nationwide availability of high quality including the availability of seeds, technology that has been generated, market availability and willingness of citrus agribusiness itself.N ational tangerine oranges being able to shift the import that circulated in Indonesia as long as we are all central and regional governments in particular, citrus and agribusiness entrepreneurs are committed to supporting the development of national tangerines. Fruit imports from China and USA are very much flooded the domestic market in Indonesia, including citrus fruits. This resulted in an orange price volatility in the domestic market is quite high. Evidenced by the surge in domestic prices and increased volatility during the period analsis oranges. Even the increase in price volatility oranges reach enpat standard deviation in January of 2008. Increased frequency volaitlitas often enough that the price of orange juice price stability exhibited by the average value yag move around the flats is relatively short

Effect of Volume Changes in Imports Against Domestic Rates

Cointegration test variable rates of domestic and import volume

Cointegreasi test conducted using the Johansen Trace Test Statistic can be seen in Table 1. Johansen Trace Test Statistic results showed thatonly thedomestic price of commodity coffee and soybeans are not terkointegrasi the volume of imports at the level of 5 percent. The number of equations that can be seen by comparing terkointegrasi Trace Statistic of the critical value where the level of 5 percent if the Trace Statistic greater than the critical value then there is an equation that is cointegrated.

Table 1: Cointegration test Variable Rates of Domestic and Import Volume

Komoditi	Hypothesized No. of CE(s)			
	None		At most 1	
	Trace Statistic	5% Critical Value	Trace Statistic	5% Critical Value
Rice	42.71*	15.49	20.84*	3.84
Corn	26.46*	12.32	0.016	4.12
Wheat	37.05*	20.26	7.33	9.16
Soybean	21.99*	20.26	5.09	9.16
Coffe	18.84	20.26	6.47	9.16
Tea	24.57*	20.26	4.43	9.16
Milk	31.96*	12.32	0.17	4.12
Sugar	82.06*	20.26	7.81	9.16
Spice	24.49*	20.26	7.23	9.16
Orange	32.81*	25.87	8.89	12.51

Notes: * denotes rejection of the hypothesis at the 0.05 level

Tabel 2: The results of VECM Analysis (Dependent variable : Domestic Price)

	Commodities	Rice	Corn	Wheat	Tea	Milk	Sugar	Spice	Orange
Short-term Variable	**CointEq1**	-0.26	-0.41	0.01	-0.03	-0.007	1.29	-0.31	-0.001
		[-2.98]*	[-5.25]*	[0.21]	[-1.02]	[-2.33]*	[-8.39]*	[-3.49]*	[-0.05]
	D(PDOM(-1))	0.22	-0.57	-0.63	-0.14	0.20	0.64	-0.19	-0.33
		[1.71]	[-4.58]*	[-5.60]*	[-1.11]	[1.64]	[5.60]*	[-1.67]	[-2.38]*
	D(PDOM(-2))		-0.11		-0.05				-0.41
			[-1.14]		[-0.68]				[3.03]
	D(PDOM(-3))								-0.24
									[-1.82]
	D(PDOM(-4))								-0.355
									[-2.66]*
	D(VOLT(-1))	-0.39	-2.59	-0.34	7033.92	-0.70	0.56	-118.89	-26.6
		[-1.88]	[-3.25]*	[-0.35]	[-0.80]	[-1.54]	[0.33]	[-2.95]*	[-0.12]
	D(VOLT(-2))				-12882.1				-5.14
			-3.60						[-0.14]
			[-5.23]*		[6099.95]*				
	D(VOLT(-3))								0.43
									[2.07]*
	D(VOLT(-4))								0.34
									[2.03]
	C	1150.37							646.27
		[0.29]							[0.03]
Long-term Variable	**VOLT (-1)**	1.27	7.57	23.85	346037	190.82	2.06	288.55	-7544.30
		[3.57]*	[-34.8]*	[6.19]*	[4.90]*	[126.08]*	[2.83]*	[3.06]*	[-5.01]*
	C	-		2464570	81691975		117838.9	-452057.4	-6654598
		77760.92		[-6.06]*	[4.89]*		[23.20]	[41.43]*	
	R-squared	**0.68**	**0.68**	**0.38**	**0.14**	**0.16**	**0.56**	**0.3**	**0.32**

Notes: *) Significant in the real level 5%
[ ] t- statistic value

Table 3: The results of OLS Analyis Methods (Dependent variable: Domestic Price)

Variable	Commodities	
	Soybean	Coffee
VOLT	-7.06 [-1.06]	-7.53 [-1.86]**
C	2980952 [6.86]*	2238089 [274.26]*
R-squared	0.017	0.05

Notes: *) Significant in the real level 5%
**) Significant in the real level 10%
[ ] t-statistic value

If there is cointegration analysis will then proceed with VECM, except for the commodity of coffee and oranges. For coffee and orange equation will use the analysis by OLS method. Based on the analysis by the method of VECM indicate that short-term volatility in the volume of imports in the previous period significantly affect the volatility of domestic prices for commodities corn, tea, spices, and orange. In addition to these variables, the volatility of domestic prices in the previous period is also significantly affected the domestic commodity price volatility of corn, wheat, sugar, and orange.

While in the long term, the volatility of the import volume significantly affect the volatility in the domestic prices of all commodities. For each commodity, the volatility effect of the volume of imports to domestic prices may vary. Increased volatility in the volume of imports will increase the volatility of domestic prices, except for oranges commodities. Increased volatility in the volume of imports shows that the surge of imports volume from its average value. Conditions showed that the volume of imports of the commodity is relatively unstable, so the price of commodities in the domestic market is increasing due to the unstable supply. This is different from the case of oranges where imports of fresh oranges which indicate a growing market segment (consumer) requires certain types of oranges fruit and excellent quality that cannot be fulfilled domestic manufacturers.

Supply of fruit imports from China also be other causes. China already has the production of fruits and vegetables that are adequate, both in terms of area and planting technology. The effect, they can produce fruits and vegetables continuously throughout the year without having to weather the problem impeded. The opposite happened to the fruit Indonesia. Fruit production in some areas is declining due to bad weather. Indonesia also has a special area which is used as granaries of fruit production. As a result, each year the production of local fruits continued to fluctuate throughout the year.

Based on cointegration tests, there was no cointegration between the variables of price volatility of domestic and import volume for commodity soybeans and coffee. Therefore, both commodities will be analyzed using OLS. The results are shown in Table 3 where the volume of coffee imports is significantly influenced by volatility in the domestic market. As for the equation of soybean commodities, volatility does not significantly affect the volume of imports of soybean prices in the domestic market.

Effects of Changes in Price Against Domestic Import Tariff

In this section we will discuss the impact of import tariffs on domestic prices. As previously explained that the rationale of this study was to an increase in the volume of imports would lower commodity prices in the domestic market. To protect domestic producers then apply a policy of import tariffs. So to find out whether the application of import tariffs will be able to influence the domestic price or not it will be done in the early stages of test cointegration between domestic prices and variable import volume and then test the cointegration between domestic prices and import tariffs. If there is cointegration among these variables will then proceed with the analysis of VAR/VECM, but if there is no cointegration testing will be made to the analysis by the method of OLS. The difference between these two methods is on the analysis of VAR/VECM are short-term relationships and long term.

Cointegration test Variable Rates of Domestic and Import Volume

Cointegration test results show that there is an equation that cointegrated on rice, corn, milk, sugar, spices, and orange. So the analysis for these commodities will be done by the method of VECM, and for other commodities will be conducted OLS analysis.

In the short term, the volatility of domestic prices and tariffs in the previous period significantly affect the domestic price volatility. While in the long term, significant tariff increases the domestic price volatility of commodities of rice, milk, sugar, and orange; and will significantly lower the price volatility of corn and spices in the domestic market in Indonesia.

Based on the analysis by the OLS method can be seen that an increase in tariffs significantly lower commodity prices of coffee and tea in the domestic market, and does not significantly affect grain commodities. An increase in tariff was increased significantly affect soybean prices in the domestic market.

Table 4: Cointegration test Variable Rates of Domestic and Import Volume

Commodities	Hypothesized No. of CE(s)			
	None		At most 1	
	Trace Statistic	5% Critical Value	Trace Statistic	5% Critical Value
Rice	13.56*	12.32	1.46	4.12
Corn	22.01*	20.26	8.59	9.16
Wheat	11.06	20.26	1.59	9.16
Soybean		No Lag Optimal		
Cofee	8.52	20.26	1.66	9.16
Tea	18.33	20.26	4.43	9.16
Milk	27.99*	20.26	1.68	9.16
Sugar	55.04*	12.32	0.01	4.12
Spice	44.90*	18.39	12.95*	3.84
Orange	27.99*	20.26	1.6	9.16

Notes: * denotes rejection of the hypothesis at the 0.05 level

Tabel 5: Results Dependent Variable Analysis: Domestic Price Volatility by VECM Methods

	Commodities	**Rice**	**Corn**	**Milk**	**Sugar**	**Spice**	**Orange**
Short-term Variable	CointEq1	-0.40	-0.11	-0.19	-1.14	-0.15	-0.19
		[0.12]	[-3.49]*	[4.97]*	[-9.14]*	[1.38]	[-4.97]*
	D(PDOM(-1))	0.29	-0.48	0.46	0.58	-0.33	0.46
		[2.42]*	[-6.62]*	[3.91]*	[5.66]*	[-1.88]*	[3.91]*
	D(PDOM(-2))	-0.22	0.07	0.34		-0.16	-0.34
		[-1.68]	[1.09]	[-2.70]*		[-0.80]	[-2.70]*
	D(PDOM(-3))			0.28		-0.14	0.28
				[2.39]*		[-0.72]	[2.39]*
	D(TARIF(-1))	-114745	84703.56	4361.30	-5961.96	6439.09	4361.30
		[516175]*	[9.22]*	[09.76]	[-0.24]	[0.67]	[0.76]
	D(TARIF(-2))	25177.21	-89022.27	-17000.78		-9969.51	-17000.78
		[0.05]	[-7.19]*	[-3.12]*		[-1.04]	[-3.12]*
	D(TARIF(-3))			11122.20		3551.27	11122.20
				[1.91]		[0.39]	[1.91]
Long-term Variable	C					-2557.54	
						[-0.30]	
	TARIF (-1)	1211.961	- 162932.3	54466.63	1381.00	- 31223.16	54466.63
		[23.8]*	[4.56]*	[3.63]*	[60.82]*	[-3.14]*	[3.63]*
	C		1333648	403904.6			403904.6
			[9.91]*	[5.30]*			[5.30]*
	R-squared	0.32	0.89	0.59	0.58	0.3	0.59

Table 6: Dependent Variable Analysis: Domestic Price Volatility with OLS method

Variable	Commodities			
	Wheat	Coffe	Tea	Soybean
TARIFF	1963.82	-17791.93	-27573.86	53057.59
	[1.59]	[-3.13]*	[-3.20]*	[2.42]*
C	43696.91	2300095	285034.50	2408467.
	[10.55]*	[96.70]*	[6.06]*	[39.44]*
R-squared	0.03	0.13	0.14	0.08

Impact of Changes in Price Against Domestic Import Tariff

Table 7: Effects of Changes in the value of elasticity of Import Volume and Import Tariff

Commodities	Independent variable: Impor volume	Elasticity	Independent variable: Impor tariff	Elasticity
Rice	Rp 1.27/ton	0.66%	Rp 1211/ton	0.97%
Corn	Rp 7.57/ton	5.11%	Down Rp 162932/ton	-0.75%
Wheat	Rp 23.80/ton	50.38%	Rp 1963/ton	0.12%
Soybean	Down Rp 3.26/ton	-8.41%	Rp 53057/ton	0.05%
Coffe	Rp 7.53/ton	0.01%	Down Rp 17791/ton	-0.03%
Milk	Rp 190/ton	0.99%	Rp 54466/ton	0.41%
Tea	Rp 346036/ton	609.50%	Down Rp 27573/ton	-1.13%
Sugar	Rp 2/ton	0.10%	Rp 1381/ton	1.00%
Spice	Rp 288/ton	0.10%	Down Rp 31223/ton	-3.00%
Orange	Down Rp 7544/ton	11.80%	Rp 63210/ton	0.32%

Based on the results that have been described previously, it can be stated that there are differences in the influence of imports on prices domstik volume, and the influence of tariffs on domestic prices for each commodity.

In the first case: There is an increasing volume of imports may increase the price of rice, wheat, milk, sugar in the domestic market and if the import tariff will be raised cause an increase in domestic prices. This suggests that the influence of the volume of commodity imports to the domestic market is very large.

In the second case: increasing the volume of imports will increase the domestic price of commodity corn, coffee, tea and spices. However, the increase in import tariffs on these commodities will lower prices in the domestic market. So the increase in import tariffs can be effectively used to dampen price increases due to an increase in import volume.

In the third case, the condition further suggests that the increased volume of imports can lower the domestic price of commodity soybeans and oranges, and if it raised import tariffs for these commodities can increase prices. These results can be explained by the theory that the increase in supply with an increase in the volume of imports will lead to falling prices. Necessitating an increase in import tariffs to reduce the domestic price increases.

CONCLUSION

This paper identifed the volume of imports of rice, corn, and oranges are the most volatile during the period June 2007 to March 2011 occurred in Indian country, for wheat and soybean commodity in Australia, coffee and spices in Indonesia, the tea place in the EU 27, the milk occurred in USA, and sugar in Brazil. Domestic prices are most volatile during the period 2006 April to June 2011 in Indonesia's domestic market is a commodity soybeans. The impact of increased volatility of 10 percent of import volume will increase domestic prices for rice, corn, wheat, coffee, milk,

tea, sugar, spices, and will lower the domestic price of commodity soybeans and oranges. The impact of increased volatility of import tariff of 10 percent in Indonesia's domestic market will increase the price of rice, wheat, soy, milk, sugar, and orange; and will lower the price of commodity corn, coffee, tea, and spices. Overall, there are differences in the impact of increased volatility of the import volume for each strategic food commodities that Indonesia needed a different trade policy in order to increase the volatility of the import volume does not hamper Indonesia's economy. For commodity import volume and price volatility of its large domestic tariff protection is necessary to protect the domestic market.

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