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Research Article

Analysis of Price Volatility Spillover of Soyabean (*Glycine max* (L.) *Merrill*) in East Java

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ABSTRACT

Variability and fluctuation of the world soybean prices lead to a volatility of the global soybean prices. This phenomenon causes risks and uncertainties on soyabean prices. The impact caused by the fluctuation of the unstable global soybean price (volatility) will be the main factor for the secondary effects of domestic soybean price development, especially in East Java, which is called as spillover. The aim of this study was to identify the temporary volatility and dynamic volatility of spillover on the soybean prices at different levels of soybean market in East Java and in The United States. The GARCH analysis was conducted in this study because of its relevancy and accuracy in analyzing the volatility of agricultural commodities.

The results showed that there was no significant difference on soybean prices between import prices and the U.S national prices. It was proven by the volatility of import prices (5.94 percen) that as high as of the U.S national prices (5.06 percen). Soybean price volatility at various price levels in dynamic conditions are diverging or more likely the greater at the level of farmers which is characterized by $\alpha + \beta > 1$, with the volatility tends to be spiky or surged sharply ($\alpha > \beta$), and convergent or getting smaller on a temporary basis. Price volatility dynamically between local soybean prices to the price of imported soybeans are diverging with the $\alpha + \beta > 1$. The existence of contemporary volatility spillover of soybean price took place only in one direction among the various levels of soybean prices, while the two-way spillover dynamically occurred only between local prices at the farm level and at the eceran level as well as between local prices at the eceran level and imported soybean prices.

INTRODUCTION

The era of globalization and trade liberalization as a consequence of an agreement, GATT / WTO (General Agreement on Tariffs and Trade / World Trade Organization), has made the economy of any country globally integrated. More specific in the field of agriculture, with the existence of agreement on agriculture that was published in the AOA (Agreement on Agriculture) in 1995, was also made so that every market in every State will be integrated globally.

The impact of trade liberalization is marked with the low price of soybean in the market. Open market access easily causes soybean imports enter into Indonesia, and raises price competition between soybean imports and local soybean. The Variability in world prices soybean and its fluctuation raises the volatility of world soybean prices. Noting that before the liberalization of free trade, soybean price in a region of Indonesia depended on the domestic soybean price fluctuations, but due to more liberty given to the soybean market causes price of domestic soybean to be greatly affected by the world soybean price volatility.

This phenomenon raises the risk and uncertainty of local soybean prices along with the fluctuations in world soybean prices, which indirectly provide shocks to the domestic soybean prices. This condition closely describes the soybean price volatility. Sumaryanto (2009) says that the surge of the price volatility that occurs in a particular time period can be in volatility with behavior that can be expected *(predictable)* and volatility with behavior that is unpredictable. Soybean price fluctuations in the world market level which tends to be unpredictable and dependent on soybean import will affect the local soybean prices at the local farm level, especially associated with the decision making.

This volatility also describes the soybean price transmission *(spillover)* which reflects the price transmission from the international market to the farmer's domestic market level or vice versa. Spillover is a secondary effect which follows the main effect; the effect of the volatility price of soybeans. Soybean price volatility become the main source of price uncertainty for farmers, and an indication of the volatility spillover can introduce cross-hedge relationships for farmers and provide predictions about the soybean price volatility in the domestic market, especially at the farm level as a result of changes in the world market volatility.

This phenomenon also occurred in East Java, which is one of the entrances of soybean imports in Indonesia, where these activities will give effect on the open space and the inflows of soybean imports, so it will be more difficult to reach stability price of soybean in the domestic market. This condition will provide risk and uncertainty *(unpredictable)* as a result of fluctuations in the price of soybean, so it would be difficult for local farmers to make decision to commercialize soybean, so this condition greatly affects the income of local farmers.

Relating to this, Wolf (2004) says that in practice, handling issues which are related to risk, the public and the government tend to focus on the diversity that can be expected *(predictable)*, thus impacting the less appropriate anticipation, especially when the pattern of fluctuation was changed from the previous patterns that have been known.

Based on the study above, this research is greatly important with the aim to:

1. Identifying temporary volatility *(contemporaneous volatility)* and dynamic volatility of prices at different levels of soybean market in East Java and United States.
2. Identifying two-way temporary volatility spillover *(contemporaneous spillover)* and dynamic volatility spillover as a result of the volatility price at all levels of market of soybean in East Java, and between the soybean price at the farm market level in East Java with soybean prices in the United States.

Strategically, the results of the research is expected to be beneficial for decision makers in local and central government levels, especially in decision making which is closely related to soybean price stabilization policy. Whereas for market participants, the general public and further researchers, the results of this research are expected to give a lot of information about the market information relating to the dynamics of soybean prices.

MATERIAL AND METHODS

The data used in this research are time series data by taking the secondary data, which is derived from soybean price data in East Java. The data are analyzed from the beginning of January 2000 to December 2012, with the assumption that it has been free from noise and variability that are too high due to the economic crisis of 1997-1999. The type of data used is the real price of domestic soybean at the farm level and consumer (retail) gotten from Central Board of Statistics East Java in Figures, the real price of imported soybean and soybean prices in the U.S. market.

Data was analyzed by descriptive qualitative method to describe the development of soybean prices at the various market levels which can be presented in the form of graph, tables and charts. The quantitative analysis used econometric methods, whereas the price movement chart analysis will be performed with the plot time series graph to view the tendency of data. Econometric research methods are quite appropriate in the commodity price that tend to fluctuate which has made it necessary to use a different approach because the assumption of homoscedaciticity are not met (Engle, 2003).

Data analysis was performed in two stages: first, measurement of the prices volatility of soybean market at the farm level, retail, imported soybean and soybean prices in the United States. Second, measurement of the presence of spillover effects of volatility in prices soybean value chain. Multivariate GARCH model (1.1) will be be used to identify the volatility and volatility spillover of the local soybean prices, imported and U.S. soybean prices. The stages analysis was done using descriptive statistics and econometric analysis. Descriptive statistics in this study will be illustrated through the average (mean), variance, skewness and kurtosis (distribution of data is the normal). Whereas econometric analysis was performed by identifying the stasionary of data (Unit Root Test), Ordinary Least Squares Test for testing the problem of heteroscedaciticity and autocorrelation, as well as the GARCH analysis for measuring volatility and spillover of soybean prices at various price levels.

RESULTS AND DISCUSSION

Descriptive analysis data of the soybeans price are presented in the following table.

Table 1. Descriptive statistics of prices and prices volatility of Local Soybean Prices, imported soybean and soybean prices in the United States

	HI	HJ	HP	HR	PAS	PF	PI	PR
Mean	5.942635	5.060030	2.392981	1.890372	2765.641	4094.628	3581.096	5093.808
Median	3.672000	3.315873	1.389500	0.902500	2305.500	3442.000	2922.500	4594.000
Maximum	42.16200	31.21123	16.45100	16.67400	5683.000	6879.000	7336.000	8601.000
Minimum	0.046000	0.040132	0.000000	0.000000	1235.000	2025.000	1703.000	2527.000
Std. Dev.	6.850545	5.088074	3.039263	2.877038	1117.868	1553.552	1414.217	2008.083
Skewness	2.576241	2.196978	2.532445	3.069471	0.551300	0.291037	0.587684	0.348468
Kurtosis	11.22907	9.943705	9.985621	13.51073	2.039583	1.484275	2.137414	1.650021

Above, the table shows that the average price of soybeans for 13 years, where the local soybean prices at the retail level has the highest average of Rp. 5093.808 per pounds, while the average of the soybean prices in the United States is lower at a price of Rp. 2765.641 per pounds. The average soybeans price volatility of imports from the United States is very large, i.e 5.94 percent, which means that the price of imported soybeans are very volatile.

Skewness value of local soybeans price volatility, imports and the U.S are greater than zero or has a sloping of distribution to the right or tends to accumulate at low values. While the value of skewness for local soybeans prices, imports and the U.S. are worth less than zero or has a sloping of distribution to the left or tends to accumulate at a high value. The value of kurtosis shows the density of distribution, where the kurtosis value of local soybeans price volatility, imports and the U.S. are greater than 3, which indicate symptoms of heteroscedaciticity.

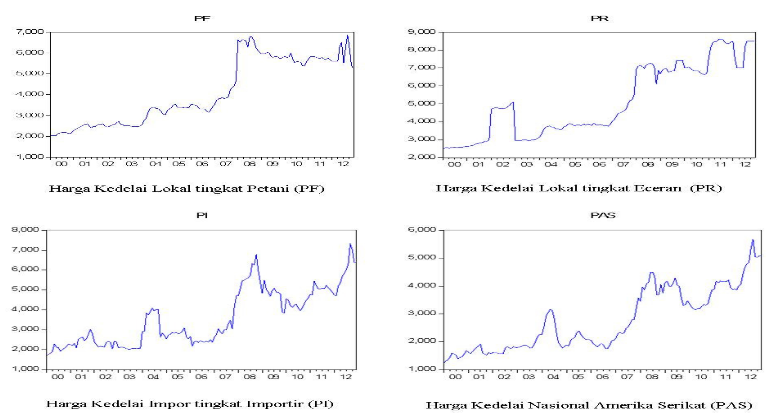

Figure 1. Trend Plot of the Local Soybean Price, Imports and the U.S.

Based on the plot of monthly pricing data of local soybean prices at the farm and retail level, imported soybean and soybean prices in the United States shows that these prices fluctuated every month with the sharp increases and decreases which were found in some periods. Enders (2004) said that the data such as these will indicate the condition of heteroscedasticity. This condition seem to be on the varianceand in the long run variance of the data would be constant, but there are some periods in which the variance are relatively high.

Stasionary Test

The stasionary test of data can be performed by using Augmented Dickey-Fuller test, in which the data is going to say already stationary (does not contain a unit root) if the ADF test statistic is greater than critical test values or probability value less than 1 percent (0.01).

Table 2. The Stationarity Test Results of Data Price and Price Volatility of Local Soybean Price, Imports and the U.S

Variabel	ADF without trend		ADF with trend	
	Level	First difference	Level	First difference
PF	-1,291 [0,6333]	-10,160** [0,0000]	-1,958 [0,6188]	-10,144** [0,0000]
PR	0,690 [0,8450]	-11,121** [0,0000]	-2,395 [0,3807]	-11,092** [0,0000]
PI	0,980 [0,7597]	-12,674** [0,0000]	-2,465 [0,3449]	-12,649** [0,0000]
PAS	0,634 [0,8584]	-10,131** [0,0000]	-2,530 [0,3135]	-10,124** [0,0000]
hp	-4,679** [0,0000]	-8,944** [0,0000]	-4,956** [0,0000]	-9,010** [0,0000]
hr	-8,926** [0,0000]	-10,914** [0,0000]	-9,243** [0,0000]	-10,871** [0,0000]
hi	-11,184**[0,0000]	-15,091** [0,0000]	-11,166** [0,0000]	-15,041** [0,0000]
hj	-10,384**[0,0000]	-10,709** [0,0000]	-10,413** [0,0000]	-10,674** [0,0000]

*** T-statistic significant in 1 percent*

Based on the table, it appears that the variable levels of local soybean prices farmers (PF) and retail (PR), the price of imported soybean (PI) and the price of United States soybean (PAS) is not significant or not stationary at the stage level with a level of 1 percent (0.01), where the value of t-statistic is greater than the critical value. Therefore, there is need to be tested whether there is any cointegration between the price variable. Test based on the first difference, all price variables are stationary with probability value of less than 0.01. The results of cointegration test showed that no cointegration among the variables of the local price of soybean at farm and retail level (PF and PR), the price of imported soybean (PI) and the price of U.S. soybeans (PAS) which is characterized with the value of trace statistic is greater than the critical value of 1 percent for all variables.

Meanwhile, local soybean price volatility variable at farm (PF) and retail (PR) level, the price of imported soybean (PI) and soybean United States (PAS) were significant or stationary on the stage level and first difference with a level of 1 percent (0.01), where the value of t-statistic was smaller than the critical value.

Autocorrelation test

Autocorrelation test will be the result of autocorrelation function which can detect the presence of ARCH effects. Enders in Wihono (2009) said that if the price of the square is there in autocorrelation, it indicates there is an element of ARCH error in the data of soybean prices.

Tabel 3. Autocorrelation Testing Results for Soybean in Different Price Levels

Variable Price	Probability Values	Autocorrelation Test
PF	Significant	Autocorrelation
PR	Significant	Autocorrelation
PI	Significant	Autocorrelation
PAS	Significant	Autocorrelation

In Table 3 it seems that there were autocorrelation in all price levels. This value indicates the error of ARCH effects on soybean price data in different price levels.

Heteroscedaciticity Test

White test results for the problems of heteroscedaciticity are presented in Table 4.

Table 4. Testing results of Heteroscedaciticity

	Volatilitas	Spillover Volatilitas
F-Statistic	6,453740 [0,0004]	5,1220071 [0,0000]
Obs*R-Squared	17,62563 [0,0005]	30,42244 [0,0001]

Based on the table, it appears that the value of obs * R-Squared for the equations of volatility and of volatility spillover is greater than the value of the test statistic F-white, and a significant probability value is smaller than α = 0.01, so that it can be concluded that the hypothesis of constant error variance was denied, or there was a heteroscedaciticity problem of error.

ARCH effect test

Examination of the residual model needs to be performed in order to show whether the model contains ARCH effect or not, so it needs to be tested with LM test for each model of volatility and of volatility spillover soybean prices at various price levels. ARCH effect test results are presented in the table below.

Table 5. Testing results of ARCH residual effects on GARCH volatility models

Price Volatility Variable	Probability**	*F-statistic*
Local soybean price volatility in the farmer level (hp).	0,6172	0,2509
Local soybean price volatility in the retail level (hr).	0,5282	0,3996
Import soybean price volatility (hi).	0,5316	0,3931
U.S. soybean price volatility (hJ).	0,7414	0,1093

The table shows that the results of LM test for each model price volatility are significant, where the probability value is greater than 1 percent (0.01). These results indicate that a whole of volatility models do not contain ARCH effects, or which means that the model is good. While the model will be tested using a volatility spillover GARCH model (1.1) with equation that has been formulated previously.

Soybean Price Volatility Estimation results in different levels of market based on the GARCH Test

Estimation results of GARCH model for measuring price volatility of the local soybean at farmers and the retail level, prices of imported soybean and soybean prices of United States can be presented in table 6

Table 6. Temporary and dynamic soybean price volatility equations at the level of a particular market

	Equation models	α +β (Volatility)
Temporary Volatility	$h_{p,t}$ = 9,39E-05 + 0,0227$\mu^2_{p,t-1}$ + 0,0129$h_{p,t-1-}$ + 1,7722$h_{p,t}$	0,0356
	$h_{r,t}$ = 2,31E-07 + 0,0014$\mu^2_{r,t-1}$ -+ 0,0026$h_{r,t-1-}$ + 1,7566$h_{r,t}$	0,004
	$h_{i,t}$ = 0,4842 - 0,0143$\mu^2_{i,t-1}$ - 0,0056$h_{i,t-1-}$ + 4,6663$h_{i,t}$	-0,0199
	$h_{j,t}$ = 0,1811 + 0,0237$\mu^2_{j,t-1}$ - 0,0142$h_{j,t-1-}$ + 3,2801$h_{j,t}$	0,0379
Dynamic Volatility	$h_{p,t}$ = 0,9580 + 0,8405$\mu^2_{p,t-1}$ + 0,3313$h_{p,t-1-}$ + 0,0886$h_{p,t-1}$	1,1718
	$h_{r,t}$ = -0,2812 + 0,0020$\mu^2_{r,t-1}$ + 0,9058$h_{r,t-1-}$ + 0,5909$h_{r,t-1}$	0,9078
	$h_{i,t}$ = 21,0593 + 0,6987$\mu^2_{i,t-1}$ + 0,2547$h_{i,t-1-}$ - 1,1995$h_{i,t-1}$	0,9534
	$h_{j,t}$ = -2,4723 – 0,1050$\mu^2_{j,t-1}$ + 0,9288$h_{j,t-1-}$ + 1,3517$h_{j,t-1}$	0,8238

The table shows that dynamically, volatility of local soybean price at the farm level extremely tends to be divergent or have greater volatility in the long term, which is characterized by α + β > 1, the volatility tends to be spiky or jump sharply. These conditions indicated by the value of α which is relatively high compared to the value of β. While the volatility of the local soybean prices at the retail level, soybeans imports and U.S. soybean tend to be convergent *(die-down)*. This condition indicates that volatility will be smaller in the long run.

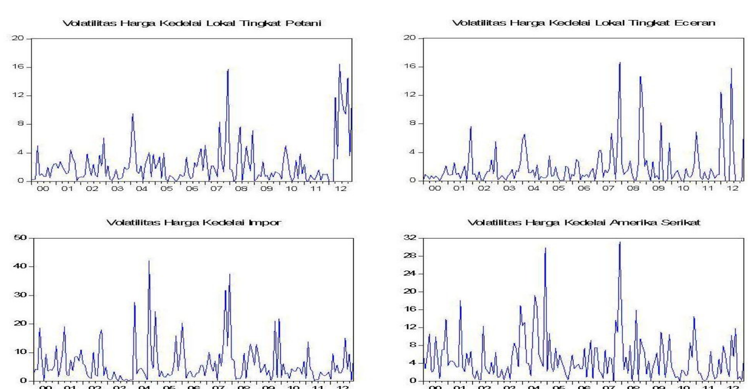

Figure 2. Trend Plot of Local Soybean Price Volatility, Imports and the U.S.

The plot illustrates the trend of the movement of rising volatility in both local soybean prices at the farm and retail levels, import soybeans and United States soybean which are extremely volatile. This high volatility (spiky), especially in dynamic, is suspected to be caused by the limited supply of local soybean, soybean world price fluctuations, conversion of land use soybeans to corn, natural conditions (in season) and policy factors. Tendency of soybean price volatility in various market levels tended to decline, although it seems extremely volatile.

Soybean Price Volatility Spillover

Dynamic volatility spillover testing was made because there is a lag in soybean prices at various price levels, both between soybean price at the local market (farmers and retail), local soybean prices with the imported soybeans and between local soybean prices and U.S. soybeans.

Table 7. Temporary and dynamic soybean price volatility equations and among the various levels price

	Equation models	α +β (Volatility)
Temporary Volatility	$h_{p,t} = -0,360 + 0,191\mu^2_{p,t-1} + 0,614h_{p,t-1-} + 0,744h_{r,t}$	0,805
	$h_{r,t} = 3,623 + 0,077\mu^2_{r,t-1} + 0,026h_{r,t-1-} + 0,694h_{p,t}$	0,103
	$h_{p,t} = 0,304 + 0,402\mu^2_{p,t-1} + 0,443h_{p,t-1-} + 0,197h_{i,t}$	0,845
	$h_{i,t} = 19,722 - 0,045\mu^2_{i,t-1} + 0,138h_{i,t-1-} + 8,043h_{p,t}$	0,093
	$h_{r,t} = -0,150 - 0,038\mu^2_{r,t-1} + 0,105h_{r,t-1-} + 0,031h_{i,t}$	0,067
	$h_{i,t} = 30,245 - 0,033\mu^2_{i,t-1} + 0,329h_{i,t-1-} + 1,899h_{r,t}$	0,296
	$h_{p,t} = 0,069 + 0,399\mu^2_{p,t-1} + 0,457h_{p,t-1-} + 0,262h_{j,t}$	0,856
	$h_{j,t} = -0,668 - 0,028\mu^2_{j,t-1} + 0,852h_{j,t-1-} + 2,338h_{p,t}$	0,824
	$h_{r,t} = 0,047 + 0,021\mu^2_{r,t-1} + 0,064h_{r,t-1-} + 1,272h_{j,t}$	0,085
	$h_{j,t} = 3,033 + 0,039\mu^2_{j,t-1} + 0,798h_{j,t-1-} + 0,361h_{r,t}$	0,837
Dynamic Volatility	$h_{p,t} = -0,310 + 0,278\mu^2_{p,t-1} + 0,594h_{p,t-1-} + 0,843h_{r,t-1}$	0,872
	$h_{r,t} = -0,073 + 0,050\mu^2_{r,t-1} + 0,306h_{r,t-1-} + 2,589h_{p,t-1}$	0,356
	$h_{p,t} = 0,867 + 0,343\mu^2_{p,t-1} + 0,735h_{p,t-1-} - 0,104h_{i,t-1}$	1,078
	$h_{i,t} = 13,324 - 0,868\mu^2_{i,t-1} + 0,195h_{i,t-1-} + 0,779h_{p,t-1}$	-0,673
	$h_{r,t} = -0,072 - 0,046\mu^2_{r,t-1} + 1,058h_{r,t-1-} + 0,021h_{i,t-1}$	1,012
	$h_{i,t} = 29,686 - 0,024\mu^2_{i,t-1} + 0,0002h_{i,t-1-} + 10,994h_{r,t-1}$	-0,0238
	$h_{p,t} = -0,484 + 0,428\mu^2_{p,t-1} + 0,446h_{p,t-1-} + 0,432h_{j,t-1}$	0,874
	$h_{j,t} = -0,7005 - 0,0238\mu^2_{j,t-1} + 0,842h_{j,t-1-} + 2,604h_{p,t-1}$	0,819
	$h_{r,t} = 5,876 + 0,039\mu^2_{r,t-1} + 0,674h_{r,t-1-} - 0,413h_{j,t-1}$	0,713
	$h_{j,t} = 7,263 + 0,275\mu^2_{j,t-1} + 0,598h_{j,t-1-} - 1,388h_{r,t-1}$	0,873

Description: $\alpha + \beta > 1$ volatility Divergent; $\alpha + \beta = 1$ stable volatility; $\alpha + \beta < 1$ volatility Convergent *(die-down)*

Based on estimates of price volatility dynamically between different levels of soybean prices above, it appears that the price volatility between the local soybean price (farm and retail levels) with imported soybeans price are diverging with $\alpha + \beta > 1$. It means that the local soybean prices have fluctuated extremely turbulent / volatile on imported soybean prices which tended to be much lower than the local soybean prices or in the future is likely to occur greater volatility.

The next stage is quite important from this study as analysis of two-way temporary and dynamic price volatility spillover between different levels soybean prices. Spillover is a secondary effect of the volatility or the effects of prices transmission as a result of volatility that are difficult to predict *(unpredictable)* at different levels soybean prices. The parameters are used to measure the volatility spillover effect of market direction.

Table 8. Spillover equation soybean price volatility

	Equation models	Spillover Volatility
Temporary Spillover Volatility	$PF_{p,t} = 42,8102 + 0,9617PF_{p,t-1} + 0,0284PR_{r,t-} - 15,2355h_{r,t} + \mu_{p,t}$ $PR_{r,t} = -5,7216 + 0,90427PR_{r,t-1} + 0,1189PF_{p,t-} + 15,8080h_{p,t} + \mu_{r,t}$	one direction
	$PF_{p,t} = 85,7476 + 0,9825PF_{p,t-1} - 0,0011PI_{i,t-} - 3,0713h_{i,t} + \mu_{p,t}$ $PI_{i,t} = 30,6884 + 0,7640PI_{i,t-1} + 0,1900PF_{p,t-} + 27,2588h_{p,t} + \mu_{i,t}$	one direction
	$PR_{r,t} = 25,9089 + 0,9234PR_{r,t-1} + 0,1085PI_{i,t-} + 1,3492h_{i,t} + \mu_{r,t}$ $PI_{i,t} = 84,1595 + 0,8939PI_{i,t-1} + 0,0601PR_{r,t-} + 16,9337h_{r,t} + \mu_{i,t}$	one direction
	$PF_{p,t} = -44,8215 + 0,8942PF_{p,t-1} + 0,1647PAS_{J,t-1} + 13,7221h_{p,t} + \mu_{P,t}$ $PAS_{J,t} = 16,9803 + 0,9307PAS_{j,t-1} + 0,0400PF_{p,t-} + 10,1471h_{p,t} + \mu_{j,t}$	No Spillover
	$PR_{r,t} = 31,9811 + 0,9016PR_{r,t-1} + 0,1772PAS_{j,t-} + 2,0654h_{j,t} + \mu_{r,t}$ $PAS_{j,t} = -0,0218 + 0,1,0038PAS_{j,t-1} + 0,0007PR_{r,t-} + 15,4426h_{r,t} + \mu_{j,t}$	one direction
Dynamic Spillover Volatility	$PF_{p,t} = 81,8767 + 0,9101PF_{p,t-1} + 0,0466PR_{r,t-} + 2,6979h_{r,t-1} + \mu_{p,t}$ $PR_{r,t} = -1,3255 + 0,8904PR_{r,t-1} + 0,1335PF_{p,t-} + 19,0251h_{p,t-1} + \mu_{r,t}$	two-way
	$PF_{p,t} = 64,7427 + 0,9689PF_{p,t-1} + 0,0047PI_{i,t-} + 0,9765h_{i,t-1} + \mu_{p,t}$ $PI_{i,t} = -38,6951 + 0,7620PI_{i,t-1} + 0,2098PF_{p,t-} + 22,4068h_{p,t-1} + \mu_{i,t}$	one direction
	$PR_{r,t} = -2,6446 + 0,9286PR_{r,t-1} + 0,1016PI_{i,t-} + 6,0011h_{i,t-1} + \mu_{r,t}$ $PI_{i,t} = 87,2291 + 0,8944PI_{i,t-1} + 0,0620PR_{r,t-} + 2,7664h_{r,t-1} + \mu_{i,t}$	two-way
	$PF_{p,t} = -7,1554 + 0,9133PF_{p,t-1} + 0,1203PAS_{J,t-1} + 5,8440h_{p,t-1} + \mu_{P,t}$ $PAS_{J,t} = 21,3802 + 0,9194PAS_{j,t-1} + 0,0430PF_{p,t-} + 15,7485h_{p,t-1} + \mu_{j,t}$	one direction
	$PR_{r,t} = -27,5079 + 0,9194PR_{r,t-1} + 0,1515AS_{j,t-} + 11,7015h_{j,t-1} + \mu_{r,t}$ $PAS_{j,t} = 27,5597 + 0,9577PAS_{j,t-1} + 0,0154PR_{r,t-} + 12,0645h_{r,t-1} + \mu_{j,t}$	one direction

The table shows that the temporary price volatility spillover occurred in one direction at different levels soybean prices, whereas the two-way dynamic priced volatility spillover only happens at the price of local soybean (East Java) between farm and retail prices, and between East Java soybean price at retail levels with the price of soybean imports. Meanwhile, the local soybean prices (East Java) with the price of U.S. soybeans are not mutually affected or does not occur in the price transmission. This indicates that soybean market in East Java was not integrated with the U.S. soybean market.

CONCLUSIONS AND RECOMMENDATION

Soybean price volatility at various price levels in dynamic conditions are diverging or more likely to be the greater at the level of farmers with jumped sharply tendencies *(spiky)*. In temporary, soybean price volatility at various price levels are converging *(die-down)*, which indicates that the volatility will be smaller in the long run.

Price volatility is dynamic between local soybean prices to the price of imported soybeans and are also divergent, which indicates that the local soybean prices have fluctuated very turbulent/volatile on imported soybean prices and tend to be very low compared with local soybean prices or in the future likely to occur more big volatility. In temporary, price volatility of soybeans tends to be convergent or became weaker *(die-down)*.

The existence of temporary volatility spillover of soybean prices occurred in one direction between the local soybean prices (East Java) at the farm and retail level, local soybean prices (East Java) with the price of imported soybeans and between local soybean prices (East Java) with the price of U.S. soybeans. A dynamically, there is the existence of spillover in two directions between the local soybean prices (East Java) at the farm and retail level, and between local soybean prices (East Java) at the retail level with the prices of imported soybean.

Recommendations from this research to protect the farmers from price fluctuations and volatility in soybean an uncertain and difficult to predict *(unpredictable)* are soy-based pricing or local government purchasing price to stimulate farmers to increase productivity, strengthen a stable farmers exchange rate, drafting the rules of trading system especially about import licenses and importers position.

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