AN EMPIRICAL ANAYSIS OF CAMBODIA'S IMPORT DEMAND FUNCTION

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Abstract

This empirical study examines an import demand function for Cambodia by employing time series data during 1993-2015. This study uses Autoregressive Distributed Lag (ARDL) model to investigate the impact of relative prices, foreign direct investment, final consumption expenditure, export volume, exchange rate and foreign exchange reserve on import demand in Cambodia for both long run and short run. The study finds that relative prices and exchange rate are negative effect on import demand in Cambodia for both long and short run, while export volume is positively effect on import demand. While, foreign direct investment, final consumption expenditure, and foreign exchange reserve are insignificant impact on import demand in Cambodia. The finding suggests that the Cambodian government should monitor domestic price.

Keywords: ARDL Model, Cambodia, Import Demand, Time Series.

Introduction

Cambodia's economy has been growing constantly more than 20 years after the fall of the Khmer Rouge regime. The Cambodia's economy is growing at the average of 7 percent over two decades (1993-2015) (The World Bank, 2016). According to the World Bank reported that Cambodia became the lower-middle-income country in 2015 with real gross national income per capita of approximately $US 1, 070 and 15.5 million population. The strong economic growth of Cambodia is mainly driven by three major sectors such as garment and textile, construction, and services sector including international trade.

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Since Cambodia became a member of the World Trade Organization in October 2004, Cambodia's exports has been sturdily increasing. The increasing in Cambodia's export stimulates the economic growth. As evidence in figure 1, the Cambodia's export has been increasing gradually about 15 percent of GDP in 1993 up to more than 60 percent of GDP in 2015. However, the shared of exports in GDP hit by the global financial crisis in 2009. The Cambodia's main exports were apparels (knit and non-knit), footwear, cereals, motor vehicles parts, furs and skins, rubber, leather products, textile, electrical machinery (GlobalEDGE, 2016). The Cambodia exports products to its majoring partners such as the United States, the United Kingdom, Japan, China, Thailand and Europe (Germany, Canada, France, Belgium, and Spain) (GlobalEDGE, 2016).

On the other hand, a small country like Cambodia is a shortage skilled labour and technology which cause to low productivity. In order to fulfil the domestic demand, Cambodia imports knitted fabrics, motor vehicles and parts, manmade staple fibres, industrial machinery, precious stones and metals, electrical machinery, cotton, plastics, paper, tobacco and other services (GlobalEDGE, 2016). Likewise, the imports share in GDP has been increasing from more than 30 percent up to over than 60 percent (figure 1). Most of the developing countries look for the right position in the global trade, in which they can understand their current trade position. For the country like Cambodia also needs to make every effort to develop its own trade position in the global market. The Cambodia's import importantly performs a role of the Cambodia's economic development, it therefore is vital to study on the import demand function for Cambodia.

Figure 1: The Cambodia's Export and Import as a Percentage of the GDP
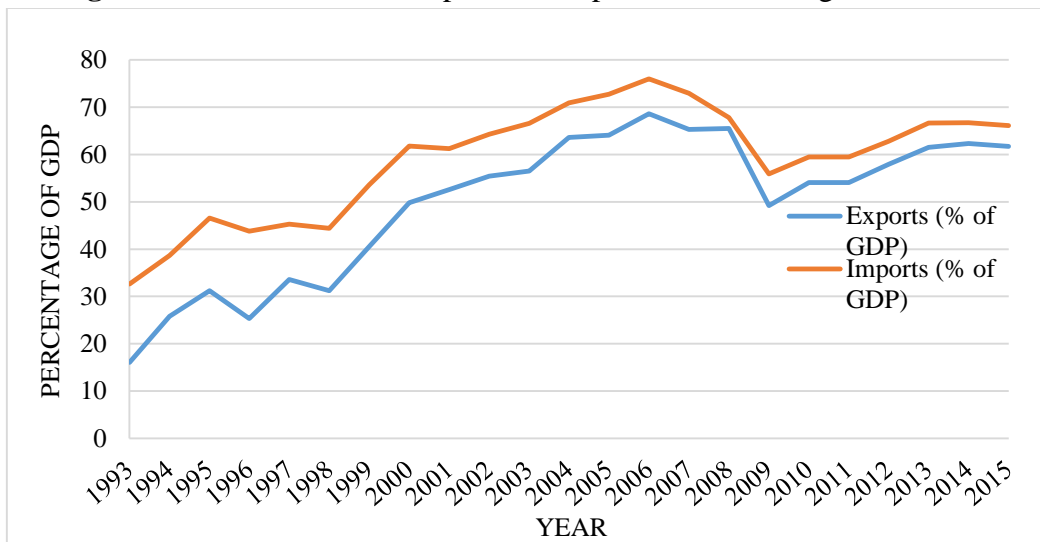
Source: World Development Indicators, World Bank

This present study aims to analyse the factors affecting the Cambodia's import by structuring its import demand function during the period of 1993 to 2015.More importantly, this paper seeks to observe in-debt long- and short-run effects on the determinant variables on the Cambodia's import demand function.

1. Literature Review

The studies on import demand function for both developed and developing countries have been done by numerous authors. There are immense economic and non-economic factors used to explain the import demand function. In this paper, we review the latest studies in an attempt to select the appropriate variables employed in the study of import demand function for Cambodia.

Aziz (2013) studied on the aggregate import demand function for developing countries, the case of Bangladesh. He employed several co-integration estimation techniques and the error correction mechanism. The finding illustrates that real income, relative price of imports, foreign exchange reserves, and export demand are statistically significant in both the short run and long run.

Alias, Tang, and Othman (2001) estimated the long-run relationship between aggregate imports and expenditure component of 5-ASEAN (Malaysia, Indonesia, The Philippines, Thailand, and Singapore). He employed the Johansen multivariate co-integration analysis. The study used the yearly data from 1968 to 1998 for four ASEAN countries, except for Singapore (1974-1998). The study introduced some significant variable, such as imports, final consumption expenditure, investment expenditure, exports, relative price, and the capacity of country to produce and supply of the goods. The finding shows that import demand is co-integrated with its determinants in the ASEAN countries.

Muhammad and Zafar (2016) used Autoregressive Distributed Lag model to estimate the long run and short run of import demand function of Pakistan during 1973-2013. He introduced important variables, such as final consumption expenditure, investment expenditure, government consumption expenditure, exports, foreign direct investment, exchange rate, and import. The result shows that the import has both long- and short-run relationship with the relevant independent variables.

The import demand function of Guyana during the period of 1960 to 2002 was estimated by using single equations and Vector Autoregression (VAR), it aims to illustrate the long-run and short-run relationship between import demand and independent variables such as gross domestic income, exports as capacity to import, real exchange rate, foreign exchange reserves, official development assistance and share-of aid in gross capital formation (Butts and Mitchell, 2012). The result supports that foreign exchange supply channel variables are important determinants on import demand function of Guyana.

Narayan and Narayan (2005) analysed the Fiji's import demand behaviour by using disaggregated import demand function during the period of 1970 to 2000. He introduced relevant variables using Fiji's import demand function such as relative prices, total consumption, and investment expenditure and export expenditure. He estimates the import demand function of Fiji by using the Autoregressive Distributed Lag (ARDL) model. The findings illustrate that there is a long-run relationship between import demand and independent variables.

From the above literature reviews illustrate the various import demand functions due to individuals' characteristics of each country, including various econometric approaches to estimate the import demand function. In this study we adopt and choose the relevant variables accordance to the characteristics of economic view and trade of Cambodia as well as using the ARDL technique to estimate the long- and short-run relationship between the Cambodia's import demand and exogenous variables.

2. Methodology

Model Specification

The traditional import demand function was implemented from the imperfect substitution theory. It illustrates that the importing country's income, own price of imported good and price of the imperfect substitute goods (Mervar, 1994). The methodical form of aggregate import demand function is illustrated below:

$$MD_t = f(Y_t, P_t^d, P_t^m) \tag{1}$$

Where, import demand is MD_t; Y_t refers to domestic income which has positive impact on import demand ; P_t^d represents price of domestic goods and services or cross prices, has a positive relationship with import demand, while P_t^m (prices of imports or own prices) has a negative relationship with import demand.

Abbott and Seddighi (1996) identified three main determinants that define a demand for imports of a country such as the level of final expenditure, the relative price of imports, and the capacity to produce and supply the goods of a country. The import demand function in Abbott and Seddighi (1996) is illustrated as following:

$$IMPD = f(FCE, INVT, EXP, (P_M/P_D)) \tag{2}$$

Where, IMPD is the volume of imports which is determined by exogenous variables, final consumption expenditure (FCE), investment expenditure of goods (INVT), expenditure on exports (EXP), and relative price of imports (P_M/P_D).

In this current study, we construct the Cambodia's import demand function by adding some other major factors into equation (2). Hence, the import demand function for Cambodia can be written in the logarithm form as follow:

$$Ln\ IMPD_t = f(Ln\ RP_t, Ln\ FDI_t, Ln\ FCE_t, Ln\ EXP_t, Ln\ ER_t, Ln\ FER_t) \tag{3}$$

Or, we set up the long-run aggregate import demand function of Cambodia in log-linear regression form as following:

$$\ln IMPD_t = \delta_0 + \delta_1 \ln RP_t + \delta_2 \ln FDI_t + \delta_3 \ln FCE_t + \delta_4 \ln EXP_t + \delta_5 \ln ER_t$$

$$+\delta_6 \ln FER_t + \varepsilon_t \tag{4}$$

Where,

$\ln IMPD_t$ = logarithm of import volume during time t, where t is the period of 1993–

2015,

$\ln FDI_t$ = logarithm of foreign direct investment during time t,

$\ln FCE_t$ = logarithm of final consumption expenditure during time t,

$\ln EXP_t$ = logarithm of exports of goods and services during time t,

$\ln RP_t$ = logarithm of relative price which is the ratio of import price index and domestic price

index (CPI) during time t,

$\ln ER_t$ = logarithm of exchange rate during time t,

$\ln FER_t$ = logarithm of foreign exchange reserve during time t,

δ_0 = the intercept,

$\delta_1, \dots, \delta_6)$ = long-run coefficient,

ε_t = the error term.

3. Data Description

The data of dependent (IMPD) and independent variables (FCE, FDI, EXP, ER, RP and FER) over the period of 1993 to 2015 in this study are obtained from the World Development Index report in 2015. Relative price is measured by the import price index divided by domestic price proxy by consumer price index.

4. Econometric Analysis

The aim of this study is to observe the long run and short run effects of determinant factors on the Cambodia's import demand function. There are numerous empirical studies on the relationship between import demand and its major determinants, as reported in the papers of (Muhammad and Zafar, 2016), (Aziz, 2013), (Ziramba and Bbuku, 2013), (Yue, 2010), and (Abbott and Seddighi, 1996).

This study applies the ARDL bounds testing approach to co-integration proposed by Pesaran et al. (2001) due to its fruitful outperformance over other time series models. This approach works well with a small sample size without concerning whether all variables are stationary at level I(0) or I(1), or mixed integration (Pesaran, 1996 & 1997).

Several steps are needed to perform in this analysis. Firstly, we use the Augmented Dickey-Fuller test to ensure none of the variables are not integrated order at I(2) level. Secondly, when there is an evidence of inexistence of unit root for all variables at level I(2), then the ARDL bounds testing

approach employs to examine the presence of long-run relationships between explained and explanatory variables, by using the following equation:

$$\Delta \ln IMPD_{i,t} = c_0 + \sum_{i=1}^{K} \theta_1 \Delta \ln IMPD_{t-i} + \sum_{i=1}^{K} \theta_2 \Delta \ln RP_{t-i} + \sum_{i=1}^{K} \theta_3 \Delta \ln FDI_{t-i} + \sum_{i=1}^{K} \theta_4 \Delta \ln FCE_{t-i}$$
$$+ \sum_{i=1}^{K} \theta_5 \Delta \ln EXP_{t-i} + \sum_{i=1}^{K} \theta_6 \Delta \ln ER_{t-i} + \sum_{i=1}^{K} \theta_7 \Delta \ln FER_{t-i} + \gamma_1 \ln IMPD_{t-1}$$
$$+ \gamma_2 \ln RP_{t-1} + \gamma_3 \ln FDI_{t-1} + \gamma_4 \ln FCE_{t-1} + \gamma_5 \ln EXP_{t-1} + \gamma_6 \ln ER_{t-1}$$
$$+ \gamma_7 \ln FER_{t-1} + \mu_t \qquad (5)$$

Where Δ the different operator; c_0 denotes intercept; k is the maximum lag length; i is number of lags; $\theta_i(i, k = 1, \dots, 7)$ denotes the short-run coefficient of the variables; $\gamma_i(i = 1, \dots, 7)$ demonstrate the long-run coefficient of the variables; and μ_t indicates the white noise error term. We set up the hypothesis for testing long-run existence among variables as following:

$$H_0: \gamma_i = 0, \text{No long-run relationship}$$

$$H_1: \gamma_i \neq 0, \text{Long-run relationship}$$

The computed value of F statistics is used to compare to the critical bounds value in order to draw conclusion whether to reject or not reject null hypotheses of no long-run relationship existence among the variables. Three possible conclusions from the comparison are: (1) if F-statistic value is higher than the upper-bound critical value, the null hypothesis of no long-run relationship existence would be rejected. This means the variables have a long-run relationship among others, (2) if the F-statistics value is smaller than the lower-bound critical value, the variables do not have a long-run relationship existences, (3) if the F-statistic value falls between the lower- and upper-bound critical values, and this cannot draw a conclusion about their relationships.

Third, after there is an evidence of long-run relationship between import volume and its determinant factors, we further use Error Correction Model (ECM) to examine the short-run dynamic coefficients and measure the coefficient of ECM_{t-1}, which associates with the short-run estimation. The coefficient of ECM_{t-1} presents the adjustment speed from the short-run towards the long-run equilibrium among variables (Bekhet and Al-Smadi, 2015), and (Pesaran et al., 2001). Therefore, the model to estimate the short-run relationship for Cambodia's import demand can be written as following equation (6):

$$\Delta \ln \text{IMPD}_{i,t} = \alpha_0 + \sum_{i=0}^{n} \alpha_{1i}\Delta \ln \text{RP}_{t-i} + \sum_{i=0}^{n} \alpha_{2i}\Delta \ln \text{FDI}_{t-i} + \sum_{i=1}^{n} \alpha_{3i}\Delta \ln \text{FCE}_{t-i}$$

$$+ \sum_{i=0}^{n} \alpha_{4i}\Delta \ln \text{EXP}_{t-i} + \sum_{i=0}^{n} \alpha_{5i}\Delta \ln \text{ER}_{t-i} + \sum_{i=0}^{n} \alpha_{6i}\Delta \ln \text{FER}_{t-i}$$

$$+ \lambda \text{ECM}_{t-1} \tag{6}$$

Where, α_0 shows the intercept; $\alpha_{ji}(j, i = 1, \dots, 6)$ denotes the short-run coefficients; λ presents coefficient of the lagged error correction term (ECM_{t-1}). The coefficient of ECM_{t-1} must be statistically negative significance (Pesaran et al., 2001).

Finally, several diagnostic tests are used to ensure that all the models are reliable and well-perform. The serial correlation (Godfrey, 1978), normal distribution (Jarque and Bera, 1980), heteroscedasticity (White, 1980), and the cumulative sum of recursive residuals (CUSUM) to assess the stability of the model (Brown et al., 1975) will be utilized in this analysis.

5. Results and Discussion

5.1 Unit Root Test Results

The results of unit root test (table1) confirm that there are none analyzed variables stationary at the second different level. The test reveals that import (IMPD), relative price (RP), foreign direct investment (FDI), and final consumption expenditure (FCE) are stationary at the first different level, while export (EXP), exchange rate (ER), and foreign exchange reserve (FER) are stationary at level and 1st different level.

Table1: Results of Unit Root Test Using ADF Augmented Dickey-Fuller Test

Variables	Level			1st different			Conclusion
	None	Intercept	Intercept & trend	None	Intercept	Intercept & trend	
LnIMPD	6.10	-1.38	-3.19	-0.14	-4.80***	-4.75***	I(1)
LnRP	-0.84	-039	-2.87	-5.77***	-6.19***	-6.16***	I(1)
LnFDI	1.62	-1.13	-2.02	-3.74***	-4.03***	-3.92**	I(1)
LnFCE	9.60	-0.14	-2.12	-0.80	-5.73***	-5.59***	I(1)
LnEXP	4.52	-3.54**	-0.91	-0.68	-6.13***	-5.16***	I(0), I(1)
LnER	1.08	-16.41***	-12.85***	-2.71***	-2.96*	-3.40*	I(0), I(1)
LnFER	3.46	-4.22***	-2.12	-2.57**	-10.94***	-9.90***	I(0), I(1)

Note: (***), (**), (*) represents 1%, 5% and 10% level of significant level.

5.2 The Results of Testing the Existence of Long-Run Relationship

The bounds test results (Table 2) confirm that F-statistic value is greater than the upper-bound critical value at significance level 1 percent, 5 percent and 10 percent. This implies that explained and explanatory variables have long-run existence relationship at 1%, 5% and 10% significance level.

Table2: Testing for the Existence of a Long-Run Relationship, Using Bounds Test

F Statistic	Critical Value Bunds					
	1% Significance		5% significance		10% significance	
K (6)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
4.876828	3.15	4.43	2.45	3.61	2.12	3.23

Source: *Calculation by the author, using EViews.9*

5.3 Long-Run and Short-Run Results

The selected ARDL model (1,1,0,0,0, 1, 1) reveals the results of the long-and short-run coefficients for the Cambodia's import demand function, as reported in the table 3. The results from the model show the expected sign for all the independent variables. Relative price and exchange rate are statistically negative effect on import demand in Cambodia at 5 percent significance level for the long run and 1 percent significance level for the short run. This implies that relative price increased by 1 percent leads to decrease the import demand by 0.25 percent. The value of the Cambodian currency increases by 1 percent, this will decrease import volume by 0.27 percent. This indicates that the weak Cambodian currency negatively impact on the import demand for Cambodia. Export is statistically positive effect on the import demand in Cambodia at 1 percent significance level, for both long and short run. However, the study also indicates that import demand function is not determined by final consumption expenditure, foreign direct investment, and foreign exchange reserve, which are insignificant.

In addition, the sign of ECM (-1) is correct with negative and strongly significant at 1 percent level. The value of ECM_{t-1} coefficients for the model is -0.88, implying that the model are corrected from the short-run towards the long-run equilibrium by 88 percent.

The several diagnostic tests are used to confirm that there are not spurious outcome created by the model. Diagnostic tests such as serial correlation LM test, heteroscedasticity test, normal distribution test, and the stability test are used to ensure the reliability of the model. The tests indicate that there are no serial correlation, no heterscedasticity, and normal distribution. The stability test also clearly demonstrates the model is stable as presented at figure2.

Table 3: Results of Long-Run and Short-Run Coefficients for Cambodia's Import Demand Function, With Selected ARDL Model (1, 1, 0,0,0,1, 1), Dependent Variable LnIMPD

Independent Variables	Coefficient	Std.Error	t-Statistic	Prob.
Constant	2.795000	2.768371	1.009619	0.3344
$\ln RP_t$	-0.251847**	0.116280	-2.165875	0.0532
$\ln FDI_t$	-0.005582	0.013946	-0.400298	0.6966
$\ln FCE_t$	0.213206	0.185016	1.152370	0.2736
$\ln EXP_t$	0.809238***	0.092099	8.786638	0.0000
$\ln ER_t$	-0.274484**	0.090636	-3.028430	0.0115
$\ln FER_t$	-0.040964	0.055558	-0.737326	0.4764
$D(\ln RP)_t$	-0.359923***	0.103132	-3.489912	0.0051
$D(\ln FDI)_t$	-0.004901	0.012315	-0.397947	0.6983
$D(\ln FCE)_t$	0.18765	0.165062	1.133909	0.2809
$D(\ln EXP)_t$	0.710398***	0.080597	8.814187	0.0000
$D(\ln ER)_t$	-0.435951***	0.111073	-3.924917	0.0024
$D(\ln FER)_t$	-0.057564	0.058521	-0.983644	0.3464
CointEq (-1)	-0.877860***	0.060312	-14.555252	0.0000
Diagnostics Test Series				
Serial Correlation LM test	0.637904			0.4245
Heteroskedasticity Test-Breusch-Pagan-Godfrey	9.393268			0.4952
Normality test-Jarque-Bera test	1.591892			0.451154

Note: *(***), (**), (*) represents 1%, 5% and 10% level of significance level.*

Source: Calculation by the author, using EViews.9.

Figure 2: Plot of CUSUM for LnIMPD
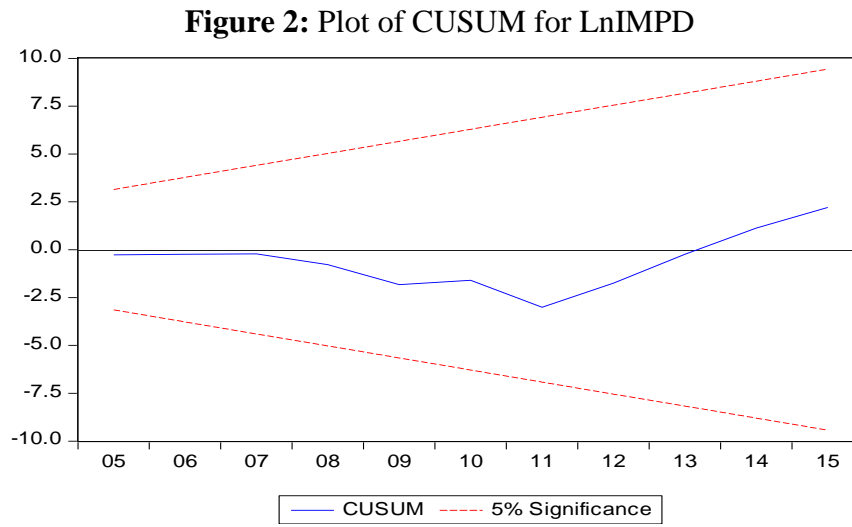
Conclusion

This paper explores the long-and short-run relationship between import demand function of Cambodia and its explanatory variables (relative prices, exchange rate, foreign direct investment, final consumption expenditure and foreign exchange reserve). This current study is employed an advance time series econometric modelling, ARDL bound testing approach to analyse the time series data during the period of 23 years (1993-2015).

The study finds that relative prices and exchange rate are statistically negative significant effect on the import demand in Cambodia for both long and short run. The outcomes indicate that higher price in Cambodia discourages investors to import products and services to the country. The export volume is positive impact on the import demand function in the long and short run. However, final consumption expenditure, foreign direct investment and foreign exchange reserve are insignificant effect on the import demand in Cambodia.

This current finding suggests that the government should monitor domestic price. However, the study has a limitation of capturing dynamic import demand behaviour in Cambodia due to the limited data length. More macroeconomic quantitative variables such as national income, real gross domestic products, and investment expenditures, and as well as qualitative data should be further investigated for the future study.

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