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PERUBAHAN HUBUNGAN KAUSALITAS *GRANGER* HARGA MINYAK KEDELAI-MINYAK SAWIT MENTAH

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ABSTRAK

Perkembangan teknologi, penerimaan minyak sawit mentah oleh konsumen, dan perubahan global perdagangan dapat mengubah hubungan harga minyak kelapa sawit dengan minyak kedelai. Kajian ini menunjukkan bahwa kausalitas Granger *minyak sawit-minyak kedelai telah berubah. Dalam kurun Januari 1983-Februari 1989, harga salah satu minyak tidak mendahului harga minyak lainnya dalam interval waktu 18 bulan. Namun, dalam kurun Mei 1989 - Juli 1995 ditemukan bahwa untuk interval waktu satu sampai delapan bulan, harga minyak sawit mentah mendahului harga minyak kedelai sekarang. Perubahan ini juga mengindikasikan bahwa kedua kurun waktu tersebut mempunyai situasi perdagangan yang berbeda. Adanya hubungan kausalitas menunjukkan bahwa minyak sawit mentah dan minyak kedelai lebih saling bergantung dari masa sebelumnya dan minyak sawit mempunyai kekuatan ekonomi yang lebih tinggi di pasar minyak nabati dunia.*

Kata kunci: Granger, kausalitas, minyak sawit, minyak kedelai

PENDAHULUAN

Minyak kedelai dan minyak sawit adalah dua jenis minyak yang mendominasi perdagangan minyak nabati dunia. Beberapa kajian tentang hubungan kedua minyak ini telah banyak dilakukan. Buana dan Daswir (5) mendapatkan bahwa harga minyak sawit mentah lebih ditentukan oleh produksi kedelai dan minyak kedelai daripada oleh produksi minyak sawit mentah itu sendiri. World Bank (16) mengevaluasi korelasi kedua minyak ini dan mendapatkan korelasi harga kedua minyak tersebut tinggi. Fatimah dan Ghaffar (7) juga mendapatkan adanya hubungan sebab-akibat harga minyak sawit mentah - minyak kedelai.

Berkembangnya teknologi pengolahan minyak menyebabkan daya substitusi antar minyak menjadi semakin besar. Tanggapan masyarakat tentang minyak sawit telah berubah sehingga minyak sawit menjadi lebih diterima. Permintaan minyak nabati menjadi jauh lebih besar dari produksi minyak lunak (*soft oil*) sehingga hanya minyak sawit yang dapat mengisi kesenjangan tersebut. Perubahan-perubahan ini diharapkan akan mengurangi perbedaan harga minyak sawit dan minyak kedelai, meningkatkan ketergantungan harga kedua minyak ini, dan bereaksi cepat terhadap perubahan pada minyak yang lain.

Buana *et al.* (4) mendapatkan bahwa harga sebelum Februari 1989 jauh lebih fluktuatif dibandingkan dengan sesudah Juni 1989 yang mungkin mengindikasikan perubahan pasar. Dalam studi ini, hubungan sebab-akibat (kausalitas) *Granger* harga minyak sawit mentah dan minyak kedelai akan dikaji.

METODOLOGI

Data yang digunakan adalah harga bulanan minyak sawit mentah (*crude palm*

oil, CPO) dan minyak kedelai (*soybean oil*, SBO) dalam USD/ton di pasar Eropa Barat sejak Januari 1983 sampai dengan Juli 1995 yang dikutip dari Oil World berbagai terbitan. Data seri masa tersebut kemudian dipisahkan menjadi dua yaitu data Januari 1983-Februari 1989 (kurun waktu 1) dan data Juni 1989- Juli 1995 (kurun waktu 2).

Metode

Konsep kausalitas diusulkan oleh Granger (9). Pada dasarnya, sebuah seri X menjadi kausal bagi Y apabila nilai Y dapat diduga dengan lebih baik apabila nilai terdahulu X digunakan. Terminologi kausalitas masih dapat diperdebatkan (1,6,10,15). Ahli ekonometrika menyatakan bahwa untuk menjadi faktor kausal, sebuah variabel harus mempunyai latar belakang hubungan teoritis yang kuat sementara ahli yang lain menyatakan konsep kausalitas seperti pada hubungan regresi dan model rancangan percobaan. Terlepas dari perbedaan pendapat tersebut, banyak kajian telah dilakukan menggunakan konsep kausalitas *Granger*, seperti Bessler dan Brandt (2) untuk kasus pasar ternak, Holmes dan Hutton (12) dalam kajian belanja pemerintah dan pendapatan nasional, Miller (13) dalam kajian hubungan harga daging babi di tingkat pengecer, grosir dan petani, Feige dan Pearce (8) dalam kasus hubungan nilai uang dan pendapatan.

Dalam kajian ini, pendekatan Haugh (10) dan Pierce (14) digunakan untuk menetapkan kausalitas *Granger*. Pendekatan Haugh dan Pierce didasarkan pada korelasi dari galat model yang dihipotesiskan mempunyai hubungan kausal. Keunggulan dari pendekatan ini adalah bahwa arah hubungan X menyebabkan Y, atau Y menyebabkan X dapat ditetapkan sehingga sesuai dengan tujuan kajian ini.

Haugh (10) dan Box dan Pierce (3) menyarankan penggunaaan statistik:

$U = N \sum_{i=1}^{m} (r_{ki})^2$ untuk menguji keberadaan kausalitas. Statistik U mengikuti distribusi χ^2 dengan derajat bebas m. Adapun m adalah interval waktu (*time lag*) yang cukup besar untuk mencakup hubungan yang dihipotesakan, N adalah banyaknya galat dalam tiap seri dan r_{ki} adalah korelasi silang (*cross correlation*) pada interval waktu k.

HASIL DAN PEMBAHASAN

Kurun Januari 1983- Februari 1989

Analisis menunjukkan bahwa model ARIMA yang sesuai untuk pergerakan harga CPO dalam kurun waktu 1 adalah ARIMA(2,1,0).

$$(1-0{,}405B^1+ 0{,}394B^2)(1-B)Y_t= 0{,}124 +e_t$$

Dugaan ragam galat adalah 2950,385 dengan *Akaike Information Criterion* (AIC) 782,521. Auto korelasi dari galat sampai interval waktu enam tidak nyata secara statistika dengan p= 0,473.

Model untuk minyak kedelai juga ARIMA (2,1,0) dengan persamaan sebagai berikut :

$$(1-0{,}412\ B^1+0{,}327B^2)(1-B)Y_t= 0{,}269 +e_t$$

Dugaan ragam galat untuk model ini 1997,183 dengan AIC 754,426. Auto korelasi dari galat sampai interval waktu enam tidak berbeda dengan p= 0,912.

Korelasi silang antara galat dari model minyak kedelai dengan dari model CPO relatif kecil baik di interval waktu negatif maupun positif. Interval waktu negatif

galat minyak kedelai-minyak sawit mentah berarti harga minyak kedelai mendahului harga CPO sedangkan interval waktu positif berarti minyak kedelai didahului CPO (Tabel 1).

Tabel 1. Korelasi silang dari galat model minyak kedelai dan CPO untuk kurun Januari 1983 – Februari 1989

SBO mendahului CPO	Korelasi	SBO didahului CPO	Korelasi
-18	0,024	0	0,671
-17	-0,063	1	0,145
-16	-0,158	2	-0,032
-15	-0,095	3	0,129
-14	-0,021	4	0,145
-13	-0,012	5	0,036
-12	-0,013	6	0,108
-11	-0,077	7	-0,028
-10	-0,117	8	0,103
-9	0,090	9	0,011
-8	0,047	10	-0,040
-7	-0,058	11	-0,041
-6	0,106	12	0,045
-5	0,097	13	0,148
-4	0,207	14	-0,035
-3	-0,080	15	0,085
-2	-0,012	16	-0,107
-1	0,024	17	-0,006
0	0,671	18	0,011

Korelasi silang pada interval waktu nol mencerminkan respon segera (*instantaneous response*) dari harga minyak. Namun, data yang digunakan adalah agregat bulanan sehingga sifat kesegeraan merupakan rata-rata.

Uji statistik U untuk interval waktu dari negatif 18 ke positif 18 menunjukkan bahwa kausalitas *Granger* tidak nyata baik pada interval waktu positif maupun negatif (Tabel 2). Nilai p terkecil pada interval waktu negatif adalah 0,465, yaitu pada interval waktu –4, sedangkan pada interval waktu positif adalah 0,230, yaitu pada interval waktu 1. Kajian ini menunjukan bahwa kedua seri yang dikaji ini tidak berhubungan dalam pengertian perubahan harga lebih ditentukan oleh minyak itu sendiri dan tidak oleh interaksinya dengan minyak lain. Situasi demikian menggambarkan daya substitusi minyak lemah yang mungkin disebabkan oleh lemahnya penerimaan minyak sawit mentah oleh pengguna minyak nabati karena berbagai alasan.

Tabel 2. Statistik U untuk menguji kausalitas *Granger*

SBO mendahului CPO	Nilai U	Nilai p	SBO didahului CPO	Nilai U	Nilai p
-18	10,320	0,921	1	1,505	0,220
-17	10,280	0,891	2	1,581	0,454
-16	9,990	0,867	3	2,788	0,424
-15	8,188	0,916	4	4,311	0,365
-14	7,542	0,912	5	4,405	0,493
-13	7,511	0,874	6	5,245	0,513
-12	7,502	0,823	7	5,302	0,623
-11	7,489	0,758	8	6,060	0,640
-10	7,059	0,720	9	6,069	0,733
-9	6,069	0,733	10	6,182	0,800
-8	5,483	0,905	11	6,303	0,852
-7	5,322	0,621	12	6,450	0,891
-6	5,077	0,534	13	8,024	0,842
-5	4,269	0,511	14	8,113	0,883
-4	3,593	0,464	15	8,631	0,896
-3	0,520	0,915	16	9,461	0,893
-2	0,053	0,974	17	9,464	0,925
-1	0,042	0,837	18	9,472	0,948

Kurun Juni 1989-Juli 1995

Model ARIMA yang sesuai untuk kurun waktu 2 adalah ARIMA (3,1,0) dengan persamaan sebagai berikut:

$$(1\text{-}0{,}214B^{1}+0{,}219B^{2}\text{-}0{,}328B^{3})(1\text{-}B)Y_t = 2{,}748 + e_t$$

Ragam galat dari model ini adalah 599,748 yang lebih kecil dari ragam galat model untuk kurun waktu 1. AIC untuk model ini adalah 687,232 dan uji terhadap autokorealsi galat sampai interval waktu enam tidak nyata dengan p= 0,667.

Model yang sesuai untuk harga minyak kedelai adalah ARIMA (2,1,0) dengan persamaan sebagai berikut:

$$(1\text{-}0{,}026B^{1}+0{,}028B^{2})(1\text{-}B)Y_t = 2{,}245 + e_t$$

Ragam galat model ini adalah 485,048, dengan AIC 670,575. Autokorelasi galat

sampai dengan interval waktu enam tidak nyata dengan p= 0,795.

Korelasi silang galat model untuk minyak kedelai dan CPO rendah baik pada interval waktu negatif maupun positif (Tabel 3).

Tabel 3. Korelasi silang galat model minyak kedelai dan CPO untuk kurun waktu Mei 1989 - Juli 1995

SBO mendahului CPO	Korelasi	SBO didahului CPO	Korelasi
-18	0,014	0	0,462
-17	-0,034	1	0,182
-16	0,010	2	-0,196
-15	-0,073	3	0,211
-14	0,039	4	-0,038
-13	-0,044	5	-0,015
-12	0,007	6	-0,182
-11	0,134	7	-0,101
-10	0,230	8	-0,021
-9	-0,015	9	0,046
-8	0,132	10	0,047
-7	-0,075	11	0,015
-6	0,032	12	-0,105
-5	0,027	13	-0,014
-4	-0,078	14	0,013
-3	0,044	15	-0,001
-2	-0,024	16	-0,134
-1	-0,037	17	-0,094
0	0,462	18	0,018

Uji terhadap statistik U menunjukkan bahwa kausalitas *Granger* tidak nyata pada interval waktu negatif. Nilai p terkecil yaitu 0,750 dijumpai pada interval waktu -4 sementara pada interval waktu lain nilai p jauh lebih besar (Tabel 4). Hal ini berarti bahwa harga minyak kedelai tidak mendahului harga CPO.

Pada interval waktu positif, kausalitas *Granger* nyata pada interval waktu satu sampai delapan dengan nilai p masing-masing adalah 0,117; 0,070; 0,053; 0,069; 0,121; 0,083; 0,103; dan 0,123 (Tabel 4). Nilai p secara konsisten turun sejak interval waktu delapan. Hal ini berarti bahwa harga minyak sawit mentah saat ini dipengaruhi, dalam pengertian kausalitas *Granger,* oleh harga CPO sampai dengan delapan bulan sebelumnya.

Tabel 4. Statistik U dan nilai p untuk menguji kausalitas *Granger* dalam kurun waktu Mei 1989 - Juli 1995

SBO mendahului CPO	Nilai U	Nilai p	SBO mendahului CPO	Nilai U	Nilai p
-18	8,616	0,968	1	2,455	0,117
-17	8,601	0,952	2	5,303	0,070
-16	8,516	0,936	3	8,589	0,055
-15	8,508	0,902	4	8,697	0,069
-14	8,109	0,883	5	8,713	0,121
-13	7,999	0,844	6	11,163	0,083
-12	7,853	0,796	7	11,915	0,103
-11	7,848	0,727	8	12,686	0,123
-10	6,522	0,770	9	12,846	0,130
-9	2,590	0,978	10	13,009	0,223
-8	2,573	0,958	11	13,026	0,292
-7	1,283	0,989	12	13,848	0,311
-6	0,868	0,990	13	13,861	0,384
-5	0,794	0,977	14	13,874	0,459
-4	0,740	0,946	15	13,874	0,535
-3	0,288	0,962	16	15,198	0,510
-2	0,144	0,931	17	15,854	0,534
-1	0,102	0,750	18	15,877	0,601

Kajian ini mendapatkan adanya perubahan status hubungan kausalitas harga minyak kedelai-minyak sawit mentah dari tidak nyata menjadi nyata. Kausalitas saat ini (kurun waktu 2) mencerminkan suatu harga minyak saling tergantung satu dengan lainnya. Hal ini disebabkan oleh daya substitusi yang besar dan penerimaan yang lebih baik bagi minyak sawit mentah oleh konsumen. Status "mendahului" dari harga minyak sawit mentah mungkin disebabkan ketergantungan yang semakin besar terhadap minyak sawit mentah dan informasi dini tentang kegagalan atau keberhasilan produksi kedelai. Apabila ramalan cuaca menunjukkan cuaca yang kurang baik bagi tanaman kedelai, maka pasar akan merespon dengan kenaikan harga pada CPO yang kemudian diikuti oleh harga minyak kedelai. Perubahan status minyak sawit mentah harus disadari oleh produsen minyak sawit mentah karena hal ini mengindikasikan bahwa CPO mempunyai kekuatan ekonomi yang tinggi di pasar minyak nabati.

KESIMPULAN

Ada perubahan kausalitas Granger harga minyak kedelai-minyak sawit mentah yang nyata pada kurun Januari 1983-Februari 1989 dengan Mei 1989 - Juli 1995. Perubahan kausalitas Granger mengindikasikan situasi perdagangan di kedua kurun waktu tersebut berbeda.

Dalam kurun Januari 1983- Februari 1989, kausalitas *Granger* tidak nyata baik di interval waktu positif dan maupun negatif. Situasi demikian mencerminkan bahwa perubahan harga minyak lebih ditentukan oleh minyak itu sendiri. Sistuasi ini juga mencerminkan bahwa minyak kedelai dan minyak sawit mentah dalam kurun tersebut tidak terlalu mampu untuk saling mensubstitusi.

Dalam kurun Mei 1989 - Juli 1995, kausalitas *Granger* tidak nyata pada interval waktu negatif tetapi nyata pada interval waktu positif. Kenyataan ini menunjukkan bahwa dalam situasi sekarang, minyak sawit mentah dan minyak kedelai saling bergantung karena lebih dapat saling mensubstitusi. Situasi ini juga menunjukkan bahwa minyak sawit mentah mempunyai kekuatan ekonomi dalam pasar minyak nabati dunia.

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Change on the Granger causality of soybean-crude palm oil prices

Lalang Buana

Abstract

The development of technology, the better acceptance of palm oil by the vegetable oil consumers and change on the global trading environment might change the price relationship of crude palm oil and soybean oil. This study showed that the "Granger" causality of crude palm oil and soybean oil prices has been changed. Within the regime of January 1983 to January 1989, none of the oil prices lead other oil price within the range of eighteen months. Within the regime of May 1989 to July 1995, however, it was found that the first to eighth previous months of crude palm oil prices leads the current soybean oil price. These changes also indicated that these two regimes might have different trading environments. The existence of causality indicated that at current situation the crude palm oil and soybean oil are relatively more dependent than before and the crude palm oil has a stronger economical power in the world vegetable oil market.

Keywords: Granger, causality, crude palm oil, soybean oil

Introduction

Soybean oil and palm oil are among the most dominating vegetable oil in the world market. There were several studies showing the relationship between these two oils. Buana and Daswir (5) found that due to the nature of the soybean, the price of palm oil is more determined by the production of soybean and soybean oil rather than by the palm oil production itself. World bank (16) evaluated the correlation among these vegetable oils prices and indeed the correlation were quite high. Fatimah and Ghaffar (7) also found that causal relationship between soybean oil and crude palm oil prices.

The technology of oil processing has been developed such that the substitutability of the oils becomes wider. The peoples' perception upon palm oil, has been changed that make the palm oil more acceptable. The demand of vegetable oil has been much bigger than the production of soft oil that only palm oil can fill the gap. These changes expectedly would narrow down the price differential of these two oils, make the prices highly dependent and react more instantaneously to each other.

Buana *et al.* (4) found the price of palm oil before February 1989 was much more fluctuated compared to that after June 1989, which might indicate the change of market. In this paper, "Granger" causality of crude palm oil price and soybean oil price of these two regimes will be examined.

Methodology

Data

The data series used in this study was the crude palm oil (CPO) and soybean oil (SBO) prices at the West European market

cited from Oil World of various issues in US $ per ton. The data were monthly series from January 1983 to July 1995. The series was partitioned into January 1983 to February 1989 (regime 1) and June 1989 to July 1995 (regime 2).

Method

The causality concept was initiated by Granger (9). Essentially, a series X is considered causing Y if the current value of Y can be better predicted by utilizing past values of X than not doing so. The term of causality is still debatable (6, 11,3,15). Some econometricians mentioned that to be a causal factor, theoretical background upon the relationship is required whereas some others mentioned that this causality is similar to other modeling like regression and experimental design model. Despite the dispute, there were many studies have applied the "Granger" causality such as by Bessler and Brandt (2) in the livestock markets, Holmes and Hutton (12) in the study on the relationship between government expenditures and national income, Miller (13) in the relationship between pork prices at the retail, wholesale and farm levels, Feige and Pearce (8) in the causal relationship between money and income.

In this study Haugh (10) and Pierce (14) approach was used to determine the "Granger" causality. The approach was based on the correlation of the residual of the models of variables which are hypothesized to have a causal relationship. The advantage of this approach that it can determined whether the X causing Y or Y causing X which is appropriate for this study.

Haugh (10) and Box and Pierce (1) suggests the statistic $U = N \sum_{i=1}^{m} (r_{ki})^2$ to test the existence of causality. The U is distributed as χ^2 with m degrees of freedom where m is the lag that is large enough to include any suspected relationship, N number of residuals in each series and r_{ki} is the cross correlation at lag k.

Results and Discussion

Regime January 1983- February 1989

Analysis showed that the appropriate ARIMA model for CPO price series in regime 1 was ARIMA(2,1,0).

$$(1-0.40466B^1+0.39399B^2)(1-B)Y_t = 0.12387 + e_t$$

The estimated error variance was 2950.385 with AIC of 782.521. The autocorrelation of the residuals up to lag six was not statistically different from zero with p value of 0.473.

The model for soybean oil was also ARIMA (2,1,0) as the following

$$(1-0.412B^1+0.327B^2)(1-B)Y_t = 0.269 + e_t$$

The estimated error variance was 1997.183 with AIC of 754.426. The autocorrelation of the residuals up to lag six was not statistically different from zero with p value of 0.912.

The cross correlation of the residual of soybean oil model and crude palm oil model were all relatively low either in the negative lag that expresses the "leading"

status of soybean oil or in the positive lag that expresses the "being lead" (Table 1).

Table 1. Cross correlation of the residuals of soybean oil - crude palm oil models of period January 1983 to January 1989

SBO leads CPO	Correlation	SBO follows CPO	Correlation
-18	0.024	0	0.671
-17	-0.063	1	0.145
-16	-0.158	2	-0.032
-15	-0.095	3	0.129
-14	-0.021	4	0.145
-13	-0.012	5	0.036
-12	-0.013	6	0.108
-11	-0.077	7	-0.028
-10	-0.117	8	0.103
-9	0.090	9	0.011
-8	0.047	10	-0.040
-7	-0.058	11	-0.041
-6	0.106	12	0.045
-5	0.097	13	0.148
-4	0.207	14	-0.035
-3	-0.080	15	0.085
-2	-0.012	16	-0.107
-1	0.024	17	-0.006
0	0.671	18	0.011

The cross correlation at lag zero reflects the instantaneous response of the oil prices. However, the data were aggregated monthly such that the instantaneous response might have been averaged out.

The test on the U statistic in the lag range of negative 18 to positive 18 indicated that the "Granger" causality were not significant both in the negative and positive lags (Table 2). The smallest p value of the test in the negative lags was 0.465 at lag -4 whereas in the positive lags was 0.230 at lag 1.This indicated that these two series were unrelated in the sense that the price movement was more determined by itself rather than by the interaction with other oil. Such situation reflected a condition in which the substitutability of the oils was weak, possibly due to the weak acceptance of the soybean oil users to palm oil for several reasons.

Table 2. The U statistic to test the "Granger" causality

SBO leads CPO	U value	p value	SBO follows CPO	U value	p value
-18	10.320	0.921	1	1.505	0.220
-17	10.280	0.891	2	1.581	0.454
-16	9.990	0.867	3	2.788	0.424
-15	8.188	0.916	4	4.311	0.365
-14	7.542	0.912	5	4.405	0.493
-13	7.511	0.874	6	5.245	0.513
-12	7.502	0.823	7	5.302	0.623
-11	7.489	0.758	8	6.060	0.640
-10	7.059	0.720	9	6.069	0.733
-9	6.069	0.733	10	6.182	0.800
-8	5.483	0.905	11	6.303	0.852
-7	5.322	0.621	12	6.450	0.891
-6	5.077	0.534	13	8.024	0.842
-5	4.269	0.511	14	8.113	0.883
-4	3.593	0.464	15	8.631	0.896
-3	0.520	0.915	16	9.461	0.893
-2	0.053	0.974	17	9.464	0.925
-1	0.042	0.837	18	9.472	0.948

Regime of June 1989-July 1995

The ARIMA model for the second regime was found to be ARIMA (3,1,0) with equation as the following :

$$(10.214B^1+0.219B^20.328B^3)(1B)Y_t = 2.748+e_t$$

The residual variance of the model of this regime was 599.748 which was much smaller than that of the model of regime 1. The AIC of this model was 687.232 whereas the test upon the autocorrelation of the residual up to lag six was not significant with p value of 0.667

The model for soybean oil was found to be ARIMA (2,1,0) as the following :

$$(1\text{-}0.026B^1+0.028B^2)(1\text{-}B)Y_t=2.245+e_t$$

The estimated error variance was 485.048 with AIC of 670.575. The autocorrelation of the residual up to lag six was not statistically different from zero with p value of 0.795.

The cross correlation of the residual of soybean oil model and crude palm oil model were all relatively low either in the negative lag or in the positive lags (Table 3).

The test on the U statistic indicated that the "Granger" causality were not significant in the negative lags. The smallest p value was 0.750 found at lag -4 whereas the others p values were much bigger (Table 4). This meant that the price of soybean oil did not "cause" the price of crude palm oil.

In the positive lags, however, "Granger" causality were significant at lag 1 to 8 with p values of 0.117, 0.070, 0.053, 0.069, 0.121, 0.083, 0.103, and 0.123 consecutively (Table 4). The p values consistently decreased after lag 8. This meant that the current soybean oil price was influenced by the one to eight previous months prices of crude palm oil in the sense of "Granger" causality.

Table 3. Cross correlation of the residuals of soybean oil crude palm oil models of period May 1989 to July 1995

SBO leads CPO	Correlation	SBO follows CPO	Correlation
-18	0.014	0	0.462
-17	-0.034	1	0.182
-16	0.010	2	-0.196
-15	-0.073	3	0.211
-14	0.039	4	-0.038
-13	-0.044	5	-0.015
-12	0.007	6	-0.182
-11	0.134	7	-0.101
-10	0.230	8	-0.1021
-9	-0.015	9	0.046
-8	0.132	10	0.047
-7	-0.075	11	0.015
-6	0.032	12	-0.105
-5	0.027	13	-0.014
-4	-0.078	14	0.013
-3	0.044	15	-0.001
-2	-0.024	16	-0.134
-1	-0.037	17	-0.094
0	0.462	18	0.018

This study found a change on the status of causality between soybean oil and CPO prices from not significant to significant. The present of causality reflected a condition in which the prices were more dependent due to a wider substitutability of the oil and better acceptance of palm oil by the consumers. The "leading" status of crude palm oil might due to such dependency as well as to the advanced information on the success or failure of the soybean production. The change on the status of crude palm oil in the world market should be realized by the palm oil producers because it also indicates that crude palm oil has a stronger economical power in the world vegetable oil market.

Table 4. The U statistics and their p values to test the "Granger" causality in the regime of May 1989 to July 1995

SBO leads CPO	U value	p value	SBO follows CPO	U value	p value
-18	8.616	0.968	1	2.455	0.117
-17	8.601	0.952	2	5.303	0.070
-16	8.516	0.936	3	8.589	0.055
-15	8.508	0.902	4	8.697	0.069
-14	8.109	0.883	5	8.713	0.121
-13	7.999	0.844	6	11.163	0.083
-12	7.853	0.796	7	11.915	0.103
-11	7.848	0.727	8	12.686	0.123
-10	6.522	0.770	9	12.846	0.130
-9	2.590	0.978	10	13.009	0.223
-8	2.573	0.958	11	13.026	0.292
-7	1.283	0.989	12	13.848	0.311
-6	0.868	0.990	13	13.861	0.384
-5	0.794	0.977	14	13.874	0.459
-4	0.740	0.946	15	13.874	0.535
-3	0.288	0.962	16	15.198	0.510
-2	0.144	0.931	17	15.854	0.534
-1	0.102	0.750	18	15.877	0.601

Conclusion

There was a significant change in the "Granger" causality of crude palm oil and soybean oil prices. The change on the "granger" causality might also indicated

that the trading environment of these two regime were quite different.

Within the period of January 1983 to January 1989, the "Granger" causality was not significant both in the negative and positive lags. Such situation reflected that the price movement was more determined by its own process. This also indicated a condition on which the oils were not very substitutable.

Within the period of May 1989 to July 1995, the "Granger" causality was not significant in the negative lags but significant in the one to eight positive lags. This indicated that in the current situation, the crude palm oil and soybean oil are more dependent because they are more substitutable one to the other in the sense. This also indicated that the crude palm oil has a stronger economical power in the world vegetable oil market.

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