

Market Integration of Palm Oil in South Sumatera

by Taufiq Marwa

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Taufiq Marwa, Abukosim, Mukhtaruddin, Abdul Bashir, and K.M. Husni Thamrin

Faculty of Economics, Universitas Sriwijaya, Palembang, Indonesia

Keywords: central market, local market, market integration, palm oil

Abstract: This study aims to determine the integration of the palm oil commodity market in South Sumatera. This market integration will be seen through the effect the price of palm oil in the central market on the price of palm oil in the local market and the influence of prices on the local market on the price of palm oil in the central market. The data used in this study are secondary data issued by the Central Bureau of Statistics (BPS) of South Sumatera Province, Directorate General of Plantations, and other relevant institutions. The analytical tool used in this study is the granger causality test. The results indicate that there is a one-way influence that the price of palm oil in the local market influences the price of palm oil in the central market while the price of palm oil in the central market does not affect the price of palm oil in the local market.

1 INTRODUCTION

Palm as a producer of palm oil is one of the plantation crops that is the mainstay of South Sumatera Province in generating foreign exchange. The export value of palm oil in South Sumatera Province ranks second after rubber commodities. Palm oil's contribution to the export value of South Sumatera is in the range of 10 percent, while rubber is 70 percent.

The development of the palm plantation in the Province of South Sumatera cannot be separated from the existence of government policies that provide various incentives, especially the ease of licensing and investment subsidy assistance for the development of smallholder plantations with the PIRBun pattern and in the opening of new areas for large private plantation areas (Azwardi, Bashir, Adam, & Marwa, 2016; and Departemen Perindustrian, 2007).

Currently, South Sumatera ranks third after Riau and North Sumatera in terms of area and total palm oil production in Indonesia. The total area of palm oil plantations in Indonesia in 2014 was 8,224,468 acres, and production in 2014 was 29,344,479 tons. The area of oil palm in South Sumatera in 2014 was 1,111,050 acres (554,687 acres of people's plantations, 55,221 acres of state plantations, 501,142 acres of private plantations) (Direktorat Jenderal Perkebunan, 2014).

South Sumatera's palm oil production amounted to 2,852,988 tons (1,213,457 tons of smallholder

plantations, 138,414 tons of State plantations, 1,501.11t tons of private plantations). Three regencies that have the largest area of oil palm plantations in South Sumatera are Musi Rawas District (14.51% of the total area of oil palm plantations in South Sumatera) Musi Banyuasin District with an area of 20.72% of the total area in South Sumatera, and Banyuasin District (29, 78%).

The price of fresh palm bunches (TBS) in most palm oil producing areas in Indonesia at the farm level often experiences very large fluctuations. Although the price level has been regulated by the Minister of Agriculture (2013) Regulation Number 14 of 2013 concerning Guidelines for Determining the Price of Fresh Palm Bunches (TBS), the price level of TBS at the farm level often experiences a decrease far below the government decree price.

The prices received by farmers are very dependent on the market structure of the palm oil commodity. Market structure can be characterized by the level of market control (market concentration) by a particular company, the higher the level of market concentration (the higher the market controlled by certain sellers or buyers) then the more it is shaped to have an imperfect competition market structure. Market structure that can be measured by market concentration can affect competition conditions and price levels (Marwa, 2001; and Marwa, Bashir, Adam, Azwardi, & Thamrin, 2017).

Based on the previous explanation, this study analyses the relationship of palm oil price at local market and its price on central market.

2 LITERATURE REVIEW AND RESEARCH METHOD

Market integration is the relationship between markets; in this study what will be seen is whether there is a link between the palm oil market at the producer or local market level and the central palm oil market (Mulyana, 2006). Linkages between markets are usually characterized by a relationship between prices in a market and prices in other markets. The market has a price relationship with one another (Hasibuan, 1993). This is because sellers and buyers will communicate with each other through price signals. Thus, price is a form of communication signals that serve many variations to coordinate market decisions. The strength of market demand and supply shapes market prices (Adam, Marwa, Husni Thamrin, & Bashir, 2017). If the inter market has a link between the power of demand and supply, the price between markets will be integrated (Azwardi et al., 2016; Marwa, 2001; Marwa et al., 2017).

The price level between markets can vary, the difference in price between markets is caused by the costs of moving from one market to another. The costs of moving goods from one market to another include transportation costs, administrative costs, wage costs and others. So it can be understood that the movement of agricultural products from the local market to other local markets and the movement from the local market to the central market usually experience several obstacles, including distance problems and other infrastructure constraints. As a result of these constraints, there will be price differences in each of these markets (Marwa, 2001; and Marwa et al., 2017).

In order to measure the level of market integration, a linear regression model will be used while the Granger method will be used to conduct causality testing.

2.1 Regression Model

The general model of Market Integration is as follows:

$$P_x = a + bP_y$$

Where: P_x is the price of palm oil at the farm/local level; P_y is The price of palm oil at the manufacturer level; and a and b is parameters.

Referring to Marwa (2001); and Monke & Petzel (1984) if both markets are independent from one another then the price movements in both markets will spread randomly, or do not related to each other. Thus, the market is not integrated (Hasibuan, 1993).

This will be characterized by the coefficient b which is not statistically and significantly different from zero. Conversely, if the coefficient b is statistically and significantly different from zero, the two prices analyzed are dependent to one another. This also shows that, to a certain degree, the market is integrated. In details, the relationship can be seen in Table 1.

Table 1: The level of market integration based on simple regression analysis

Coefficient	Relationship	Integration Level
$a = 0, b = 0$	Independent	Not integrated
$a \neq 0, b = 0$	Independent	Not integrated
$a = 0, b > 0 \& b = 1$	Identical	Integrated
$a = 0, b > 0 \& b \neq 1$	Pure Percentage Premium	Integrated
$a \neq 0, b > 0 \& b = 1$	Absolute Premium	Somehow Integrated
$a \neq 0, b > 0 \& b \neq 1$	Pure Perc. & Abs. Premium	Somehow Integrated

Source: Monke & Petzel (1984)

2.2 Granger Method to Test Causality

The general model of causality testing of Granger is as follows:

The general model of Market Integration is as follows:

$$P_x = a + bP_y$$

$$Y_t = \sum_{i=1}^r c_i Y_{t-i} + \sum_{j=1}^s d_j X_{t-j} + v_t$$

Where: X_t is The price of palm oil at the farm/local level; Y_t is The price of palm oil at the manufacturer level (which is measured by export prices); u_t and v_t are error terms that are assumed not to contain serial correlation and $m = n = r = s$.

The regression results of these two forms of linear regression models will produce four possibilities regarding the value of each regression coefficient:

The general model of Market Integration is as follows:

$$P_x = a + bP_y$$

There is one-way causality from Y to X

$$(2) \text{ if, } \sum_{j=1}^n b_j = 0, \text{ and } \sum_{j=1}^s d_j \neq 0;$$

There is one-way causality from X to Y

$$(3) \text{ if, } \sum_{j=1}^n b_j = 0, \text{ and } \sum_{j=1}^s d_j = 0;$$

X and Y are free

$$(4) \text{ if, } \sum_{j=1}^n b_j \neq 0, \text{ and } \sum_{j=1}^s d_j \neq 0;$$

There is two-way causality of X and Y

3 RESULT AND DISCUSSION

3.1 The Development of Palm Oil Production in Indonesia

Palm oil commodities currently become one of the mainstay commodities in Indonesia, commodities that can produce palm oil can provide considerable added value, especially the added value obtained from the production that is exported. In addition, it can become one of the sources of state foreign exchange revenue.

The development of palm oil production in the period of 1998-2015 shows a fluctuating trend, it can also be influenced by erratic weather, as well as supporting materials such as fertilizer and others. When viewed from the production growth in the period of 1998-2015, the highest growth was experienced in 2001 at 19.94 percent, up from the previous year of 8.44 percent. Furthermore, the highest production growth was experienced in 2005, amounting up to 18.61 percent.

Currently, oil palm plantations need to be rejuvenated, in addition to the need for technological innovations and other supporting materials in order to increase the yield of palm oil in Indonesia. With this effort, Indonesia is expected to become a world oil exporting country. Currently Indonesia is still inferior to Malaysia, currently Malaysia has become the

world's palm oil producing country that is calculated at the world level.

Table 2: Plant Area & Production of Indonesian Palm Oil Plantations 1998-2015

Year	Production (acres)	G (%)	Size (acres)	AP Per Acres (Ton)
1998	5.930.415		3.560.196	1,67
1999	6.455.590	8,86	3.901.802	1,65
2000	7.000.508	8,44	4.158.076	1,68
2001	8.396.472	19,94	4.713.431	1,78
2002	9.622.344	14,60	5.067.058	1,90
2003	10.440.834	8,51	5.283.557	1,98
2004	12.326.419	18,06	5.717.026	2,16
2005	14.619.830	18,61	5.950.321	2,46
2006	16.569.927	13,34	6.284.960	2,64
2007	17.796.374	7,40	6.853.916	2,60
2008	19.400.794	9,02	7.333.707	2,65
2009	21.390.326	10,25	7.949.389	2,69
2010	22.496.857	5,17	8.548.828	2,63
2011	23.995.973	6,66	9.102.296	2,64
2012	26.015.519	8,42	10.133.322	2,57
2013	27.782.004	6,79	10.465.020	2,65
2014	29.278.189	5,39	10.754.801	2,72
2015	31.284.306	6,85	11.300.370	2,77
Av	17.266.816	10,37	7.059.893	2,32

Source: Badan Pusat Statistik (2015) Note: AP = Average product; Av= Average; G = growth

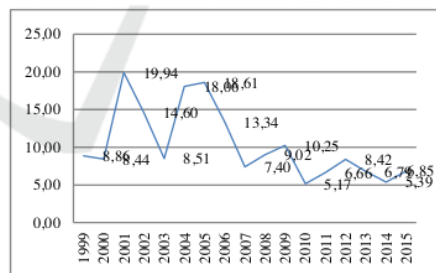


Figure 1: Indonesian Palm Plantation Production Growth 1999-2015

Source: Badan Pusat Statistik (2015)

The development of palm oil exports in the period of 1998-2015 experienced quite varied fluctuations. When viewed from the growth of palm oil exports for the period of 1998-2015, in 1999, the export of palm oil production grew by 123.01%, a high growth at the beginning of the recovery of the world economic crisis in 1997.

But there was also a declining growth in the year 2007, which is fell by -1.86 percent, and in 2010, fell

by -3.19 percent. The reason for such decline is the price. The unpredictable palm prices can lead to the fluctuation in the production of palm oil especially at the level of smallholder plantations.

Table 3: Development of Indonesia's Export Volume and Value from 1998-2015

Year	Volume (Tons)	Export (US\$ 000)	G (%)
1998	1.479.278	745.277	-
1999	3.298.987	1.114.242	123,01
2000	4.110.027	1.087.278	24,58
2001	4.903.218	1.080.906	19,30
2002	6.333.708	2.092.404	29,17
2003	6.386.409	2.454.626	0,83
2004	8.661.647	3.441.776	35,63
2005	10.376.190	3.756.283	19,79
2006	12.100.921	4.817.642	16,62
2007	11.875.418	7.868.640	-1,86
2008	14.290.686	12.375.569	20,34
2009	16.829.206	10.367.621	17,76
2010	16.291.856	13.468.966	-3,19
2011	16.436.202	17.261.248	0,89
2012	18.845.020	17.602.168	14,66
2013	20.577.976	15.838.850	9,20
2014	22.892.224	17.464.754	11,25
2015	26.467.564	15.385.275	15,62
Average	12.342.030	8.234.640	20,80

Source: Badan Pusat Statistik (2015)
Note: G= Growth

Table 4: The World's Main Palm Oil Producer, 2009 - 2015

Country	Volume (000 Tons)						
	2009	2010	2011	2012	2013	2014	2015
Indonesia	21.000	22.100	24.100	26.300	28.500	30.800	31.284
Malaysia	17.566	16.993	18.912	18.650	19.216	19.930	21.000
Thailand	1.310	1.380	1.530	1.600	1.970	1.930	2.300
Nigeria	870	885	930	940	970	1.010	970
Colombia	802	753	941	970	1.040	1.120	1.175
Ecuador	448	380	495	550	495	515	560
Others	3.107	3.367	3.650	3.804	4.123	4.281	4.385
Average	6.443	6.551	7.223	7.545	8.045	8.512	8.811
Total	45.103	45.858	50.558	52.814	56.314	59.586	61.674

Source: Oil World Annual (2009-2015), Malaysia Palm Oil Board

When viewed based on the main producer countries of world palm oil, Indonesia is a major producer in the world. Then followed by Malaysia, Thailand, Nigeria, Colombia, Ecuador, and others. But the problem at the moment is the unpredictable price of palm oil, there is a tendency for prices to rise and become a problem which should be revealed whether it is a determining factor in the price of world palm oil. Hypothetically, the price of palm oil has an integration with each other, both in the local market and in the international market.

The contribution of palm oil commodities contributes to a large amount, especially for foreign

exchange. In addition, when viewed from the contribution of the value of palm oil commodity exports to Gross Domestic Product (GDP), it is quite encouraging for the role of one commodity, the highest share can be seen from the period 2007-2009 which is 2.30 percent, 2.76 percent, and 2.29 percent. Meanwhile the lowest share was experienced in 2000-2001, which was 0.84 percent and 0.71 percent.

Table 5: Share the Export Value of Oil Palm to GDP, 1998

Year	Export (Rp. Million)	GDP (Rp. Million)	Share (%)
1998	11.551.794	765.950.523	1,51
1999	9.994.751	994.009.603	1,01
2000	13.281.101	1.583.376.613	0,84
2001	11.862.943	1.668.648.255	0,71
2002	19.563.977	1.749.205.863	1,12
2003	20.520.673	1.987.348.864	1,03
2004	32.937.796	2.547.821.882	1,29
2005	39.816.600	2.810.088.527	1,42
2006	43.734.554	3.288.426.051	1,33
2007	93.400.757	4.052.464.133	2,30
2008	155.932.169	5.659.456.019	2,76
2009	128.040.119	5.588.970.527	2,29
2010	146.407.660	6.932.519.461	2,11
2011	148.187.814	8.028.685.219	1,85
2012	175.229.582	8.875.802.062	1,97
2013	193.233.970	11.122.756.702	1,74
2014	203.551.708	11.077.659.208	1,84
2015	201.193.241	12.384.928.299	1,62

- 2015 (Percentage)

Source: Badan Pusat Statistik (2015)

Indonesia's palm oil exports throughout 1998-2015 tended to increase. This is a manifestation of the State's demand in the world for palm oil, besides that, Indonesia is now also the world's palm oil producer. Even though the price of palm oil commodities currently does not provide great benefits for producers in the region, especially in rural areas.

3.2 The Development of Palm Oil Production in South Sumatra

Currently, South Sumatra ranks third after Riau and North Sumatra in terms of area and total palm oil production in Indonesia. The total area of palm oil plantations in Indonesia in 2014 was 8,224,468 acres, and production in 2014 was 29,344,479 tons. The area of oil palm in South Sumatra in 2014 was 1,111,050 acres (554,687 acres of people's plantations, 55,221 acres of state plantations, 501,142 acres of private plantations).

The development of palm oil production in South Sumatra varies from year to year, but if seen from the growth in the period of 1998-2015, it shown that in

certain years there is a striking growth lie in 2005 as it grew by 312 percent, it was also accompanied by an increase in the number of companies as many as 132, of which there were only 91 companies in the previous year. In addition, the increase can also be caused by the conversion of agricultural land into plantation land.

Table 6: Plant Area, Production & Number of People's Palm Oil Plantations in South Sumatra, 1998-2015

Year	Area (acres)	Production (Tons)	G (%)	Number of Large Plantation
1998	314.967	512.505	-	72
1999	455.750	615.038	20,01	87
2000	384.496	844.261	37,27	87
2001	408.065	903.070	6,97	72
2002	398.269	937.884	3,86	72
2003	352.064	856.399	-8,69	77
2004	411.546	1.231.538	43,80	91
2005	454.065	5.080.363	312,52	132
2006	499.981	1.043.251	-79,47	138
2007	550.524	1.388.007	33,05	147
2008	605.886	1.049.645	-24,38	190
2009	720.682	1.986.559	89,26	190
2010	862.276	2.542.822	28,00	206
2011	820.787	2.203.275	-13,35	230
2012	828.114	2.242.649	1,79	241
2013	1.060.573	2.690.620	19,98	241
2014	1.111.050	2.852.988	6,03	243
2015	1.002.196	3.034.697	6,37	238
Average	624.516	1.778.643	28,41	153

Source: Badan Pusat Statistik (2015)

South Sumatra's palm oil production amounted to 2,852,988 tons (1,213,457 tons of smallholder plantations, 138,414 tons of State plantations, 1,501.11 tons of private plantations).

Three regencies that have the largest area of oil palm plantations in South Sumatra are Musi Rawas District (14.51% of the total area of oil palm plantations in South Sumatra) Musi Banyuasin District with an area of 20.72% of the total area in South Sumatra, and Banyuasin District (29, 78%).

Table 7: Plant area, production of large & people's oil palm plantations in South Sumatra 2015

No	Regency/City	Area (acres)	Production (Tons)	AP Per acres (Tons)
1	Ogan Komering Ulu	20.785	45.146	2,2
2	Ogan Komering Ilir	80.383	179.358	2,2
3	Muara Enim	74.285	193.719	2,6
4	Lahat	40.967	125.303	3,1
5	Musi Rawas	103.256	320.356	3,1
6	Musi Banyuasin	147.502	383.456	2,6
7	Banyuasin	211.988	266.119	1,3
8	OKU Selatan	389	136	0,3
9	OKU Timur	20.788	43.127	2,1

10	Ogan Ilir	10.036	26.196	2,6
11	Empat lawang	340	73	0,2
12	PALI	-	-	-
13	Musi Rawas Utara	-	-	-
14	Palembang	-	-	-
15	Prabumulih	874	2.775	3,2
16	Pagar Alam	-	-	-
17	Lubuk Linggau	235	548	2,3
South Sumatera		711.828	1.586.312	2,2

Source: Badan Pusat Statistik (2016)

Note: AP = Average Product

Table 8: Producer Price Trends and Central Palm Oil Market Prices 1998-2015

Year	Central Market Price (Rp/Kg)	Producer Price is South Sumatera (Rp/Kg)
1998	7.809	3.450
1999	3.030	1.025
2000	3.231	2.641
2001	2.419	2.476
2002	3.089	3.307
2003	3.213	2.591
2004	3.803	2.490
2005	3.837	2.104
2006	3.614	2.085
2007	7.865	2.214
2008	10.911	1.017
2009	7.608	733
2010	8.987	1.021
2011	9.016	1.329
2012	9.298	1.125
2013	9.390	1.359
2014	8.892	1.340
2015	7.602	1.221
Average	6.312	1.524

Source: BPS South Sumatera (2014)

The price of fresh palm bunches (TBS) in most palm oil producing areas in Indonesia at the farm level often experiences very large fluctuations. Although the price level has been regulated by the Minister of Agriculture (2013) Regulation (Permentan) Number 14 of 2013 concerning Guidelines for Determining the Price of Fresh Palm Bunches (TBS), the price level of TBS at the farm level often experiences a decrease far below the government decree price.

The prices received by farmers are very dependent on the market structure of the palm oil commodity. Market structure can be characterized by the level of market control (market concentration) by a particular company, the higher the level of market concentration (the higher the market controlled by certain sellers or buyers) then the more it is shaped to have an imperfect competition market structure.

Market structure that can be measured by market concentration can affect competition conditions and price levels (Marwa, 2001). According to the table above, price developments show a fluctuating trend and are quite varied between the central market price and the price of palm oil producers in South Sumatra. From these developments, the average market price of palm oil is 6,312 per kg, while for the South Sumatra producer the average price is only 1,524 per kg.

There were periods in which producer prices were quite high compared to other periods in 1998 and 2002 with prices of Rp. 3,450 per kg and Rp. 3,307 per kg, during which period the best prices were received by producers. In 2009, the price of South Sumatra producers dropped by a price of Rp. 733 per kg.

This price occurred after the crisis in 2008, meaning that the economic crisis could also affect the price of palm oil commodities, especially in Indonesia which is the main producer in the world.

3.3 Market Integration Analysis

To find out whether market integration exists in South Sumatra, "Monke and Petzel" criteria is used. Based on these criteria, it turns out that the palm oil market in South Sumatra is integrated (there is a relationship between the price of oil in the central market and the price of palm oil in the local markets of South Sumatra).

Table 9: Granger Causality Model of Estimation Results

Pairwise Granger Causality Tests

Sample: 1998 2015

Lags: 1

Null Hypothesis:	Obs	f-Stat	Prob.
PRSS does not Granger Cause PRPP	17	7.35198	0.0169
PRPP does not Granger Cause PRSS		0.18833	0.6709

Source: Authors calculation

According to the estimation data above (granger causality test), it shows that the direction of the relationship between the price of palm oil in the producer market and the price of palm oil in the central market is; the palm oil market in the local market (producer market) influences central market prices but not vice versa.

The price of palm oil in the central market (PRPP) does not affect the price of palm oil in the local market (producer market). This condition is reinforced by the estimation of the effect of palm oil

price in the central market on the price of palm oil in the local market as shown in table 10.

Table 10: Estimation of Market Integration Model Results

Dependent Variable: ln(PRSS)

Method: Least Squares

Included observations: 18

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	5.40225	1.428988	3.780473	0.0016
ln(PRPP)	0.21493	0.165260	1.300557	0.2118
R ²	0.09561			
Adj-R ²	0.03908			
F-stat	1.69145			
Prob(F-stat)	0.21183			

Source: Authors calculation

Table 10 shows that the price of palm oil in the central market does not affect the price of palm oil in the local market in South Sumatra. The insignificant influence of the price of palm oil in the central market on the price of palm oil in the local market (South Sumater) indicates that there is no integration of the palm oil market in these two markets.

The insignificant influence of the price of palm oil in the central market on the price of palm oil in the local market indicates that prices formed in the local market have different mechanisms and are apart from price formation in the central market (international market). This condition is understandable because the price of palm oil in the local market is largely determined by government policy in determining the price of Fresh Palm Bunches (TBS) and a large portion of TBS is sold to certain buyers whose numbers are relatively limited (leading to the oligopsonic market).

4 CONCLUSION AND DISCUSSION

4.1 Conclusion

Based on the results of the discussion above, it can be concluded that the price of palm oil in the central market does not affect the price of palm oil in the local market, whereas prices in the local market affect prices in the central market.

4.2 Suggestion

The role of the government in determining prices at the producer level must continue to be optimized, because Indonesia has strengths, one of which is that

Indonesia has become a major producer at the ASEAN level. In addition, market integration that occurs needs to be optimized so as not to harm farmers as producers. Price information between markets, infrastructure so that the mobility of goods and people between markets can be smoothly needs to be facilitated by the government.

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