RELATION ANALYSIS OF INTERNATIONAL COCOA PRICES AND INDONESIAN COCOA FARMERS' PRICE AFTER EXPORT TAX POLICY ON COCOA BEANS

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ABSTRACT: *The government of Indonesia imposed export tax on cocoa beans since April 2010. This policy has objectives to guarantee the availability of domestic cocoa beans as raw materials for domestic processing companies at an affordable price. The aim of this paper is to analyse the relation of cocoa prices between international price and farmers' price after export tax implementation. The method utilized in the analysis is Vector Autoregression or Vector Error Correction depending on the characteristic of the data. The results show that, in the short-run relation and the long-run relation, international price has a significant effect to domestic price. There is strong correlation between the export taxes to farmer's price as the international price is well transmitted to the domestic price. Farmers has the highest risk. Farmer encounter the uncertainty and it cause on decreasing cocoa beans production. Lack of cocoa beans supply impacts to cocoa processing industry.*

KEYWORDS: Cocoa, Relation, Export Tax, Farmers, Price

INTRODUCTION

Indonesia is the third largest producer of cocoa beans in the world, after Ivory Coast and Ghana. The majority of cocoa cultivated by small-scale farmers. Small-scale farmers contribute for 96.70 percent of total national cocoa production, and 3.30 percent comes from state-owned and private plantations. Cocoa beans is considered to be one of important product in Indonesian economy. Cocoa is the main source of income for more than 1.4 million rural household in Indonesia. Their income information could get from the price. Variability of cocoa beans prices can have impact on farmer's incomes and farmers decision from making investment in agriculture especially cocoa (Anggraenie 2005).

The majority of Indonesian cocoa production is exported in the form of unfermented beans. Based on Indonesian Cocoa Association peak exports of cacao beans was approximately 81 percent of total national cocoa beans production in 2009. However, cocoa beans exports often rejected from several export destination countries due to their quality and standards that have not met the established requirements. Destination market considered Indonesian cocoa has low quality because farmer is unable to dry the harvest naturally so the price gets discount (ul Haque, 2004). The discount gave financial loss to traders and farmers. To decreasing the financial loss and to give value added of cocoa product, the government of Indonesia issued the Ministry of Finance Regulation No 67/PMK.011/2010 in April 2010 regarding implementation of cocoa beans export tax.

Implementation a cocoa export tax policy has the effect of reducing cocoa beans exports significantly, by 46 percent. On the other hand, the implementation of the export tax also shifted the contribution of cocoa product exports from cocoa beans to be processed cocoa product

(Rifin, 2015). The decreasing of cocoa beans exports gave enough raw material supply for cocoa processing industry. The impact of the export tax was marked by increasing cocoa processing product exports. Export of cocoa products is supported by increasing world demand of cocoa products approximately two percent every year (Stapleton, 2016).

The high demand of world cocoa product is not supported by Indonesia cocoa beans productivity. The cocoa beans encounters decreasing productivity. There are several factors which affect cocoa beans productivity, such as the old cacao trees, pests and diseases, environmental influences, government schemes, return on investment (farmer prices), and costs. Cocoa as one of the main export commodity. Indonesia cocoa prices influenced by the world cocoa price. High returns from selling cocoa encourage growers to apply more inputs such as fertilisers and pesticides which increases the yield. Financial success in setting up a cocoa farm depends on quick returns from the initial investment and increasing yields to cut unit costs (ICCO, 1998). Cocoa price tend to have a wide fluctuation. Uncertainty of cacao price urged farmers to switchover to other crops. Decreasing of cocoa productivity could affect the raw material supply of cocoa processing industry.

Government has been imposed export tax policy to guarantee the cocoa beans supply for domestic cocoa processing industry. Cocoa industry need to grow but lack of cocoa beans supply. This paper will analyse the relation between farmer prices, domestic price, international price, and export tax.

LITERATURE REVIEW

Export restrictions have become a common practice in the world trading system. Some developing countries implemented export taxes and quantitative restriction on their primary commodity. Regarding on Piermartini (2004), there were approximately one-third of WTO Members imposed export taxes, giving as examples the export taxes implements by Madagascar on vanilla, coffee, pepper and cloves, by Pakistan on raw cotton, by Philippines on copra and coconut oil. In April 2010, Indonesia also introduced an export tax on cocoa beans. Economic analysis provide several motivations for using these instruments. There were improving terms of trade, food security and stabilization of final consumption price, stabilizing intermediate consumption price and developing processing industries, increasing public receipts, income redistribution, and stabilization of export earnings. The difference between taxation in a small and country consists in the impact of a variation on net supply (exports) on world prices. A change in a small country's exports does not lead to a change of world prices as this country is too small to have an influence on world markets. However, when a large country modifies its net supply (the level of its exports) on the world markets, it can exert an influence on world price (Bouët and Debucquet, 2010). The other theory about export tax to domestic price was explained by Helpman and Krugman (1989). The export tax will decrease the domestic price of cocoa beans, eventually it will give benefit the downstream cocoa industry since raw material will be available at a lower price. Nevertheless, the impact of export tax on farmers is still unclear.
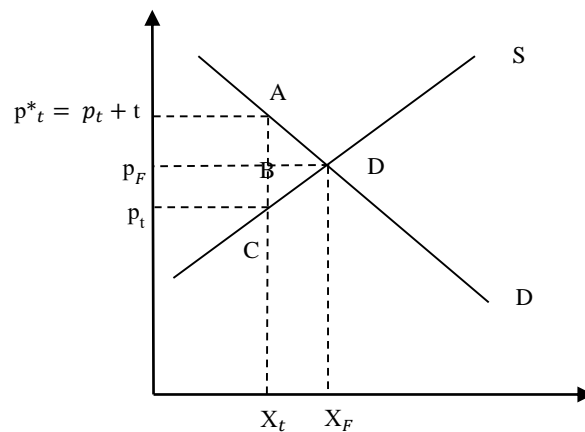
Figure 1. The imposition of export tax. Source: Helpman and Krugman (1989)

Figure 1 illustrate the impact of export tax at a rate of t in a case where the producing country accounts for a large share of world trade. The domestic price of export falls to p_t, reducing the sum of consumer and producer surplus by the area of $p_F DC p_t$ on the graph. Nevertheless, the tax yields revenue equal to after tax volume multiplied by the tax rate, or the area of $p^*_t AC p_t$. The loss of tax equal to the area of BCD, while a terms of trade gain is equal to the area of $p^*_t AB p_F$ (Helpman and Krugman 1989).

Many researcher have analysed the impact of export taxes on specific commodities. Those are classified into group calculates the optimum export tax (Akiyama, 1992; Burger, 2008) and analyses the impact on welfare (Permani, et al. 2011; Permani, 2013). Burger's study (2008) which is very clearly focused on impacts of cocoa beans export tax in Ivory Coast as the largest cocoa producer and found that, in the short-run, the country would get advantage since it has a high share of cocoa bean exports, while, in the long-run, the tax may have a negative impact. For producers, the export tax caused their welfare to decrease significantly. In total, welfare will not change in the short-run, but the distribution will shift. Processing companies will get the benefits while producers will suffer (Rifin, 2015). The impact of export tax on welfare and the economy has been analysed (Rifin, 2010; Nyein, Sirisupluxana & Titapiwatanakun, 2010) and indicate it will have a negative impact on the economy and decrease its competitiveness.

After examining the articles on export taxes for all commodities, there is lack of articles which analysed the impact of an export tax at the micro level, such as farms, and therefore the real situation on the field cannot be captured. This article utilized farmers' associate data to represent the farmers' price. The farmers' price is the average of all cocoa farming (not from the warehouse, traders, or company) in Indonesia. Price has important role. For the farm producers, price contains information on expected income as well as investment planning. This research also utilized domestic price from Makassar spot price as the largest producer of cocoa beans in Indonesia. Price variability can be a serious concern for producer, traders and consumers alike. Farm producers are price takers, who have very limited control over prices received for their products. Moreover, the price often exhibits variability, that is, changes over the time. The variability could means losses or profit, hence it leads to a great uncertainty. Uncertainty is important concept since it is found to reduce production, investment and consumption and thereby trade (Sandmo, 1971 in Anggraenie, 2005). Accordingly, the price variable is important to be analysed in the context of risk circumstances. This research aims to

contribute and enrich the studies on the export tax on farmers' level and cocoa processing industry.

The processed cocoa industry reached its golden period in 2001. In 2001, the government implemented regulation regarding the value added tax (VAT) on primary products. In 2007, the VAT on primary products was abolished, then world agricultural product prices increased, including for cocoa beans. The government issued the progressive export tax policy in April 2010 to reduce the cocoa beans exports and to maintain cocoa beans supply for the processed cocoa industry (Rifin, 2015). According to Ministry of Finance Regulation No 67/PMK.011/2010, the export tax for cocoa beans is calculated as follows:

Export Tax = Export Tax Tariff × Check Price × Export Volume × Exchange Rate

The export tax tariff is based on reference price, which is tied to the world price. The reference price and check price are usually announced by the Ministry of Trade at the end of every month to be applied in the coming month. The reference determines the export tariff which has a higher reference price will induce a higher tariff. The reference price is based on the average international price for the previous month.

METHODOLOGY

The impact of the export tax on farmers is predicted to be due to changes in income. Income would be predicted through the price. In order to analyse whether the price change is caused by the changes in international price or by the export tax, an analysis regarding the linkage between farmers price, domestic, and international price was conducted. Meanwhile, the analysis on the impact on the cocoa processing industry was conducted through descriptive data based on AIKI data. The impact on industry will be shown by machine utilization data regarding on cocoa beans availability as raw material supply before and after the export tax were compared to see if there were changes in the supply of cocoa beans for industry and growth of investment on cocoa industry after export tax implementation.

The methodology utilized in this research includes both quantitative and qualitative approaches. The quantitative analysis was the price linkage and price variability. The qualitative approach was used in analysing the cocoa processing industry before and after the implementation of export tax.

The price linkage analysis was utilized to analyse the link between domestic price and the international price. According to Rifin (2015), the analysis was conducted before and after the implementation of the export tax. The Vector Error Correction Model (VECM) or Vector Autoregression (VAR) was utilized to analyse the price linkage between those two price. VECM is a VAR model adding the error correction equation. The error correction equation is added when there is a cointegration in the model. If there are two variables, X and Y, and both variables are cointegrated, the first difference of X_t and Y_t can be modelled using a VAR and augmented by including $Y_{t-1} - \theta X_{t-1}$ as an additional regressor (Stock & Watson, 2007), as shown in Equation 1. Meanwhile, if there is no cointegration between those prices, the first difference VAR will be utilized.

$$\Delta Y_t = \beta_{10} + \beta_{11}\Delta Y_{t-1} + \cdots + \beta_{1p}\Delta Y_{t-p} + \gamma_{11}\Delta X_{t-1} + \cdots + \gamma_{1p}\Delta X_{t-p} + \alpha_1(Y_{t-1} - \theta X_{t-1}) + \mu_{1t}$$

$$\Delta X_t = \beta_{20} + \beta_{21}\Delta Y_{t-1} + \cdots + \beta_{2p}\Delta Y_{t-p} + \gamma_{21}\Delta X_{t-1} + \cdots + \gamma_{2p}\Delta X_{t-p} + \alpha_2(Y_{t-1} - \theta X_{t-1}) + \mu_{2t}$$

According to Anggraenie (2005), methods to measure price variability in this article is descriptive statistics. It measures the characteristics of distribution of price in levels and period-to-period changes. Mean, and standard deviation are basic statistics as measurement of central tendency and dispersion of the data. Although the standard deviation can be used as a measure of variability, comparing directly two or more standard deviations can lead to falsely conclude the results. Besides depend on the value of mean, the standard deviation of the different unit measurements cannot be compared. To solve this fault, coefficient of variation, as a relative measurement can be applied. Coefficient of variation (CV) is defined as the standard deviation divided by the mean. The CV expresses the dispersion of observed data values as a percent of the mean. Since the coefficient of variation is unit free, it facilitates comparison of price changes in different directions across different periods of time and for different commodities. Although this measurement provides some information on the nature of price variability, it ignores the dynamic properties of prices.

The flow of agricultural commodities (raw materials) is started from villages to domestic (central) market. The equations below show that the producer price will be lower and the coefficient of variation of agricultural commodity in the remote village will be higher compared to those in the domestic (central) market.

$$P_c = P_r + T_{cr}$$

$$\bar{P}_c = \bar{P}_r + T_{cr}$$

$$\text{Var}(P_c) = \text{Var}(P_r) + Cov(P_c, T_{cr}) + Var(T_{cr})$$

$$\bar{P}_c > \bar{P}_r$$

If T_{cr} = constant $\qquad \text{Var}(P_r) = \text{Var}(P_c)$

$$CV_r = \frac{\sqrt{\text{Var}(P_r)}}{\bar{P}_r} = \sqrt{\text{Var}(P_r)} = CV_r\bar{P}_r$$

$$CV_c = \frac{\sqrt{\text{Var}(P_c)}}{\bar{P}_c} = \frac{\sqrt{\text{Var}(P_r)}}{\bar{P}_r + T_{cr}} = \frac{CV_r\bar{P}_r}{\bar{P}_r + T_{cr}} \div CV_r$$

$$\frac{CV_r}{CV_c} = \frac{\bar{P}_r + T_{cr}}{P_r} = 1 + \frac{T_{cr}}{P_r} > 1$$

RESULT AND DISCUSSION

The imposing of cocoa bean export tax in April 2010 is expected to affect the domestic price and farmers. Mostly the price which farmer received was lowered and it was caused by the export tax. These findings are similar to the research conducted by Pradiptyo *et al*. (2011), Rifin (2015). The domestic price, farmers' price and the international price (based on NYBOT) move in the same direction.
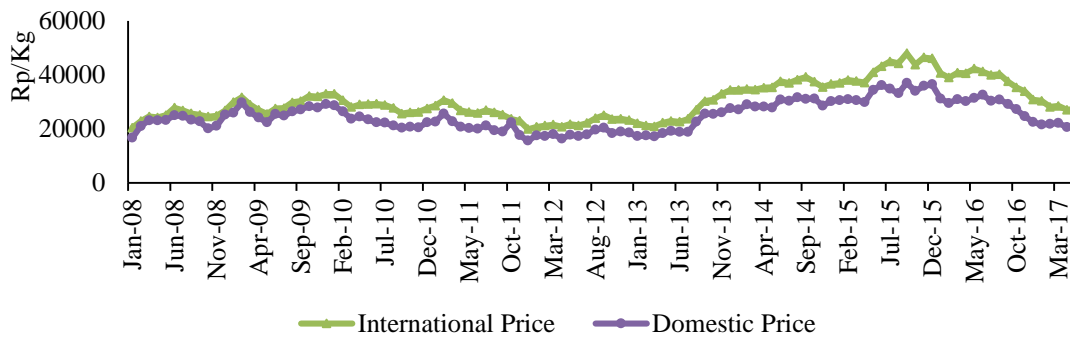
Figure 2. International and domestic price of cocoa beans.

Source: ICCO 2017 and Bappebti 2017

The NYBOT price is used because the price is for unfermented beans, which is what most cocoa beans exported from Indonesia are. Meanwhile, the farmers' price is based on the cocoa farmers selling price from Indonesian cocoa farmer association (APKAI). The price data from APKAI was the average cocoa farmers selling price from all Indonesia province. APKAI claimed that the price was got randomly which has assumption represent the majority prices directly from farmers not from traders, warehouse, or company. The price data was recorded since May 2015 to May 2017.
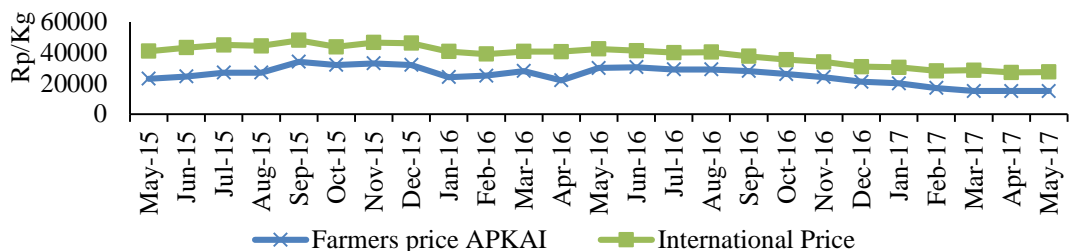

Figure 3. International and farmers price of cocoa beans.

Source: ICCO 2017 and APKAI 2017

The same direction moving indicates that the domestic price and farmers price is determined by the international price. Furthermore to analyse the price linkage between the domestic price and international price, a VAR or VECM is used. The domestic data used were from the period of January 2008, before the export tax was implemented, until May 2017, after the export tax was implemented. Before estimating the VAR or VECM model, a unit root test was conducted to detect the data stationary, using an Augmented Dickey Fuller test (Table 1). To measure price variability, the farmers' price, domestic price, and international price was utilized. The weekly data was used from May 2016 to May 2017. Important concepts to measure risk are variance, standard deviation, and coefficient variation.

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Table 1. Unit root test

Variable	ADF Test	p-value
Domestic Price	-2.271	-2.8869
D(Domestic Price)	-10.9299	-2.8871
International Price	-1.7773	-2.8871
D(International Price)	-8.4041	-2.8871

Table 1 indicates that both data is stationary after first differencing I(1). The next step is to conduct a co-integration test to determine whether both prices have long-run equilibrium (Table 2). The result indicates that the prices have a co-integration. There are a long-run relation and the short run relation.

Table 2. Johansen co-integration test

Hypothesized No. of CE(s)	Trace		Max Eigen	
	Trace Statistic	*p*-value	Max Eigen Statistic	*p*-value
None	35.8525	12.3209	0.2716	12.3209
At most 1	0.0462	4.1299	0.0004	4.1299

The result is shown in Table 3. The result shows that only one variable, the international price, is significant. At international prices there is an adjustment mechanism from short to long term which is indicated by negative value co-integration. Coefficient CointEq1 by -0.3566 is the value of speed in self-adjustment to long-term trend of 0.36% with 1 lag. This means 0.36% of short-term recurrences can be short-term for 1 month. In the short term, domestic prices are affected by international prices in the previous month.

Table 3. Estimation result vector error correction model (VECM) short-run relation

Error Correction:	D(LN_PD)	D(LN_PI)
D(LN_PD(-1))	-0.13889	-0.0111
	[-0.82679]	[-0.09113]
D(LN_PI(-1))	0.44906	0.19776
	[2.16579]*	[1.31092]
DUMMY	-0.03989	0.02525
	[-1.74841]	[1.52110]

The long-run relation result indicates that a change in the international price by 1 percent in the first lag will increase the farmers' price by 0.99 percent. It means that the international price is perfectly transmitted to the domestic price. This finding is similar to Firdaus and Ariyoso (2010) which study about market integration between Indonesia's cocoa market and the world (ICE Futures). There was a strong co-integration between NYBOT cocoa beans price and Makassar spot price in long-run even short run relation.

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**Table 4. Estimation result vector error correction model (VECM) long-run relation**

Cointegrating Eq:	CointEq1
LN_PD(-1)	1.000
LN_PI(-1)	-0.988
	[-903.921]*

In this study the projection period used in analyzing the response of domestic price for over the next 96 weeks (2 years) and will be tried to see how the domestic price response to the international market price shock (ICE Futures). The response will be shown in Figure 4.
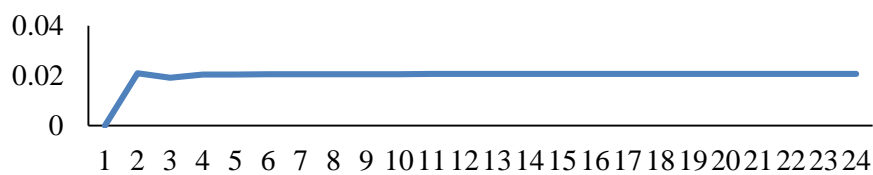
Figure 4. Impulse response function domestic price to international price

In the second month until the third month there is a positive response but decreased in the third month by 0.019% but in the fourth month reached a long-term balance at the level of 0.020%. The response provided by domestic prices shows that international prices affect domestic prices. Domestic cocoa price follow international price because cocoa is an export-oriented commodity sector.

As the result shows that international price is a dominant variable. It is reinforced by forecast error variance decomposition graph (Figure 5). The results of the decomposition analysis show that fluctuations in cocoa prices over the next 24 periods.
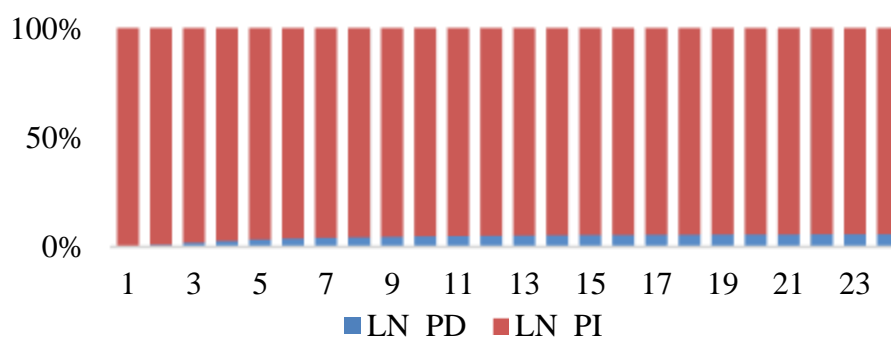
Figure 5. Forecast error variance decomposition results

In the first period, the fluctuations in international prices were explained by the international price alone by 100 percent. In the second period, domestic cocoa prices were explained by international cocoa prices of 99 percent. Furthermore, it can be seen clearly that domestic cocoa price is strongly influenced by international cocoa price as dominant variable. This is because Indonesian cocoa products only contribute 7 percent of world cocoa production, so Indonesia does not have market power to influence international prices.
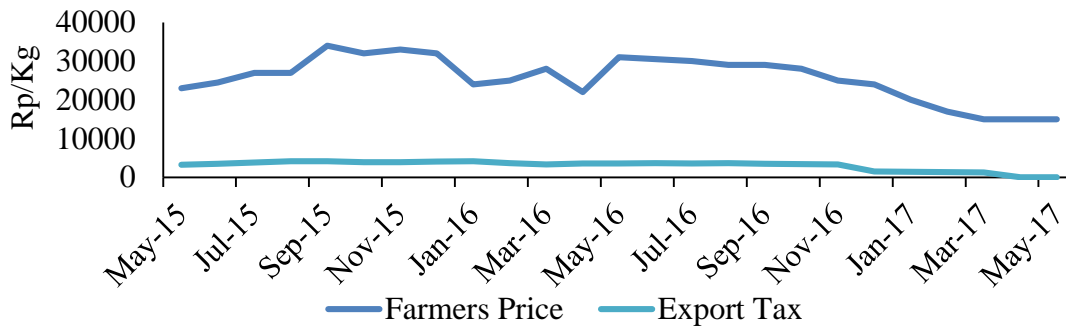
Figure 6. Farmers' price and export tax value after implementation of export tax

Concerning to the impact of the export tax value on farmers price, both values are shown in Figure 6, which the graph shows no trend on both values. However, when a correlation analysis was used to analyse the relation between both values, it indicates that both values (farmers price and lag export tax) are correlated and significant (p-values < 0.05), the relation is relatively strong (0.8454). The lagged export tax was used because the value of the export tax is determined by the previous month's international price (Rifin, 2015). Similar to Rifin (2015), the positive correlation shows that the impact of the export tax is not through the domestic price, but through the international price. International prices affect domestic prices and the export tax. These study has a strong correlation between the export taxes to farmers' price as the international price is well transmitted to the domestic price. This has caused the farmers have a higher bargaining position compare to the exporters after export tax was imposed in 2010.

Government policy on commodity prices could affect producer prices and domestic prices. Price is an important determinants for farm income. Comparing to other non-farm goods and services, agriculture commodity prices are more volatile (Anggraenie, 2005). Cocoa beans price tend to have a wide fluctuation. This fluctuation will give impact to producer income. Figure 7 shows the volatility of price on different level that give illustrate who is the risk taker.

Figure 7. The volatility of price on international price, domestic price, and farmers' price

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The price which has high variance, consequently bear the greater risk. Coefficient of variation (CV) can determine volatility at a price. Based on the results of the CV can be said that the price on the farm level is more volatile compared to domestic prices and international price. Farmer-level prices have a higher risk. The high price risk raises the uncertainty at the farm level. This risk causes less incentives received by farmers. Farmer incentive are useful for maintaining cocoa farming. However, the low incentives for farmers will give impact on cocoa productivity as well as the supply of cocoa beans for the domestic processing industry. According to KPPOD (2015) study indicating that there is no incentive for cocoa farmers in Donggala district. If the government does not take any kind of action, then Donggala will face the big problem of land shifting of cocoa to palm oil approximately 6,407 hectare. Institutional improvement is required through the value chain that would help enhance and sustain cocoa bean production and increase the reward that farmers receive.

In regard to the impact of the export tax on cocoa processing industry, there was increasing the number of cocoa companies, number of labour, number of investment, and installed capacity after export tax implementation. Theoretically, the export tax will decrease the domestic price of cocoa beans, which will benefit the downstream cocoa industry since raw materials will be available. The increasing of downstream cocoa industry is shown by Table 5.

Table 5.   Number of companies, labour, investment, installed capacity, used capacity, utility, and cocoa beans production

No	Description	Unit	Year								
			2008	2009	2010	2011	2012	2013	2014	2015	2016
1	Number of companies	Unit	15	15	15	16	16	18	19	20	20
2	Number of labour	Unit	4000	4000	4000	4300	4300	5300	5800	6000	6000
3	Number of investment	Million USD	-	-	250	330	495	570	600	635	635
4	Installed capacity of the machine	(1000) Ton	345	345	345	560	660	735	765	800	800
5	Used capacity	(1000) Ton	163	130	151	268	310	324	391	426	392
6	Utility	%	47	37	43	47	47	44	51	53	49
7	National cocoa beans production	(1000) Ton	530	545	559	459	460	482	400	377	340

Source: Indonesian Cocoa Industry Association (AIKI), 2017

Table 5 presents the increasing investment of downstream cocoa industry is inversely to cocoa beans production. Lubis and Nuryanti (2011) claimed that the increasing of cocoa downstream investment, there should be more fiscal incentives, easiness of investment permits, and domestic raw material availability. On the other hand, the decreasing production has happened because the wide fluctuation on the cocoa beans prices and less incentive for farmers to

maintain their cocoa farming. Decreasing domestic production would impact to the lack of raw material availability, then reduce the machine utility and threatening industry production.

This paper also analyse there is correlation between export tax and farmers price. Government policy on commodity prices could affect producer prices and domestic prices. Due to the price adjustment in domestic market, the excess of supply in domestic market decrease since the producers tended to reduce its supply while the consumers increase their demand due to a lower price.

MANAGERIAL IMPLICATIONS

The volume of high quality beans could be increased if farmers were motivated to enhance the quality of their harvested cocoa beans. At present, farmers sometimes are unable or unwilling to invest resources into the recommended farm practices because there are little or no incentives to do so. Farmers receive low prices and they has the highest price variability. This implies that farmers as the price taker and the risk averse need government intervention to reduce the price levels and the variability. Government should implement minimum price policy to farmers and brief them about the methods used to determine prices.

The export tax policy which has been imposed is still progressive tariff. This policy attract investor to develop in cocoa processing industry. Development of domestic cocoa industry was not supported by national cocoa beans production. The lack of cocoa beans as raw material could lead some companies to stop production temporarily. Government has to decide the optimum tax or flat tariff which could reduce big amount of cocoa beans export.

CONCLUSION AND SUGGESTION

According to findings and discussion, the research concludes that the farmer's cocoa bean price is determined by the international price. Based on the VECM test, in the short-run relation and the long-run relation, international price has a significant effect to domestic price. Based on the IRF test shows that international price shocks responded positively by the price of domestic cocoa in Indonesia. Based on the results of FEVD shows that the shock that gives the largest contribution to domestic prices is the international price. Accordingly, domestic price has affect to the farmer's price. The international price is nearly perfectly transmitted to the domestic price. There is strong correlation between the export taxes to farmer's price as the international price is well transmitted to the domestic price. This has caused the farmers have a higher bargaining position compare to the exporters after export tax was imposed in 2010.

Cocoa beans price have a wide fluctuation which impacts to producer income. Farmers as price takers bear the greater risk than domestic and international price level. Coefficient of variation farmer's price is the highest value than domestic and international price level. Farmer encounter the uncertainty so that no incentive received by farmer to maintain cocoa farming. This implies that no incentive is one of the causes of decreasing cocoa beans production. Lack of cocoa beans supply impacts to cocoa processing industry. After export tax implementation, the cocoa processing industry investment was increase, otherwise the cocoa beans production was on the wane.

According to discussion and conclusion, the research suggests that Indonesian government is required to have a policy which reduce the variability of price and the price levels. Government also need to determine policy that can improve domestic cocoa production by repairing quality started from maintenance, grading the good beans, and doing fermentation.

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