Fuel subsidy reforms in ASEAN countries

Nam Foo
Edith Cowan University
CAREC Institute/ADB Visiting Fellow
Co-authors with
Professor Hooi Hooi Lean (Universiti Sains Malaysia) &
Professor Ruhul Salim (Curtin University)

Introduction

1

Fuel subsidization policies primarily aim to assist lower-income households.

2

Energy subsidies can generate inequality and inefficiency.

3

This policy can distort pricing signals and misallocation of resources

The motivation

Outline a comprehensive picture of the energy industry in the Association of Southeast Asian (ASEAN) region.

Discuss the household welfare issues in governments of phasing out fuel subsidies.

Literature Review

- Growing interest in evaluating fuel subsidies
- Fuel subsidies can act in different channels by targeting consumers or producers.
- Figure 1 shows how record low oil prices affect the oil and energy sector.
- The price gap approach and the inventory approach are the most common methods for evaluating fuel subsidization policies (Kojima and Koplow, 2015).
- Many literature debates about the need to eliminate fuel subsidy policies (Saboohi, 2001; Dartanto, 2013; Rao, 2012).
- Some researchers find that fuel subsidy reform can help reallocate wealth to low-income households but the policy continues to be intractable (Scobie, 2017).

Figure 1: Brent crude oil prices (USD per barrel)

Source: FRED (2015) and authors' calculations

Data descriptions

- We used three ASEAN countries namely Indonesia, Malaysia, and Thailand to discuss fuel subsidization-related issues.
- Consumer subsidies comprise a substantial percentage of governments' subsidization budgets in these emerging ASEAN economies (Schwanitz et al., 2014).
- Sample periods: Quarterly data was used from 1992Q1 to 2018Q4 to conduct the analysis.
- Data sources: The World Bank, the IMF World Economic Outlook database, and various three individual ASEAN governments' websites.

The model (1)

- We follow the study in Lean and Smyth (2010) and Akinlo (2008) to develop the following basic model:

$$SS = f(HH, Y, OP), \qquad (1)$$

Where:

SS = fuel subsidy

Y = GDP

HH = Household consumption

OP = oil price

The model (2)

- To examine the separate effect of fuel subsidization policy on household consumption and social welfare implication in Equation (1), we develop three additional models as the following:
- The model for HH in ASEAN is as follows:

$$HH=f(Y,SS,OP). \quad (2)$$

- The model for Y in ASEAN is as follows:

$$Y=f(SS,HH,OP). \quad (3)$$

- The model for OP in ASEAN is as follows:

$$OP=f(SS,HH,Y). \quad (4)$$

The model (3)

- The study applies the standard augmented Dickey-Fuller (ADF) unit root test to conduct the stationarity test.
- For robustness check, we used the autoregressive distributed lag (ARDL) bound-testing approach to find the cointegration relationships for all variables considered in the study.

The ARDL approach can be written as the following:

$$\Delta \ln SS_{it} = \theta_1 + \theta_{DUM} DUM + \theta_Y \ln Y_{it-1} + \theta_{HH} \ln HH_{it-1} + \theta_{OP} \ln OP_{it-1} + \sum_{l=1}^{L} \theta_1 \ln Y_{it-l} + \sum_{r=0}^{R} \theta_2 \ln SS_{it-r} + \sum_{s=0}^{S} \theta_3 \ln HH_{it-s} + \sum_{u=0}^{U} \theta_4 \ln OP_{it-u} + \mu_{it}, \quad (5)$$

Where:

Δ is the operator of the first difference,

DUM is the dummy variable that allows for a structural break in the series,

μ_{it} is the normally distributed residual term.

The result (1)

- The outcome of ADF unit root test shows evidence to support the stationarity of variables SS, GDP, HH and OP at 10% significance level.
- The series are integrated at I(1)

Table 1: Augmented Dickey-Fuller (ADF) unit root test for Indonesia, Malaysia and Thailand

Variables	ADF Test (Indonesia)		ADF Test (Malaysia)		ADF Test (Thailand)	
	Level	First Difference	Level	First Difference	Level	First Difference
lnY_{it}	-0.656	-4.498*	-1.293	-7.242*	-1.000	-4.635*
$lnSS_{it}$	-2.702	-2.735*	-2.702	-2.735*	-0.732	-1.479*
$lnHH_{it}$	0.176	-3.743*	0.037	-4.997*	-1.796	-4.905*
$lnOp_{it}$	-2.795	-5.564*	-1.980	-5.695*	-1.736	-5.663*

Note: ***, ** and * represent significance at the 1%, 5% and 10% level of -4.051, -3.455 and -3.153.

The result (2)

Dependent Variable: InSS						
Long-Run Results						
Variables	Indonesia		Malaysia		Thailand	
InHH	9.146**	1.37**	-0.438**	-0.05**	10.969**	0.27**
	(6.666)	(0.174)	(9.241)	(0.962)	(40.63)	(0.788)
InY	-12.258**	-1.79**	-0.397**	-0.04**	-21.687**	-0.49**
	(6.788)	(0.077)	(11.089)	(0.972)	(44.495)	(0.627)
InOP	8.204**	5.58**	0.645**	0.37**	1.499**	0.29**
	(1.471)	(0.000)	(1.757)	(0.714)	(5.208)	(0.774)
Short-Run Results						
Constant	25.73**	3.66**	1.697**	0.40**	7.231**	0.86**
	(7.032)	(0.000)	(4.212)	(0.688)	(8.406)	(0.392)
InHH	9.207**	0.65**	0.149**	0.09**	0.592**	0.23**
	(5.658)	(0.125)	(1.339)	(0.108)	(2.608)	(0.821)
InY	0.989**	0.13**	1.273**	0.66**	0.037**	0.02**
	(7.343)	(0.18)	(1.921)	(0.289)	(1.771)	(0.022)
InOP	-3.845**	-2.57**	0.139**	0.34**	0.093**	0.31**
	(1.421)	(0.012)	(0.407)	(0.247)	(0.292)	(0.080)
R2	0.366		0.251		0.254	
Adj R2	0.259		0.124		0.129	
Root MSE (Sigma)	2.318		0.592		0.494	
F-Statistics (ARDL Bound Test)	6.824		1.161		0.956	

Note: ** represents significance at the 5% levels

Table 2: Long- and short-run autoregressive distributed lag (ARDL) results for Indonesia, Malaysia and Thailand using variable *lnSS*

The finding (3)

Dependent Variable: InHH						
Long-Run Results						
Variables	Indonesia		Malaysia		Thailand	
InY	1.055**	25.94**	0.968**	2.29**	0.689**	1.91**
	(0.041)	(0.000)	(0.422)	(0.024)	(0.361)	(0.060)
InSS	0.017**	1.74**	0.004**	0.04**	-0.019**	-0.86**
	(0.01)	(0.086)	(0.085)	(0.967)	(0.023)	(0.394)
InOP	-0.264**	-2.79**	0.191**	0.43**	0.107**	0.72**
	(0.095)	(0.007)	(0.446)	(0.669)	(0.147)	(0.471)
Short-Run Results						
Constant	-0.143**	-1.30**	-0.037**	-0.12**	0.464**	1.21**
	(0.11)	(0.198)	(0.297)	(0.902)	(0.382)	(0.228)
InY	0.302**	2.93**	0.017**	0.13**	0.079**	0.980**
	(0.103)	(0.004)	(0.137)	(0.003)	(0.081)	(0.035)
InSS	0.0005**	0.32**	0.002**	0.27**	-0.002**	-2.63**
	(0.002)	(0.749)	(0.008)	(0.115)	(0.005)	(0.010)
InOP	0.024**	-0.23**	0.019**	0.65**	0.002**	0.15**
	(0.021)	(0.066)	(0.025)	(0.202)	(0.013)	(0.035)
R2	0.581		0.411		0.388	
Adj R2	0.511		0.312		0.285	
Root MSE (Sigma)	0.034		0.042		0.023	
F-Statistics (ARDL Bound Test)	4.418**		0.656**		3.148**	

Note: ** represents significance at the 5% levels

Table 3: Long- and short-run ARDL results for Indonesia, Malaysia and Thailand using variable *lnHH*

The result (4)

Dependent Variable: InY						
Long-Run Results						
Variables	Indonesia		Malaysia		Thailand	
InSS	-0.017**	-1.37**	-0.033**	-3.06**	-0.004**	-0.82**
	(0.012)	(0.174)	(0.011)	(0.003)	(0.005)	(0.416)
InHH	0.895**	16.21**	0.749**	20.21**	0.877**	13.99**
	(0.055)	(0.000)	(0.04)	(0.000)	(0.063)	(0.000)
InOP	0.273**	2.41**	0.141**	4.35**	0.064**	2.13**
	(0.113)	(0.018)	(0.032)	(0.000)	(0.029)	(0.036)
Short-Run Results						
Constant	0.257**	2.44**	0.866**	5.21**	0.984**	1.92**
	(0.105)	(0.017)	(0.166)	(0.000)	(0.511)	(0.058)
InSS	0.0003**	0.25**	0.004**	0.88**	0.007**	2.63**
	(0.002)	(0.04)	(0.005)	(0.013)	(0.006)	(0.01)
InHH	0.027**	0.33**	-0.09**	-3.51**	0.110**	0.66**
	(0.083)	(0.000)	(0.06)	(0.001)	(0.167)	(0.227)
InOP	-0.005**	-0.47**	0.014**	2.62**	0.004**	1.69**
	(0.021)	(0.642)	(0.016)	(0.01)	(0.018)	(0.95)
R2	0.581		0.636		0.524	
Adj R2	0.511		0.574		0.444	
Root MSE (Sigma)	0.034		0.027		0.031	
F-Statistics (ARDL Bound Test)	2.000**		6.940**		4.031**	

Note: ** represents significance at the 5% levels

Table 4: Long- and short-run ARDL results for Indonesia, Malaysia and Thailand using variable *InY*

The result (5)

Dependent Variable: InOP						
Long-Run Results						
Variables	Indonesia		Malaysia		Thailand	
InSS	0.072**	1.78**	0.075**	0.61**	0.138**	3.97**
	(0.04)	(0.079)	(0.123)	(0.546)	(0.035)	(0.000)
InHH	1.836**	0.74**	-3.772**	-1.97**	-0.603**	-0.29**
	(2.497)	(0.464)	(1.911)	(0.05)	(2.075)	(0.772)
InY	-1.401**	-0.57**	5.007**	2.42**	2.649**	1.26**
	(2.443)	(0.568)	(2.069)	(0.018)	(2.111)	(0.213)
Short-Run Results						
Constant	-0.753**	-1.32**	-2.318**	-1.84**	-8.332**	-2.94**
	(0.569)	(0.189)	(1.259)	(0.069)	(2.838)	(0.004)
InSS	0.0027**	0.32**	0.048**	1.46**	0.017**	0.42**
	(0.0087)	(0.441)	(0.033)	(0.149)	(0.040)	(0.220)
InHH	0.464**	0.96**	1.419**	0.39**	2.044**	2.29**
	(0.433)	(0.187)	(0.517)	(0.007)	(0.893)	(0.024)
InY	0.058**	0.09**	1.465**	2.36**	1.156**	1.98**
	(0.617)	(0.925)	(0.620)	(0.020)	(0.585)	(0.051)
R2	0.312		0.283		0.332	
Adj R2	0.196		0.162		0.220	
Root MSE (Sigma)	0.177		0.180		0.174	
F-Statistics (ARDL Bound Test)	1.989**		1.993**		3.050**	

Note: ** represents significance at the 5% levels

Table 5: Long- and short-run ARDL results for Indonesia, Malaysia and Thailand using variable *lnOP*

Discussion

- The government's decision to abolish fuel subsidies can alter people's living standards in both the short and long run.
- Household consumption (HH), GDP (Y), and oil price (OP) are significant for Indonesia, Malaysia, and Thailand.
- The study further evidence that the reform can affect vulnerable groups.
- Oil prices can have severely damaging effects on the government subsidy policy decision-making.

Conclusions

Energy subsidization policy reform can affect all levels of economic performance in ASEAN countries.

Importantly, oil price is one of the key factors by governments in determining the abolishing of fuel subsidy policies.