**THE 12TH MALAYSIA-INDONESIA INTERNATIONAL CONFERENCE ON ECONOMICS, MANAGEMENT, AND ACCOUNTING 2011**

# MIICEMA

**"Borderless Economy: Opportunities and Challenges for Businesses in Southeast Asia"**

**13-14 October 2011**

**VENUE:**
**Magister Manajemen**
**Magister Perencanaan Pembangunan**
**Fakultas Ekonomi, Universitas Bengkulu**

# PROCEEDINGS


**EDITED BY:**
**Lizar Alfansi**
**Paulus Sulluk Kananlua**
**Sugeng Susetyo**
**Effed Darta Hadi**
**Siti Aisyah**
**Ferry Tema Atmaja**


**MAIN ORGANIZER:**

**Fakultas Ekonomi**
**Universitas Bengkulu, Indonesia**

**JOINT ORGANIZERS:**

**Universitas Kebangsaan, Malaysia**
**Universitas Syahkuala Banda Aceh, Indonesia**
**Universitas Muhammadiyah Surakarta, Indonesia**
**Institut Pertanian Bogor, Indonesia**
**Universitas Padjajaran Bandung, Indonesia**


**ISBN 978-979-9431-68-4**

*Published in Bengkulu by*
*Fakultas Ekonomi, Universitas Bengkulu*
*Jl. WR.Supratman, Kandang Limun Bengkulu 38371 A*

*Printed in Bengkulu By*
*Unib Press*
*Universitas Bengkulu*
*Jl. WR.Supratman, Kandang Limun Bengkulu 38371 A*

*Proceedings of the 12th Malaysia-Indonesia International Conference on Economics, Management, and Accounting: Borderless Economy: Opportunities and Challenges for Businesses in Southeast Asia/ Edited By Lizar Alfansi, Paulus Sulluk Kananlua, Sugeng Susetyo, Effed Darta Hadi, Siti Aisyah, Ferry Tema Atmaja*

**ISBN 978-979-9431-68-4**

# TABLE OF CONTENT

# List of MIICEMA 2011 Organizing Comittee

## Steering Committee

Dekan Fakultas Ekonomi, Universitas Bengkulu
Dekan Fakultas Ekonomi, Universiti Kebangsaan Malaysia
Dekan Fakultas Ekonomi, Universitas Syiah Kuala Banda Aceh
Dekan Fakultas Ekonomi, Universitas Muhammadiyah Surakarta
Dekan Fakultas Ekonomi, Institut Pertanian Bogor
Dekan Fakultas Ekonomi, Universitas Padjajaran, Bandung

## Local Organizing Committee

| | | |
|---|---|---|
| Chair | : | Lizar Alfansi |
| Secretary and registration | : | Ferry Tema Atmaja, Fenny Mariezta |
| Finance | : | Paulus S Kananlua, Bambang A Hermanto |
| Protocol | : | Husaini |
| Hospitality and Logistic | : | Purmini, Roose Marina A Rambe |
| Sponsorship and Accommodation | : | Sugeng Susetyo |
| Publication | : | Siti Aisyah |
| Webmaster | : | Fany Farady, Siti Aisyah |

## List of MIICEMA 2011 Reviewers

- Prof. Lizar Alfansi Ph.D (Marketing, University of Bengkulu, Indonesia)
- Prof. Dr. Hadri Kusuma (Accounting, Indonesia Islamic University, Indonesia)
- Prof. Daniel D Karneo (economics, Christian University of Satya Wancana, Indonesia)
- Prof. Suryana Sumantri (Organizational Behavior, University of Padjajaran, Indonesia)
- Prof. Dr. Darwin Sitompul (Operation Management, University of Sumatera Utara, Indonesia)
- Prof. Dr. Siti Sulasmi (Human Resource Management, University of Airlangga, Indonesia)
- Dr. Petrus Usmanij (Accounting, La Trobe University, Australia)
- Isnuhardi, Ph.D (Accounting, University of Sriwijaya, Indonesia)
- Dr. Martin Nanere (Marketing, La Trobe University, Australia)
- Claire D' Souza (Marketing, La Trobe University, Australia)
- Dr. Sri Kusreni (Regional Planning, Airlanga University, Idonesia)
- Yunizar, Ph.D (Organizational Theory, University of Padjajaa, Indonesia)
- Dr. Suherman (Financial Mangement, Universitas Nasional Jakarta, Indonesia)
- Nor Asiah Omar (Marketing, University Kebangsaan Malaysia, Malaysia)
- Martinus Sulistio Rusli, Ph.D (Marketing, PPM School of Management)
- Ruzita Abdul Rahim (Finance, University Kebangsaan Malaysia, Malaysia)
- Assoc. Prof. Dr. Rasidah Arshad (Human Resource Management, University Kebangsaan Malaysia, Malaysia
- Norliza Abdullah (Human Resource Management, University Kebangsaan Malaysia, Malaysia)
- Muhammad Abduh, Ph.D (Economic/Enterpreneurship, La Trobe University, Australia)
- Arief Daryanto, Ph.D (Economics, Bogor Agriculture University, Indonesia)
- Dr. Ketut Sukiyono (Economics, University of Bengkulu, Indonesia)
- Siti Hajar Mohd Idris (University Kebangsaan Malaysia, Malaysia)
- Zaleha Abdul Shukor (University Kebangsaan Malaysia, Malaysia)
- Dr. Ridwan Nurazi (Accounting, University of Bengkulu, Indonesia)
- Dr. M. Ridwan (Economics, University of Bengkulu, Indonesia)
- Dr. Handoko (Economics, University of Bengkulu, Indonesia)
- Dr. Retno Ekaputri (Economics, University of Bengkulu, Indonesia)
- Dr. Mintargo (Economics, University of Bengkulu, Indonesia)
- Dr. Kamaludin (Management, University of Bengkulu, Indonesia)
- Dr. Fachruddin JS Pareke (Management, University of Bengkulu, Indonesia)
- Dr. Syaiful Anwar (Management, University of Bengkulu, Indonesia)
- Dr. Effed Darta (Management, University of Bengkulu, Indonesia)
- Dr. Slamet Widodo (Management, University of Bengkulu, Indonesia)
- Syaiful, Ph.D (Accounting, University of Bengkulu, Indonesia)
- Dr. Fachruzzaman (Accounting, University of Bengkulu, Indonesia)
- Dr. Rini Indriani (Accounting, University of Bengkulu, Indonesia)
- Dr. Husaini (Accounting, University of Bengkulu, Indonesia)
- Dr. Fadli (Accounting, University of Bengkulu, Indonesia)
- Dr. Irwansyah (Accounting, University of Bengkulu, Indonesia)
- Meiliani (Human Resource Management, University of Bengkulu, Indonesia/University of New South Wales, Australia)
- Yefriza (Public Sector Marketing, University of Bengkulu, Indonesia, Indonesia/Monash University, Australia)

# How Indonesian Crude Palm Oil Export Demands Respond to Exchange Rate Volatility?: An Error Correction Model Approach

***Ketut Sukiyono***

*Deprtment of Agricultural Socio-Economics, Faculty of Agriculture*

*The University of Bengkulu*

*ksukiyono@yahoo.com*

***Abstract***

*This study was focussed on investigating the effect of exchange rate volatility on the Indonesian Palm Oil export demand. Quarterly data of Indonesian pal oil export from 1995:1-2011:1 were used. Under error correction and cointegration modelling techniques, the study found that real exchange rate volatility has negative and significant effect on Indonesian non-oil and gas export, while real exchange rate does not. Another factor having significant effects is International Palm Oil price.*

**Key words: CPO, Export demand, Exchange rate volatility**

## Introduction

Number publications have discussed the Indonesian macroeconomics and trade performances, among others are Rodgers (1994) and Fane (1999). Nearly all agreed that the remarkable of macroeconomic and trade performance in the last twenty five years has provided strong evidence for the significant of economic reforms taken the Government of Indonesia (GOI). Historically, Indonesia experienced, as (Rodgers 1994 and Fane 1999) noted, that after enjoying a rapid growth in the oil-boom era, Indonesia faced severe external shocks, caused by slump of oil price, increase of interest rate, and appreciation of Yen, that crippled its financial system and increased debt service burden. With sensible policy reform and the non-oil export promotion, Indonesia was able to encumber from macroeconomic instability. In addition, with its export promotion strategy (1983 – up to now), Indonesia exports have no longer depended on oil and gas export merely. In 1975, the share of non-oil export value to total export value accounted 25 percent, this share has become more than 70 percent of total export value in 2010.

The Indonesian exchange rate policy is one of the economic policies that received considerable attention in the study of Indonesia's foreign trade. Many studies agreed that devaluation rupiah along with other economic reforms had significant impacts on trade performance. Rodgers (1994) examined the impact of exchange rate devaluation and income growth on Indonesia aggregate import and non-oil export performance. And cloncluded that exchange rate devaluation has increased non-oil export supply. Study by Simatupang and Sudi (1995) concluded that the value of exchange rate have a positive impact on farming terms of trade. Two other recent studies are study by Rodgers (1998) and Kulkarni and Irawati (1998). Different with his early study, Rodgers in his 1998's study examined the role of exchange rate management and trade policy in export performance across sectors, that is, by covering the principal non-oil export sectors. He concluded that the non-oil exporters' responsiveness to the relative price changes, as a result of exchange rate changes, varies widely across sectors. Meanwhile, study by Kulkarni and Irawati (1998) analysed the possible causing and implication of the rupiah devaluation to the Indonesian economy, focused on trade of balance. They found that the past devaluation show its effectiveness in improving trade of balance compared to 1997's devaluation.

So far, those studies merely focused on the impact of rupiah devaluation or the nominal value of exchange rate on aggregate export performance. Those studies did not give explanation how far exchange rate variability has affected the Indonesian export performance. Study by Sukiyono and Romdhon (2006) found that exchange rate volatility has a negative effect and statisticallly significant to non oil and gas export. The question is that does Indonesian exchange rate variability also has similar affect on estate commodity export demand, especially crude palm oil (CPO) export demand?

Based on above discussion, this paper is aimed at examining the impact of exchange rate volatility on the Indonesian CPO export demand. This paper also investigates whether the CPO exporter has symmetric respond to the exchange rate volatility or not. It is hypothesised that the Indonesian CPO exports performance is not only affected by the level of exchange rate, but also by the stability of exchange rate.

## Review Literature

### *Exchange Rate Policy in Indonesian*

In the last four decades, GOI has depreciated rupiah against US dollar five times, as presented in Table 1. The first devaluation was taken in August 23, 1971. This devaluation was taken due to external disturbances in which, at that time, the rupiah was overvalued and could deteriorate the Indonesian export. Thus, the government was forced to devaluate rupiah to close the gap between the exchange rate fixed by the government and the free market rate (Kulkarni and Irawati 1998). Since August 1971, the rupiah has been kept at Rp. 415 per US dollar or an increase around 10 percent compared to prior August 1971, Rp. 378/US dollar. Since then, the government implemented the fixed exchange rate management in which Rupiah was pegged to the US dollar for over seven years. This system has resulted in a period of unprecedented exchange rate stability.

***Table 1. Indonesian Exchange Rate Policy Since 1970: summary***

| No. | Devaluation | Objectives | Exchange Rate System |
|---|---|---|---|
| 1 | August 23, 1971 | • Close the gap between exchange rate fixed with free market rate. | Fixed |
| 2 | November 15, 1978 | • Reverse a harmful effect of real exchange rate appreciation on non-oil exports.<br>• Increase non-oil and gas export | Fixed |
| 3 | March 1983 | • Cure the deficit in current account, rising debt service costs<br>• Boost non-oil export | Managed float |
| 4 | September 1986 | • Lower the current account deficit due to the decrease of oil price and heavy debt burden. | Managed float |
| 5 | August 1997 | • Due to currency crisis in the South East Asia led to increasing current account deficit. | Float |

*Source: Hill (1996), Kulkarni and Irawati (1998), and Rodgers (1994, 1998).*

On 15 November 1978, the Government appreciated rupiah against US dollar from Rp. 415 per US dollar to Rp. 625 per US dollar. According to Rodgers (1994, 1998), when Indonesia experienced booming oil revenue that increased import and the government took limited step to promote non-oil export has forced the government to devaluate rupiah in order to reverse the harmful effects of real exchange rate appreciation on non-oil export. In addition, Kulkarni and Irawati (1998) noted that the devaluation of rupiah is aimed at strengthening the competitiveness of Indonesian products in the world

markets which was justified by increasing the value of non-oil and gas export in the following years. However, devaluation along with the high oil price has led to a rapid monetary expansion, which further created a high inflation around 40 percent in 1980. At the same time, the government also implemented restriction on trade and investments. This condition eroded the beneficial effects of devaluation (Hill 1996). In addition, another side effect of this devaluation has been making people eager to speculate in the foreign exchange market.

After the oil boom periods, there were two other major devaluations of rupiah. These two devaluations were mainly caused by the slump of oil price that led to deteriorating of the Indonesian debt burden and current deficit. The first was On March 1983 when the government took another devaluation of 39 percent, that is, from Rp. 625, - to Rp. 909 per US dollar. The oil shock and the heavy debt burden caused the 1983's devaluation (Rodgers 1994). Again, this devaluation was also aimed to boost non-oil export and to cure the current deficit. These objectives were achieved as shown by the improvement of current account position in 1985 and 1986.

In September 1986, the government was forced to devaluate rupiah again due to the fall in oil revenue and increasing account deficit. This devaluation was also directed to improve the non-oil export competitiveness. Along with this devaluation, the government also accelerated reform by deregulating trade, investment, and capital market (Kulkarni and Irawati 1998, and Rodgers 1994, 1998). These policies have resulted in notable achievement in the non-oil export by which non-oil export value superseded oil and gas export. This success story is maintained until the currency crisis hit Indonesia since July 1997.

Prior to crisis, Indonesia current deficit was the lowest of the Asian-5 (Thailand, Indonesia, Malaysia, South Korea and Philippine) and export growth was the second highest. This means, according to Cerra and Saxena (2000), Indonesian crisis is not caused by the poor traditional economic fundamental. The pressure from the outside of the economy (contagion from economies in the region) combined with the weak financial sector and political uncertainty have led to crisis. This crisis has pressured the government to devaluate rupiah. In response to this pressure, the government has widened its intervention band until 12 percent before decided to float Rupiah to follow market forces (Kulkarni and Irawati 1998). As a result of floating management, the Indonesian currency is likely more volatile than it was before. Since implementation of floating exchange rate policy, the rupiah has been depreciated to the lowest exchange rate of around Rp. 3500, - till reaching of Rp. 13000, - in July 1998.

### *Impact of Exchange Rate Volatility on Trade*

The impact of exchange rate volatility has been widely examined, which mainly focused on the industrialised countries. However, according to Hassan and Tifte (1998), the impact of exchange rate randomness on international trade, theoretically and empirically, is inconclusive. Theoretically, it was argued that higher exchange rate volatility has led to a decrease in international trade. This theory was supported by study by Arize (1995), Koray and Lastrapes (1989). In case of Indonesia, study by Sukiyono and Romdhon (2006) resulted that using quarterly data of non-oil and gas export from 1982:1-2005:2 and under error correction and cointegration modelling techniques, real exchange rate volatility has negative and significant effect on Indonesian non-oil and gas export, while real exchange rate does not. Other factors having significant effects are real foreign income and Indonesian export price.

Many empirical studies, however, also suggest that exchange rate variability may have a positive impact on international trade. Rey (2006) investigated the impact of nominal and real effective exchange rate volatility on exports of six Middle Eastern and North Africa (MENA) countries to 15 member countries of the European Union (EU). Using quarterly data and Error Correction Model (ECM), he found that the Granger – causality effects of the volatility on real exports are significant, whereas the effects of real exchange rate and the gross domestic product of EU are more contrasted. Other studis have also similar result, see for example study by Broll and Eckwert (1999), Daly (1996), and Arsery and Peel (1991).

Hosseinni and Moghaddasi (2010) presented different result in his study on exchange rate volatility and Iranian Export. They conclude that depending on the measure of volatility used, exchange rate volatility either does not have a significant impact on Iran's export flows or it has a positive impact on agriculture, mineral, transport meas and oil and fats and also on aggregate exports.

## Research Method

### *Analytical Framework*

The effect of exchange rate uncertainty on Indonesian CPO export demand is analysed using the practice of Arize (1995), Adjaye (1999) as well as Sukiyono and Romdhon (2006). Those studies employed cointegration and error correction Approach. In the case of Indonesian, the long run real CPO export demand is assumed as a function International CPO price (Rotterdam), real effective exchange rate (EXC) and exchange rate uncertainty (VEXC).

$$Q_t = E(\text{Price}_t, EXC_t, VEXC_t) \quad (1)$$

In logarithm form, a function (1) can be written as

$$q_t = \alpha_0 + \alpha_1 price_t + \alpha_2 exc_t + \alpha_3 vexc_t + u_t \quad (2)$$

where $q_t$ is the logarithm of real CPO export; $price_t$ denotes logarithm of International CPO price; $exc_t$ refers to the logarithm of real exchange rate; $vexc_t$ measures exchange rate volatility; and $u_t$ is a disturbance term.

The coefficient of $\alpha_1$ is expected to be a negative. Theory underlying this expectation is that an increase in relative price will force the buyers to find other substituted goods that are relatively cheap. Different from $\alpha_1$, $\alpha_2$ is expected to have a positive sign since if the real exchange rate, $exc_t$, rises, and future trade appears relatively more profitable to exporters, so export supply will vary directly to change in exchange rate. The coefficient of $\alpha_3$ is indefinite. The reasons for this indeterminacy are very importance. First, there is no single study on the effect of exchange rate volatility on Indonesian CPO export that can be used as a reference. Second, as discussed earlier, the empirical studies of the effect of exchange rate volatility is inconclusive. Some studies conclude that exchange rate variability impede the flow of international trade. On the other hand, many studies show that exchange rate volatility has a positive effect on trade flows. According to Daly (1996), the overall effect of exchange rate volatility depends on the firms' attitude toward risk and the price elasticity of demand for the firms' exports.

In measuring the exchange rate volatility, the root mean square error (RMSE) is employed as also used by Adjaye (1999). In this study, the exchange rate volatility is defined as the standard deviation of the growth of the real exchange rate, $e_t$, and is formulated as follows:

$$v_t = 100\sqrt{\frac{1}{4}\sum_{j=1}^{4}\left(\frac{e_t - e_{t-1}}{e_{t-1}}\right)^2} \tag{3}$$

where $e_t$ is measured by $e_t = 100\dfrac{ER_t - ER_{t-1}}{ER_{t-1}}$ and *ER* is the level form of the real exchange rate. According to Adjaye (1999), the coefficient of variation as a proxy of exchange rate uncertainty is essentially a moving sample standard deviation of the growth rate of the real effective exchange rate calculated over the previous periods. In addition, Dwyer et al (1996) and Akhtar and Hilton (1984) have also used the variants of this measurement.

Statistical inference from time series in equation (2) is usually based on the assumption of stationary. Thus, before applying equation (2), the time series property whether it is stationary or not is tested using the unit root test. The unit root analysis employed are based on the work of Dickey and Fuller (1981). For time series X, the Dickey-Fuller test involve estimating two forms of the"Augmented Dickey-Fuller" equations

$$\Delta X_t = \beta_0 + \beta_1 X_{t-1} + \sum_{j=1}^{k}\gamma_j \Delta X_{t-j} + \varepsilon_t \tag{4}$$

and

$$\Delta X_t = \beta_0 + \beta_1 X_{t-1} + \beta_2 t + \sum_{j=1}^{k}\gamma_j \Delta X_{t-j} + \varepsilon_t \tag{5}$$

where $\varepsilon_t$ for $t = 1, \ldots, N$ is assumed to be Gaussian white noise.

To test the null hypothesis $H_0 : \beta_1 = 0$, the *t* statistic on $\beta_1$ is compared to the critical values. As long as the *t* statistic is larger than the relevant critical value, the null of a unit root can not be rejected. For this purpose, the number of lagged terms *k* used is four.

The second step is to determine the number of cointegrating vectors by employing the trace and Eigenvalue likelihood ratio test developed by Johansen and Juselius (1990). The basic idea of cointegration is that two or more variables may be regarded as defining a long-run equilibrium relationship if they move close together in the long run, even though they may drift apart in the short run. This long-run relationship is referred to as a cointegrating vector. For the purpose of this test, let consider the unrestricted vector autoregression (VAR) model

$$X_t = \mu + \sum_{i=1}^{k}\Pi_i X_{t-i} + \varepsilon_t \tag{6}$$

Since $X_t$ is assumed to be nonstationary and let $\Delta X_t = X_t - X_{t-1}$, equation (6) can be rewritten in the first-differences notation reformulated in the error-correction form as,

$$\Delta X_t = \mu + \sum_{i=1}^{k} \Gamma_i \Delta X_{t-i} + \Pi X_{t-1} + \varepsilon_t \qquad (7)$$

where $\Gamma_k = I - (\Pi_1 - \cdots - \Pi_k)$, *i = 1, ..., p-1*, and $\Pi = I - \Pi_1 - \Pi_2 - \cdots - \Pi_k$. The matrix $\Pi$ captures the long-term relationship between the variables in the data vectors. When $0 < the\ rank\ of\ \Pi(r) < k$, then $\Pi$ can be decomposed into two $k \times r$ matrices $Q$ and $R$ such that $\Pi = QR'$. The matrix $R$ consist of $r$, $0 < r < k$, cointegrating vectors while $Q$ refers as a matrix of vector error-correction parameters. The cointegrating vectors, $R$, have the property that $R'X_t$ is stationary even though $X_t$ is non-stationary. Johansen (1988) and Johansen and Juselius (1990) developed the likelihood ratio test for the hypothesis that $\Pi = QR'$. The cointegrating rank, $r$, can be formally tested with two statistics: Trace and Eigen value Likelihood ratio test. This procedure is, then, applied to equation (2) to detect the existence of a long-run relationship between Indonesian export and its determinants.

### *Empirical Result*

### Indonesian Palm Oil Industries Performances

In line with palm oil estate expansion, palm oil and palm kernel oil production, as a yield of the processing of fresh oil palm bunches and palm kernel, have increased sharply. The production of Palm oil was just 721 172 tonnes in 1980 and increased to 19 844 901 tonnes in 2010. That is, by increases around 80 per cent per year. The rapid growth of total production, both CPO and PKO, is apparently due to the increase in smallholder and private estate.

***Table 2. Palm Oil area and Production in Indonesia by Category of Producers in Selected Years.***

| Year | Area ( Ha ) | | | | Production ( Ton) | | | |
|---|---|---|---|---|---|---|---|---|
| | Smallholders | Government | Private | Total | Smallholders | Government | Private | Total |
| 1980 | 6,175 | 199,538 | 88,847 | 294,560 | 770 | 498,858 | 221,544 | 721,172 |
| 2005 | 2,356,895 | 529,854 | 2,567,068 | 5,453,817 | 4,500,769 | 1,449,254 | 5,911,592 | 11,861,615 |
| 2006 | 2,549,572 | 687,428 | 3,357,914 | 6,594,914 | 5,783,088 | 2,313,729 | 9,254,031 | 17,350,848 |
| 2007 | 2,752,172 | 606,248 | 3,408,416 | 6,766,836 | 6,358,389 | 2,117,035 | 9,189,301 | 17,664,725 |
| 2008 | 2,881,898 | 602,963 | 3,878,986 | 7,363,847 | 6,923,042 | 1,938,134 | 8,678,612 | 17,539,788 |
| 2009*) | 3,013,973 | 608,580 | 3,885,470 | 7,508,023 | 7,247,979 | 1,961,813 | 9,431,089 | 18,640,881 |
| 2010**) | 3,314,663 | 616,575 | 3,893,385 | 7,824,623 | 7,774,036 | 2,089,908 | 9,980,957 | 19,844,901 |

Source: Directorat General Estate (2011)

With the rapid increase in palm oil area and productivity, total production of palm oil has increased rapidly. As a result, the share of Indonesian palm oil production in the world production has increased. In 1969, Indonesia was the fourth largest of palm oil producer in the world after Malaysia, Nigeria and the Congo which shared 34, 27 and 14 per cent respectively. Indonesian production was 12 per cent. However in 1993, Indonesia exceeded Nigeria as second largest producer. Indonesian production is currently 26 per cent of total world palm oil production while Malaysia and Nigeria are 50 and seven per cent respectively. Furthermore, As of 2009, Indonesia was the largest producer of palm oil,

surpassing Malaysia in 2006, producing more than 20.9 million tonnes. The Indonesian aspires to become the world's top producer of palm oil. But at the end of 2010, 60 percent of the output was exported still in the form of Crude Palm Oil. FAO data show production increased by over 400% between 1994–2004, to over 8.66 million metric tonnes.

If viewed from the export side, there changes have occured. Previously, most palm oil production was exported. For example, between 1950 and 1960, more than 75 per cent of palm oil production was exported. Then in the following years, this changed so that after 1970 the export proportion decreased. Soetrisno and Winahyu (1991) report that the continuous decrease in coconut oil supply has forced the government to allocate palm oil production. The allocation of palm oil is intended to meet domestic demand, particularly to stabilise the price of cooking oil. In addition, palm oil is one of sixteen commodities controlled by the government for export. Hence, exports fluctuate from year to year depending on domestic demand. However, in line with rapid growth of palm oil production and coconut production, the volume of palm oil exported is increasing.

Table 3. shows volume and value export of palm oil by in selected year. The volume of palm oil exported fluctuates around an increasing trend in the 1980s. Before the 1970s, more than 50 per cent of total palm oil production was exported. This figure declined during the coconut oil crisis in the 1970s and 1980s. In the 1989, for instance, palm oil exports were only 12.44 per cent of total production. Thereafter, the volume exported increased as shown in Table 3.

*Table 3. Indonesia Palm Oil Volume and Value Export in Selected Years.*

| Year | EXPORT | |
|---|---|---|
| | Volume (Ton) | value (000 US$) |
| 1981 | 201,251 | 108,846 |
| 2004 | 9,565,974 | 3,944,457 |
| 2005 | 11,418,987 | 4,344,303 |
| 2006 | 11,745,954 | 4,139,286 |
| 2007 | 13,210,742 | 8,866,445 |
| 2008 | 18,141,006 | 14,110,229 |
| 2009 | 21,151,127 | 11,605,431 |

Source: Directorat General Estate (2011)

### *Model estimation result*

### Unit root test

The time series of the variables used in the model is suspected to be non-stationary in which in a strict econometric sense, a random variable is said to be stationary if its mean and variance are constant overtime. For this purpose, the Augmented Dickey Fuller (ADF) test is applied. Table 4 summarizes the result of the ADF unit root tests.

**Table 4 the Augmented Dickey Fuller Test of Unit Root**

| Variable to be tested | Level | First Difference | Conclusion |
|---|---|---|---|
| VOL | -3.64581 | -8.221574 | I(0) |
| PRICE | -0.623692 | -6.13205 | I(1) |
| EXC | -2.27101 | -7.110331 | I(1) |
| VEXC | -2.422193 | -4.328547 | I(1) |

*Note : the null hypothesis of ADF test is $H_0$: the variables has a unit root, i.e., I(1) series*

The result suggest that the null hypothesis that the variables are non stationary in level cannot be rejected and significant at least at 10 percent for the lag lengths assumed, i.e, 4. To ascertain whether there is a second unit root, the ADF test was applied to the first differences of the time series. The results show that the presence of a unit root is easily rejected at at least 95 % level of significance. These results confirm that all variables under consideration are stationary and are integrated of order one. Therefore, the series can be used for cointegration analysis.

## Cointegration Test Result

This study applies the maximum likelihood framework as suggested by Johansen and Juselius (1990) to perform The Johansen test for cointegration test. The use of maximum likelihood test is based on finding that maximum likelihood framework is known to offer better properties than the traditional Eagle and Grager approach which is on residual approach (Adjaye 1990). Table 5 reports the cointegration test result. This table shows that Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level. This means that the null hypothesis of one cointegrating relationship cannot be rejected at least at 5 percent level of significance. In other words, all of series data have a long-run relationship. As a consequence, they can be modeled as specified before to find out parameter estimate using empirical data.

**Table 5 Cointegration Test Results for the Indonesian CPO Exports**

| Hypothesized No. of CE(s) | Eigenvalue | Max-Eigen Statistic | 0.05 Critical Value | Prob.* |
|---|---|---|---|---|
| None * | 0.384573 | 29.12632 | 27.58434 | 0.0315 |
| At most 1 | 0.142923 | 9.253636 | 21.13162 | 0.8115 |
| At most 2 | 0.11792 | 7.528322 | 14.2646 | 0.4287 |
| At most 3 | 0.000924 | 0.055441 | 3.841466 | 0.8138 |

The long run relationship between export volume of CPO (VOL) and international Price (PRICE), Real Exchange Rate (EXC), and Volatility Index of exchange rate (VEXC) is presented in Table 6. The model estimation find that the sign of variables are as expected in the above *a priori hypothesis* except for exchange rate volatility. However, only exchange rate variability is insignificant at all levels. This finding inform that the volatility of exchange rate will not affect the Indonesian CPO export. Similar explanation is applied for other independent variables.

**Table 6. The Long Run Relationship The Indonesian CPO Exports.**

| Variable | Estimated Coefficient | Standard Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | - 1149.062 | 270.5785 | - 4.246687$^{+++}$ | 0.0001 |
| PRICE | - 2.013266 | 0.305447 | - 6.59121$^{+++}$ | 0 |
| EXC | 0.096262 | 0.026437 | 3.641224$^{+++}$ | 0.0006 |
| VEXC | 104.5271 | 78.94465 | 1.324056 | 0.1904 |
| **Goodness of Fit Statistics** | | | | |
| R-squared | | 0.511149 | | |
| Adjusted R-squared | | 0.487107 | | |
| F-statistic | | 21.26081$^{+++}$ | | |

Note: $^{++}$and $^{+++}$ denote statistical significance at the 95 % and 99 % level respectively.

### Error Correction Model Results

The result for error component model (ECM) is summarized at Table 7. The ECM represents the short run effects of independent variable under consideration to dependent variable, i.e., Indonesian CPO exports in term of volume. The empirical results show that the explanatory power of model is indicated by the value of $R^2$ , that is, 13.44 %. This value implies that all independent variables included in the model are able to explain a 13.44 % percent variation of dependent variable. From the F-test, the result also found that $F_{statistic}$ is higher than F-table at 95 % implying that the null hypothesis that all the right-hand side variables are jointly zero can be strongly rejected. Furthermore, the diagnostic test indicates that there are no serious econometric problems found.

**Table 7 Error Correction Model for Indonesian CPO Exports**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 23.03661 | 50.57263 | 0.455515 | 0.6504 |
| D(PRICE) | -0.459038 | 0.588025 | -0.780645 | 0.4381 |
| D(EXC) | 0.024383 | 0.048653 | 0.50116 | 0.6181 |
| D(VEXC) | -57.74479 | 94.31411 | -0.61226 | 0.5427 |
| RESID01(-1) | -0.297078 | 0.102034 | -2.911569$^{+++}$ | 0.0051 |

| | | | |
|---|---|---|---|
| R-squared | 0.13437 | Mean dependent var | 20.47898 |
| Adjusted R-squared | 0.075684 | S.D. dependent var | 415.8056 |
| F-statistic | 3.289619 | Durbin-Watson stat | 1.942208 |
| Prob(F-statistic) | 0.020327 | | |

Note: $^{++}$and $^{+++}$ denote statistical significance at the 95 % and 99 % level respectively.

The results from ECM analysis as presented in Table 7 seem to perform satisfactorily. All variables have expected sign and are significant at least at 95 percent level except for real exchange rate. The inclusion of lagged error correction variable (RESID01(-1)) has the correct negative sign and is statistically significant. This finding implies that ECM model used in this study is valid. The coefficient of (RESID01(-1)) implies that Indonesian CPO exports fall by roughly 0.30 percent for every 1 percent deviation (or error) from the long term equilibrium relationship in the preceding quarter. This deviation is relatively higher compared to case of Japan, Germany, and USA (Mahdavi 2000) and lowers than case of Fiji (Adjaye 1999). Second finding is that real exchange rate has no significant impact on the export. This finding is different from Adjaye's study in Fiji which the real exchange rate has greater impact on Fiji's real export.

This study also suggests that apart from the long run relationship alluded to earlier; all independent variables included in the model have insignificant short-term effects on Indonesian CPO export. This conclusion is based on t-test in which t-statistic of all independent variable is less that t-critical. This finding differs from study by Romdhon and Sukiyono (2007) on the effect of exhange rate volatility on Cofee export. They found that real exchange rate and exhange rate volatility have sgnificant effect on Indonesian coffee export in the short run.

The study also denotes that exchange rate volatility has adverse impact on the Indonesian CPO exports and is significant at all levels. This finding is similar to study of Siregar and Rajan (2002). They explain that the adverse impact of exchange rate volatility on trade and the real sector may in part be the reason for the supposed "fear of floating" that has seemed to characterize many emerging economies. Recent financial crises involving emerging economies have called into question the wisdom of them adopting pegged exchange rates (be it "hard" or "soft") and have strengthened the appeal of allowing for greater exchange rate flexibility. However, it is easy to overlook that flexible exchange rates bring with them their own problems. This surely has implications for the perennial issue of appropriate choice of exchange rate regime.

### *Conclusion and Recommendation*

The primary goal of this paper is to analyze the extent to which historical experience, as incorporated in these estimated equations, can be used as a reliable guide to future trends in exports. In this context, real export of Indonesian CPO export is estimated by applying cointegrating and error component model frame work.

Indonesian CPO exports, as in most economies, are continually subjected to a range of domestic and external factors. Over the past 30 years, export growth has rarely moved along a smooth growth profile. Nevertheless, it is still possible to identify the key exogenous factors underlying the short-term fluctuations in CPO exports. In the short-run, empirically, the movements in the variable independent included in model account for close to the quarterly change in exports. Stability in the exchange rate is also a factor in improving and promoting Indonesian exports.

The results suggest both domestic and external shocks largely influence movements in exports. Some of the shocks cannot be controlled by policymakers. The best policy prescription in such a situation would be to put in place broad-based macroeconomic conditions, which could dampen the effect of

these shocks. Diversification of exports through further research and development should be a part of this prescription. Continued stability in exchange rates and a concerted move towards diversifying export market would improve economic fundamentals and help bring about sustained growth in export earnings.

This study ignored other external factors that could play an important role, such as foreign income or trading partner. In future, this factor should be included in the analysis due to many studies suggested that foreign income or trading partner income has significant result on country's exports. A study by Williams and Morling (2000) found that Fiji's economy moves roughly one-for-one with its trading partner economies. Developments in our trading partner economies are quickly transmitted to the Indonesian economy as Indonesian has strong trade and investment links with these economies.

## *Reference*


Akhtar, M. and R. Spence Hilton.1984. Effects of Exchange Rate Uncertainty on German and US Trade. *Federal Reserve Bank of New York: Quaterly Review*. Spring: 7 –16.

Adjaye, J. Asafu, 1999. *Exchange rate variability and export growth in Fiji*. Working Paper No.99-4. Asia Pacific School of Economics and Management, Australian National University.

Arize, A.1995.The Effects of Exchange Rate Volatility on US Exports: an Empirical investigation, *Southern Economic Journal*.62: 34 – 43.

Arseery, A. and D.A. Peel.1997.The Effects of Exchange Rate Volatility on Exports. *Economics Letters*. October: 173 – 177.

Broll, U., and Eckwert, B., 1999, Exchange rate volatility and international trade, *Southern Economic Journal*, 66:178 – 185.

Cerra, Valerie and Saxena, Sweta Chaman 2000, *Contagion, Monsoons, and Domestic Turmoil in Indonesia: A Case Study in the Asian Currency Crisis*, IMF Working Paper WP/00/60, European I Department IMF.

Daly, Kevin.1996.The Effect of Exchange Rate Volatility on the Volume of Japan's Bilateral Trade. *The Singapore Economic Review*.41 (2): 23 – 39.

Dickey, David A. and Wayne A.Fuller.1981.Likelihood Ratio Statistics for Auto Regressive Time Series with a Unit Root. *Journal of the American Statistical Association*. July: 1057 – 1072.

Dwyer, L. D. C. Nguyen and Rajapake, S. 1996. The Volatility of Australia's Exchange Rate: a Synthesis, *Economic Analysis and Policy*. 26 (1): 25 – 44.

Fane G.1999, Indonesian Economic Policies and Performance, 1960-98, *World Economy*, 22(5): 651 – 668.

Hassan, M. Kabir and David R. Tufte.1998.Exchange Rate Volatility and Aggregate Export Growth in Bangladesh. *Applied Economics*. February 30(2): 189 – 202.

Hill, Hall 1996, *The Indonesian Economy since 1966: Southeast Asia's Emerging Giant*, Cambridge University Press, Cambridge.

Hosseini, M. R., and Moghaddasi, R., 2010, Exchange rate volatility and Iranian export , *World Applied Sciences Journal*, 9: 499 – 508.

Johansen, S.1988. Statistical Analysis of Cointegration Vectors. *Journal of Economic Dynamics and Control.*12: 231 – 254.

Johansen, S. and k. Juselius.1990.Maximum Likelihood Estimation and Inference on Cointegration with application Demand for Demand. *Oxford Bulletin of Economics and Statistics.*52: 169 – 210.

Koray, F. and W.D. Lastrapes.1989.Real Exchange rate Volatility and US Bilateral Trade: a VAR approach.*Review of Economics and Statistics*.71: 708 – 712.

Kulkarni, Kishore G. and Irdina Irawati 1998, the Recent Indonesia Currency Crisis: Underlying Factors and Implication, *Journal of Foreign Exchange and International Finance*, 12(2): 145 – 158.

Mahdavi, Saeid. 2000. Do German, Japanese, and US Export prices asymmetrically respond to exchange rate changes? Evidence from aggregate Data. *Journal of Contemporary Economic Policy*. 18(1): 70-81.

Rey, S., 2006, Effective Exchange Rate Volatility and MENA countries Exports to the EU , *Journal of Economic Development*, 31:23-54.

Rodgers, Yana Van der Meulen, 1998. Empirical investigation of one OPEC country's successful non-oil export performance, *Journal of Development Economics*, 55: 399 – 420.

Rodgers, Yana van der Meulen. 1994. Estimation of Devaluation Impact on Indonesian Aggregate Trade Performance. Development Discussion Paper No. 488.May 1994, Harvard Institute for International Development, Harvard University.

Simatupang, Panjar and Sudi M. 1995. *The Effect of Monetary and Exchange Rate to Economic Structural Transformation in Indonesia*. Paper Presented at the Seminar National PERHEPI.

Siregar, Reza and Ramkishen S. Rajan. 2002. *Impact of Exchange Rate Volatility on Indonesia's Trade Performance in the 1990s*. Discussion Paper No. 0205. CIES. University of Adelaide. Australia

Soetrisno, Lukman and Retno Winahyu. 1991. *Kelapa Sawit: Kajian Sosial Ekonomi*.Yogyakarta: Aditya Media

Sukiyono, Ketut and Romdhon, M. Mustopa, 2006. *Fluktuasi Nilai Tukar Rupiah Dan Pengaruhnya Terhadap Ekspor Kopi Indonesia*. Paper presented at SEMIRATA BKS-PTN Barat Bidang Ilmu Pertanian, Pekanbaru 23-26 Juli 2007

Indonesia: Palm Oil Production Prospects Continue to Grow December 31, 2007, USDA-FAS, Office of Global Analysis

http://www.thejakartapost.com/news/2011/05/24/pg-may-build-oleochemical-plant-secure-future-supply.html.

Williams, G. and S. Morling. 2000. Modelling Output Fluctuations in Fiji, Reserve Bank of Fiji, *Working Paper*, 00/01.