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# The Impact of Currency Fluctuations on Palm Oil Exports



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# Introduction

- Investigate the impact of currency fluctuations on Malaysian palm oil exports
- Four major products of palm oil for exports considered:
  1. Crude Palm Oil (CPO)
  2. Processed Palm Oil (PPO)
  3. Crude Palm Kernel Oil (CPKO)
  4. Processed Palm Kernel Oil (PPKO)
- The standard export demand model will be used for this analysis, where export is determined by relative price, foreign income, and currency fluctuations



# Relative Price

- In the standard export-demand model, we use relative price to control the price effect
- Importers will compare the price of Palm Oil from Malaysia and the price of palm oil from other countries
- Expected coefficient sign: Negative
- Expectation: Higher price of Malaysian Palm Oil relative to global palm oil price → lower export of Palm Oil



# Foreign Income

- If income of the rest of the world increases...
- Economic boom in the economies of Malaysia's major trading partners → increase quantity of exports from Malaysia
- Use Gross Domestic Product (GDP) as a measure of national income
- Expected coefficient sign: Positive
- Expectation: Higher income of palm oil importing countries → larger export of Palm Oil



# Currency Fluctuations

- To measure currency fluctuation – use moving sample standard deviation (MSSD) of real effective exchange rate (REER) like in standard model to measure the impact of exchange rate variations on exports
- In short, standard deviation is a measure of volatility – larger s.d. → more volatile
- Expected coefficient sign: Negative
- Expectation: a more stable MYR (smaller MSSD) → larger export of Palm Oil

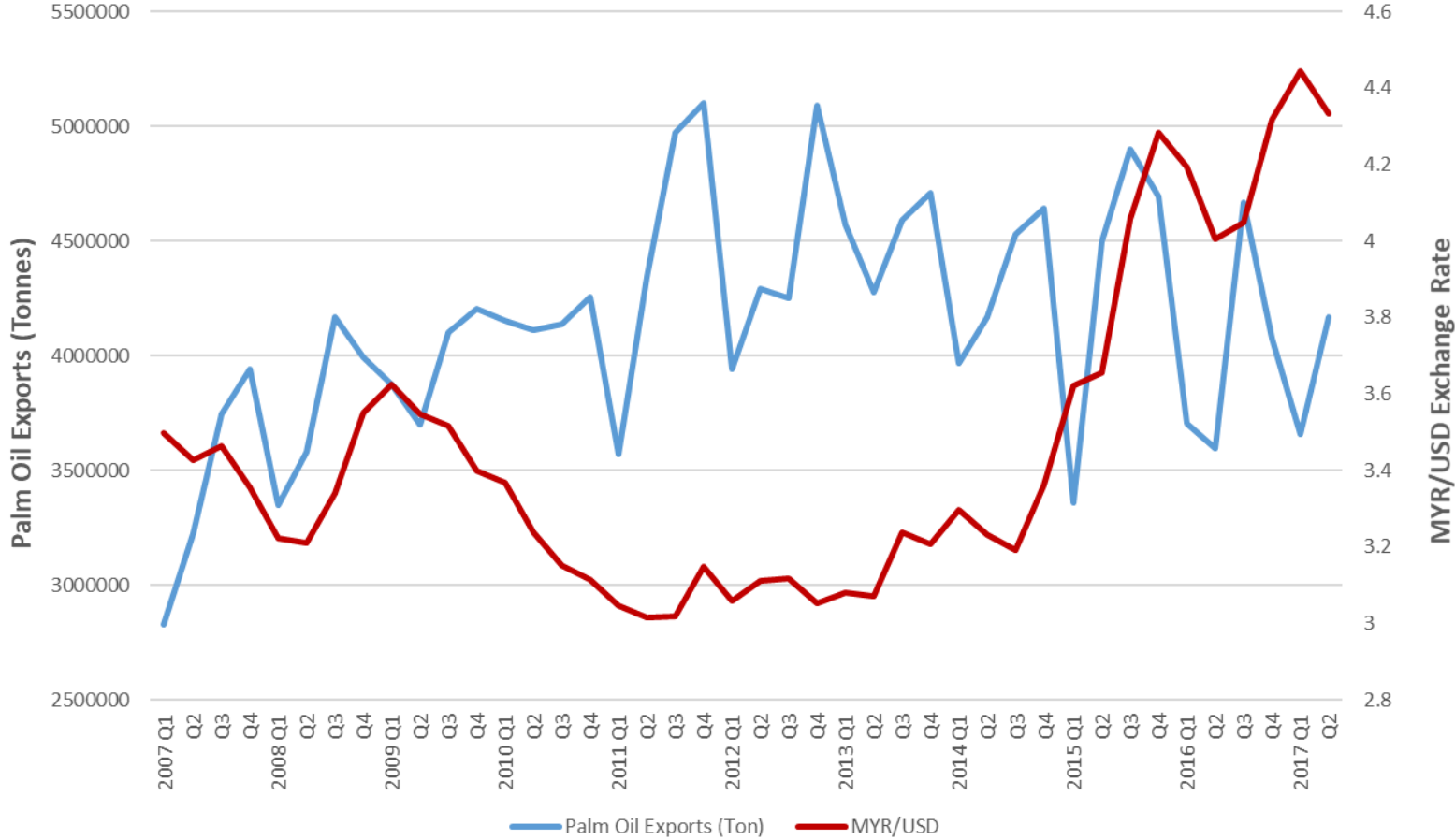


# Currency Fluctuations

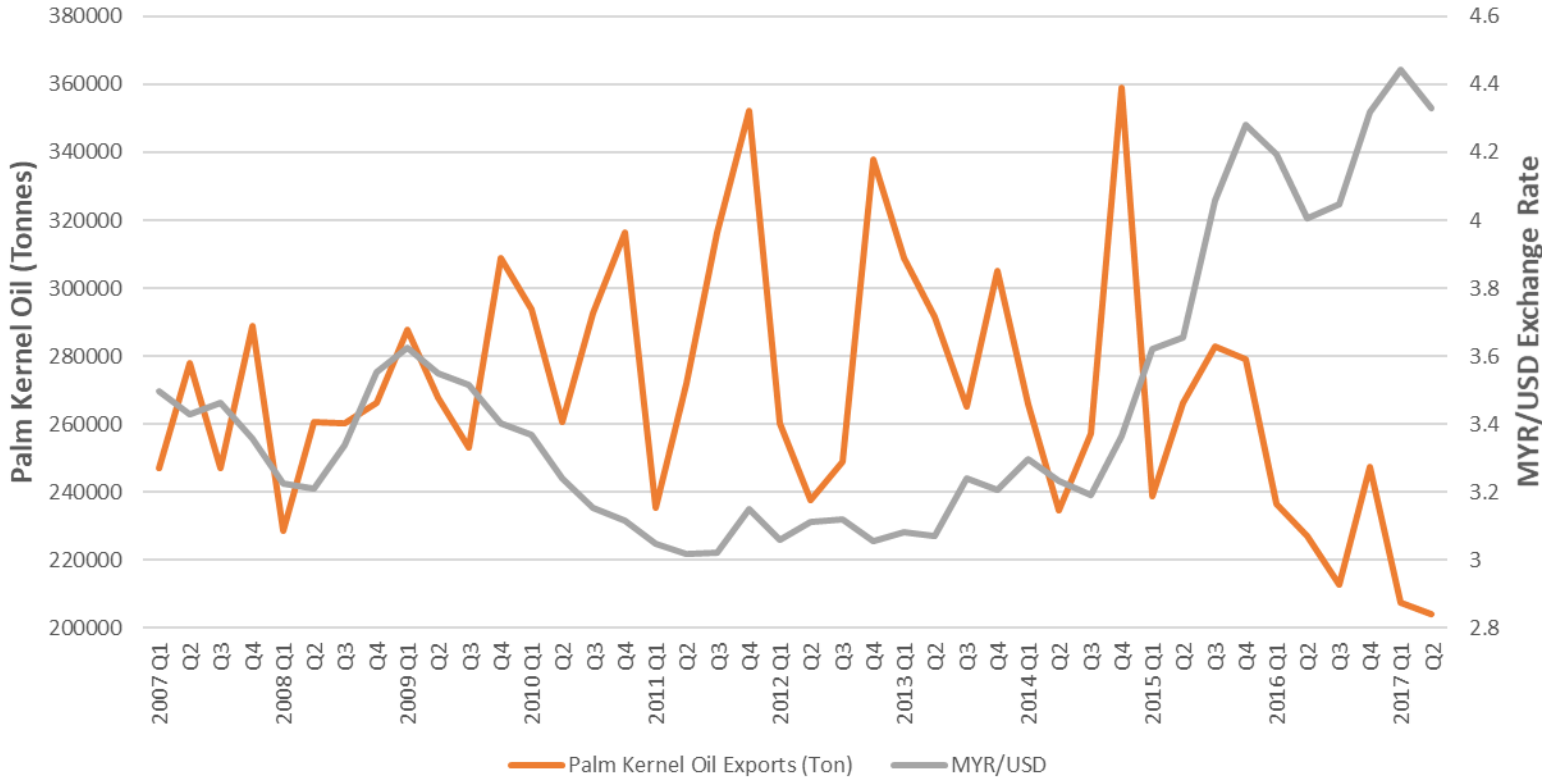
- However, for comparison purpose and to simplify the analysis, we also include the REER and nominal exchange rate, MYR / USD
- REER → trade balance-weighted average of a country's currency relative to basket of other major currencies, adjusted for the effects of inflation
- Instead of measuring MYR against a foreign currency, we measure the value of MYR against a set of major currencies
- Expectation: As MYR appreciates (REER ↑ or MYR/USD ↓) → Ambiguous



# Palm Oil Exports and Exchange Rate

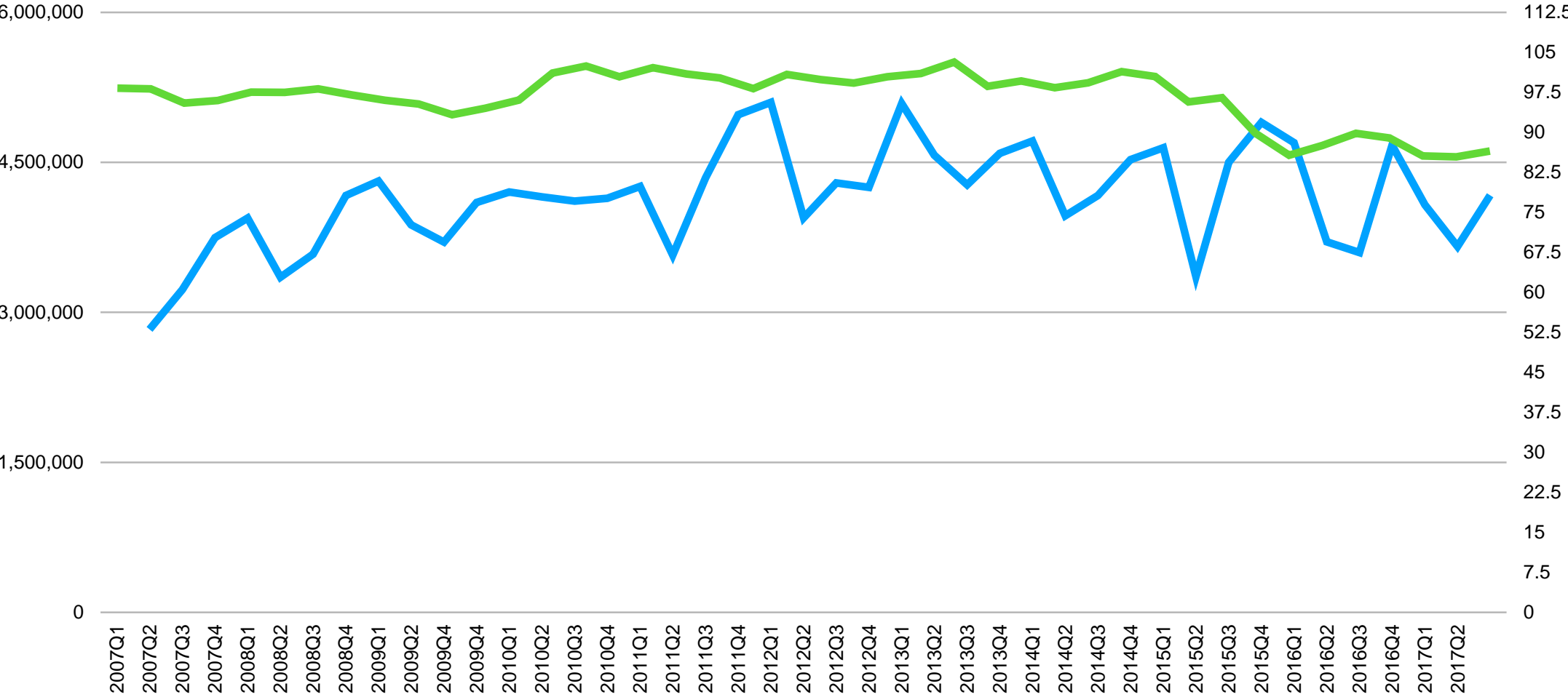


# Palm Kernel Oil Exports and Exchange Rate





# Palm Oil Exports and REER

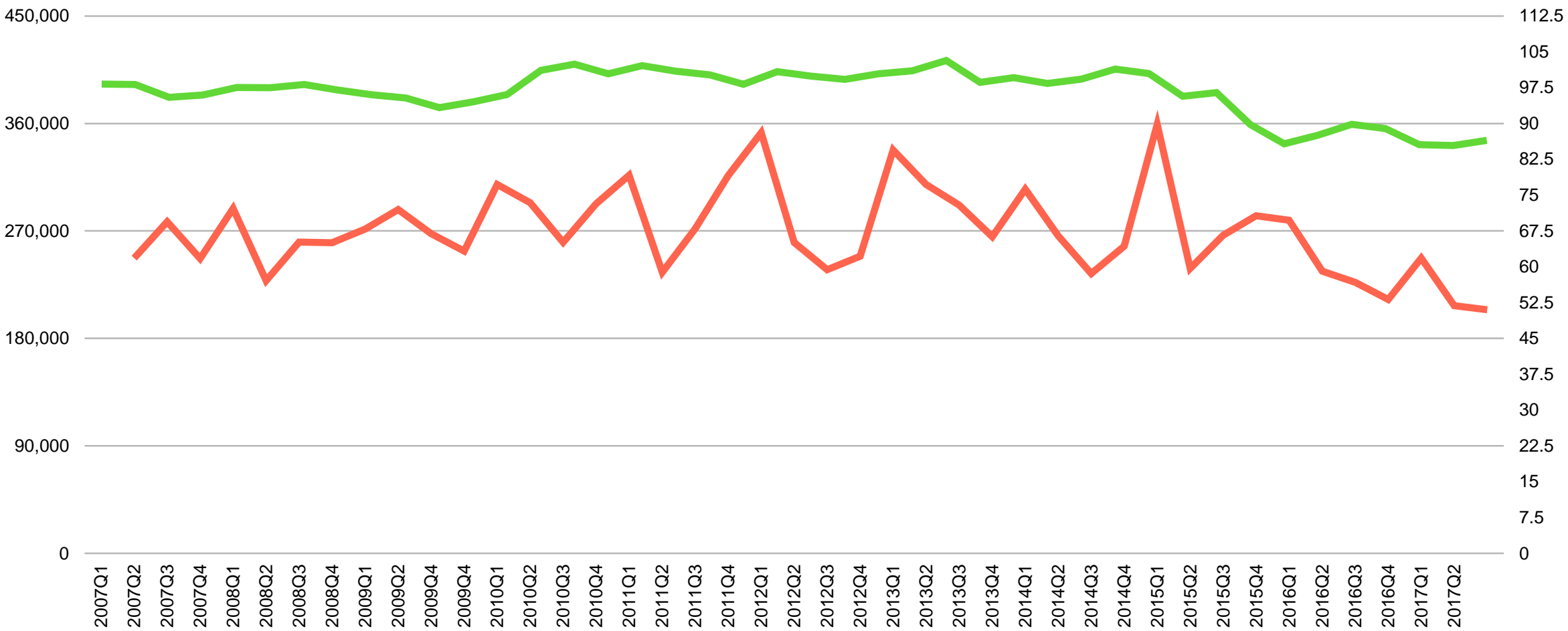


— Palm Oil Exports (Tonnes)

— Real Effective Exchange Rate (MYR)



# Palm Kernel Oil Exports and REER



— Palm Kernel Oil Exports (Tonnes)

— Real Effective Exchange Rate (MYR)



# Model Specification

$$\ln X_t = \beta_0 + \beta_1 \ln P_t + \beta_2 \ln Y_t + \beta_3 EV_t + \varepsilon_t$$

Variable	Name	Remark	Source
X	Export Volume (in tonnes)	CPO, PPO, CPKO, and PPKO	MPOB
P	Relative Price (in USD)	Malaysian Export Price deflated by Global Price	MPOB and World Bank
Y	Foreign Income (in USD)	Average GDP of Top Four Importers of Malaysian Palm Oil	IFS
EX	Exchange Rate Variation	Nominal MYR / USD and moving-sample standard deviation of MYR Real Effective Exchange Rate (REER)	World Bank and IFS

- Quarterly data from 2007:Q1 to 2017:Q2 → 42 observations



# Unit Root Tests for Stationarity

Table 1: Unit Root Tests for Stationarity

Var	Level		Difference		Order	Var	Level		Difference		Order
	ADF	KPSS	ADF	KPSS			ADF	KPSS	ADF	KPSS	
XCPO	-0.06	0.18**	-6.64**	0.08	I(1)	PCPO	-4.17**	0.06	-9.31**	0.04	I(0)
XPPO	-4.72**	0.19**	-6.83**	0.12	I(1)	PPPO	-4.15**	0.05	-8.06**	0.05	I(0)
XCPKO	-1.63	0.11	-8.05**	0.09	I(1)	PCPKO	-3.64**	0.08	-7.38**	0.06	I(0)
XPPKO	-0.80	0.25**	-5.10**	0.07	I(1)	PPPKO	-4.08**	0.06	-7.03**	0.05	I(0)
REER	-1.69	0.24**	-4.44**	0.07	I(1)	Y	-3.12**	0.15**	-3.20**	0.09	I(1)
MSSD	-3.38**	0.07	-4.68**	0.07	I(0)	MYUS	-1.91	0.26**	-4.51**	0.07	I(1)

Note: ADF is Augmented Dickey-Fuller Test for Unit Root, KPSS is Kwiatkowski-Phillips-Schmidt-Shin Test for stationary. \*\* Denotes 5% significance level



# ARDL Approach to Cointegration

- Based on ADF and KPSS results → *RPs* are level stationary, while all other variables are stationary at first differences
- Apply the autoregressive distributed lag (ARDL) approach to cointegration → allows for simultaneous estimation of short-run and long-run effects of exchange rate on export volume
- The bounds testing to capture the long-run relationship is robust to small sample size (42 observations over 2007-2017)





# ARDL Approach to Cointegration

- The ARDL representation of the baseline model is:

$$\begin{aligned} \Delta \ln X_t &= a_0 + \sum_{j=0}^p b_{1j} \Delta \ln P_{t-j} + \sum_{j=0}^p b_{2j} \Delta \ln Y_{t-j} + \sum_{j=0}^p b_{3j} \Delta EV_{t-j} \\ &+ \sum_{j=0}^p b_{4j} \Delta \ln X_{t-j-1} + c_1 \ln P_{t-1} + c_2 \ln Y_{t-1} + c_3 EV_{t-1} + c_4 \ln X_{t-1} + u_t \end{aligned}$$

- Backward elimination method is applied
- Diagnostic tests indicate well-behave estimation: no serial correlation, normally distributed and homoskedastic error term, stable regression



# Short-Run Estimates: CPO & PPO

Table 2: Short Run Estimates of CPO and PPO

	CPO			PPO		
	MSSD	REER	MYUS	MSSD	REER	MYUS
$\Delta X_{t-1}$				0.27**	0.25**	0.26**
$\Delta Y$	10.09***	9.24***	9.32***	2.91***	2.77***	2.73***
$\Delta EV$	-0.01	-0.01				
ECT	-0.43***	-0.55***	-0.53***	-0.75***	-0.79***	-0.80***
F-Bounds Test	5.15***	5.71***	5.28***	6.85***	6.24***	6.30***

Note: \*, \*\*, \*\*\* denote 10%, 5%, and 1% significance level, respectively



# Short-Run Estimates: CPKO & PPKO

Table 3: Short Run Estimates of CPKO and PPKO

	CPKO			PPKO		
	MSSD	REER	MYUS	MSSD	REER	MYUS
$\Delta X_{t-1}$	-0.17					
$\Delta X_{t-2}$	-0.35**					
$\Delta X_{t-3}$	-0.47***					
$\Delta P$		-0.21	-0.51	0.01	-0.01	-0.01
$\Delta Y$		12.56***	13.06***	3.19***	2.96***	2.96***
$\Delta Y_{t-1}$				4.27***	4.13***	4.10***
$\Delta Y_{t-2}$				2.55***	2.42***	2.42***
$\Delta EV_t$	-0.01	-0.04*	0.83**			
$\Delta EV_{t-1}$	0.17***					
$\Delta EV_{t-2}$	0.12***					
ECT	-1.03***	-0.80***	-0.85***	-0.62***	-0.66***	-0.66***
F-Bounds Test	5.59***	8.08***	8.58***	13.37***	13.55***	13.44***

Note: \*, \*\*, \*\*\* denote 10%, 5%, and 1% significance level, respectively



# Short-Run Result Discussion

- MYR fluctuation does not affect palm oil export demand in the short-run, except for CPKO
- Possible explanations:
- Export demand is not sensitive to MYR fluctuations since importing countries are not using MYR
- Palm oil supply is inelastic to MYR fluctuations in the short run → fixed amount of export
- CPKO export increases when (1) MYR was volatile in the past (two quarters); and (2) MYR depreciates



# Short-Run Result Discussion

- Palm oil exports are very responsive to changes in foreign income → higher foreign income, greater demand for palm oil → suggest that palm oil is a normal good
- CPO and CPKO exports are more sensitive to foreign income relative to PPO and PPKO
- All exports converge to average in the long run, any shocks are quickly adjusted
- Adjustment speed (from fastest to slowest): CPKO, PPO, PPKO, and CPO





# Long-Run Estimates

Table 4: Long Run Estimates of CPO and PPO

	CPO			PPO		
<i>P</i>	3.93**	2.29*	2.59**	0.18	0.18	0.19
<i>Y</i>	1.19	2.69**	2.95**	-0.34	-0.35	-0.30
<i>MSSD</i>	0.09			-0.02		
<i>REER</i>		0.03*			0.00	
<i>MYUS</i>			-0.30			-0.04 (0.05)
Constant	-21.40	-67.58**	-71.30**	24.96***	24.83***	23.96***
F-Bounds Test	5.15***	5.71***	5.28***	6.85***	6.24***	6.30***

Note: \*, \*\*, \*\*\* denote 10%, 5%, and 1% significance level, respectively



# Long-Run Estimates

Table 5: Long Run Estimates of CPKO and PPKO

	CPKO			PPKO		
<i>P</i>	-1.19*	1.22	0.70	0.79***	0.73***	0.75***
<i>Y</i>	3.63***	2.33**	2.05**	-1.70***	-1.50***	-1.48***
<i>MSSD</i>	-0.19*			0.01		
<i>REER</i>		0.01			0.00	
<i>MYUS</i>			-0.11			-0.04
Constant	-94.80***	-58.20**	-48.58*	61.72***	55.32***	55.45***
F-Bounds Test	5.59***	8.08***	8.58***	13.37***	13.55***	13.44***

Note: \*, \*\*, \*\*\* denote 10%, 5%, and 1% significance level, respectively



# Long-Run Result Discussion

- Exchange rate variation is not significant, except in the case of CPO where REER is (positively) significant at 10% level; and CPKO where MSSD is (negatively) significant at 10% level
- Export of CPO increases when MYR strengthen against other major currencies
- Export of CPKO increases when MYR becomes more stable
- Policy recommendation: Bank Negara Malaysia should manage a stable MYR fluctuations in the long run



# Long-Run Result Discussion

- MYR fluctuation has no impact on palm oil export demand in the long run → may only affect supply in the long run (possibility, need further research)
- Since price of palm oil is quoted in USD → fluctuation in USD may affect palm oil export demand since importing countries will compare their currency with USD
- Long-run period allows countries to substitute palm oil with alternatives to avoid currency fluctuations



# Long-Run Result Discussion

- Long run exports of CPO, CPKO, and PPKO are sensitive to foreign income
- Foreign income positively affects CPO and CPKO, but has an adverse effect on PPKO
- Positive relationship between price and CPO, price and PPKO → this is a puzzle since a negative relationship is expected





# Limitation of Study and Future Research

- Possibility that palm oil prices are endogenous to exports and/or exchange rate
- The behavior of palm oil buyers are not determined solely by the currency fluctuations, there are other factors
- The price of palm oil by Malaysian competitors, such as Indonesia, should be included in the model, but due to unavailability data, this variable is omitted
- Potential research areas in the future:
  - *The importance of exchange rate to business and/or hedging activities of industry players*
  - *Currency fluctuations and its risk to palm oil exporters*
  - *Study on how exporters manage their FOREX*
  - *Analyze the impact of exchange rate fluctuations on the exporters decision to buy or sell palm oil in the future market*

