ANALYSIS OF FACTORS AFFECTING
THE EXPORT PERFORMANCE IN CAMBODIA:
THE ARDL BOUNDS TESTING APPROACH

Monineath EL

Faculty of Economics, Chiang Mai University, Thailand

Corresponding author:
monineath.el@gmail.com

Abstract

This empirical study examines the factors affecting export performance in Cambodia through the period of 1993-2015. This study employed Autoregressive Distributed Lag (ARDL) model to investigate the long and short-run relationship among export and its determinant factors-inflation, real exchange rate, official development assistance, and trade liberalization. The study finds that INF obtains negative relationship with EX in both short and long run meanwhile TL has positive relationship with EX. But, RER has negative impact on the export performance in the short run only; ODA poses the significant positive relationship in the long run, vice versa. Unexpected positive relationship between crisis and export would be explain by insignificant impact of 1997 ASEAN financial crisis and the remaining growth of export during 2008 world economic crisis. The significant and negative coefficient of ECM_{t-1} indicates the relative speed of adjustment to achieve the long run equilibrium. This study suggests that government should prioritize to maintain inflation rate and real exchange rate, which negatively associate the export performance and export competitiveness of the country, at an optimum level. This study provides concrete evidence for policymakers in conducting the feasible policies to enhance and facilitate the trade liberalization in Cambodia

Keywords: Export, Inflation, Real Exchange Rate, Trade Liberalization, Official Development Assistance, ARDL model, Cambodia

Introduction

The success from East Asian miracle of the outward looking strategies in the forms of export-oriented paradigm has been spread across the South East Asian nations including Cambodia. In the post-1991 Paris Peace agreement, Cambodia shifted from the planed market system to a free-market economy which adopted export-oriented strategy without getting through the stage of import-substitution industrialization (Natsuda et al., 2010). From national peace, stability and free-market economy catalyzed economic and industrial development in Cambodia; then, export sectors started to grow dramatically. Given the pre-existing abundance of low cost production in the form of low labor cost; the beauty of Normalized Trade Relationship (NTR) in exporting garment and textile products to US market; the quota-free and duty-free under the Everything But Arms-General System of Preferences (GSP) provided by European Union in 2001, the Cambodian export has been become the major driver of economics growth which approximately 70% of the exports is dominated by the garment and textile products (Natsuda et al., 2010).

Upon the Cambodian economics' structure shown in the table 1, export share to GDP has been increased in the post-1997 ASEAN financial crisis from average 29.44% to 50.99%. Also, it kept continuously on this upward trend till 65.43% before it faced the decline during 2008 World Financial Crisis and onward. Notably, reliance on imported products and raw materials for the domestic production and consumption, the large trade deficit appeared to shape negative share of net export of GDP in the last couple decades (see table 1). The gap exists between export and import also can be explained the sluggish growth of export since Cambodia heavily relies on garment and textile commodities in her exports.

Even so, the deficit in balance of payment owed to the deficit in trade is offset by the donor assistance and loans resulted into the rise of the external debt. As shown in table 1, the net official development assistance per capita is gradually increasing in each phase of the years. The loans and grants in foreign currencies pressure on the Cambodian exchange rate system which in turn would Khmer Riels appreciation against the dollars denied export capacity. In spite of the trade deficit, the real GDP growth rate of Cambodian economy still keeps on the positive growth by maintaining at average over 6% in the post-2008 financial crisis.

Table 1: Economic Indicators in Cambodia, 1994-2015

Indicators	1994-1998	1999-2003	2004-2008	2009-2015
Export, percent of GDP	29.44	50.99	65.43	57.27
Import, percent of GDP	43.75	61.50	72.08	62.47
Net Export, percent of GDP	-14.31	-10.51	-6.65	-5.20
Real GDP growth rate	6.32	8.78	10.25	6.00
Inflation rate	7.84	1.41	9.82	2.82
Net ODA, per Capita	35.63	33.59	43.76	52.76
Population growth	3.03	2.05	1.54	1.59
Real exchange rate	4475.93	5257.22	5038.66	3930.74

Source: Author's calculation using data from World Bank Development Indicators (2016) & CEIC Database

However, export-led growth paradigm does not always make a win-win outcome all the time. Export-oriented countries which heavily depend on the market of developed countries -called "fallacy of composition" would make them become more vulnerable from unpredictable global economic shocks. Exactly, Cambodia which highly depends on EU and USA market for her export market would be not an exceptional.

Given conditions of the trade deficit, rising of debt, fluctuation of exchange rate, and high dependency on foreign market, it is still questionable whether above mentioned factors really affect the export performance of Cambodia or not. Hence, the purpose of this research paper is to investigate the factors affecting the export performance in Cambodia through the short-run and long run analysis using an advanced time series econometric analytical approach

1. Literature Review

The study of factors affecting the export performance has outweighed much attention from economic policymakers, researchers, think-tanks and academia proved by a number of existing literatures using immense economic and non-economic factors in explaining factors affecting the export performance. Through this review, author attempts to select the appropriate variables employed in the study of factor affecting export performance in Cambodia.

Ali (2017) assessed the determining factors affecting the Sudan's trade balance over the period of 1970-2014 through the ARDL approach to co-integration and error correction error model (ECM). The author used cost of finance, exchange rate, credit to the private sector, real GDP per capita, domestic investment and inflation rate to assess Sudan's trade balance.

Though there are no significant relationship among the explanatory variables and trade balance in the short run analysis, the long run analysis revealed that real GDP per capita, inflation, exchange rate obtained negative effect on the trade balance, except the wrong sign of exchange rate owing to the devaluation/deprecation of Sudan currency.

Bhavan (2016) examined the determinants of export performance in the case of Sri Lanka over the period of 1980 to 2013 by using the gross capita formation, interest payment on foreign debt, import, foreign direct investment, per-capita income. Employing Johansen co-integration test to measure the long run relationship and Vector Error Correction Method (VECM), the results depicted that FDI, interest payment on foreign debt and import significantly impact on export in the long run; meanwhile, the negative impacts from the gross capital formation and per capita income of the export destination countries was existed. Also, there are existences in the short run of significant effect of foreign direct investment and per capita income of export destination countries.

Narayan and Narayan (2004) investigated the determinants of demand for Fiji's export by employing the ARDL bound test approach and error correction model through the period from 1970 to 1999; authors used export price, trading partners' income, and competitor price as variables to be assessed. The results shown the existence of long run relationship between Fiji's export and its determinants; remarkably; the competitor price obtained most influence on the export followed by trading partner income, and export price. Meanwhile the short-run relationship analysis revealed that competitor price and trading partner income have significantly positive relationship, except negative relationship with export price.

Kakar et, al. (2010) used ARDL co-integration approach to measure the short and long-run relation between the Pakistan's trade balance and its determinants—income, money supply and real exchange rate—over the period of 1970 till 2005. The results illustrated that income (GDP), real exchange rate, and money supply are statistically significant in both short and long run.

Duasa (2007) conducted a study to examine the short and long run relationships between the Malaysian trade balance and its determinants—real exchange rate, money supply, and income using an Autoregressive Distributed Lag (ARDL) bound testing approach. The results revealed that the long run relationship existed between trade balance (X/M) with income (GDP) and money supply (M2), except real exchange rate. Meanwhile, most variables are statistically insignificant in the short run analysis with the high rate of convergence to the equilibrium (57%), except the significant negative relationship with GDP.

Funke and Ruhwedel (2001) studied on the export variety and export performance from the 10 emerging East Asia economies through the dynamic panel model employed GMM estimator. The authors measured the relationship between Export variable with Real Effective Exchange Rate (REER), product variety (PV) and the world GDP (Y). The results pinpointed that the world economic activities (world GDP) has positive impacts on export; accordingly, the higher relation of EX and PV is resulted from real exchange rate depreciation which is consistent with the existing theoretical and empirical finding.

From the above literature reviews illustrate the different variables employed to determine export performance including various econometric approaches. In this study, author adopts and employs the relevant variables in accordance with the Cambodia's economic and export structures as well as using the ARDL bound testing approach to estimate the long and short run relationship between the Cambodia's export and exogenous variables.

2. Methodology

Model Specification

The major problem in the time series data is non-stationary variables which produce unreliable and inefficient results, particularly the existence of spurious regression. Even so, this research study tends to employ ARDL framework developed by Pesaran, Shin & Smith (2001) though this approach does not require as important as the stationary variables.

This ARDL model provides the number of advantages: firstly, the most appropriate for the small sample size; secondly, an order of integration of a series of the variables whether I(0), I(1) or mixed integration; thirdly, the free from residual correlation; fourthly, producing the speed of adjustment with the long run equilibrium without losing the long run formation; fifthly, capturing the co-integrating vector from the multiple co-integrating vectors (Uko, A. K. & Nkoro, E., 2016; Pesaran et al, 2001).

Given the limitation of data, only selected explanatory variables are used as factor affecting export performance in Cambodia. Henceforth, to investigate the long run and short run relationships among export performance and its determinant factors, the following EX-induced functional relationship is formulated:

$$EX_t = (INF_t, RER_t, ODA_t, TL_t, CS)$$

$$lnEX_t = \alpha_0 + \beta_1 lnINF_t + \beta_2 lnRER_t + \beta_3 lnODA_t + \beta_4 lnTL_t + \beta_5 CS + \varepsilon_t \qquad (1)$$

Where,

$lnEX_t$ = Logarithm of Cambodian Export at time t.

$lnINF_t$ = Logarithm of Inflation rare at time t

$lnRER_t$ = Logarithm of Real Exchange Rate, obtaining by multiplying the nominal exchange

rate by US CPI and dividing by domestic CPI at time t.

$lnODA_t$ = Logarithm of Official Development Assistance, percentage of GDP at time t

$lnTL_t$ = Logarithm of Trade Liberalization, measured as trade-to-GDP ratio at time t.

CS = Crisis including economic crisis of 1997 ASEAN financial crisis, 2008 World

Economic Crisis for which CS=1 for the period of 1997 and 2009, and the rest of the

year are CS =0.

$\beta_1 to \beta_5$ = the parameters of independent variables.

α_0 = the intercept term

ε_t = error terms,

From equation 1, the log-linear functional form is employed to reduce the possibility or severity of heterogeneity and directly obtained export elasticity with respect to regressors.

3. Data Description

This research study is conducted through the annual time series data during the period 1993-2015 for all variable in study (INF, RER, ODA, TL, and EX) variables taken from the World Development Index of World Bank and CEIC database.

4. Econometric Analysis

This research study employs the ARDL bound testing approach to co-integration developed by Pesaran, Shin & Smith (2001) to investigate the short run and long run relationship between Cambodia's export and its determinants.

To conform the non-existence of variables' stationary at I (2) before proceeding to ARDL Bound testing, Augmented Dickey and Fuller (ADF) test is employed. Basically, ARDL approach to cointegration includes the estimation of conditional error correction of the ARDL model for export performance and its determinants:

$$
\begin{aligned}
\Delta lnEX_t = \alpha_0 &+ \sum_{i=0}^{l} \beta_1 \Delta lnEX_{t-i} + \sum_{i=0}^{l} \beta_2 \Delta lnINF_{t-i} + \sum_{i=0}^{l} \beta_3 \Delta lnRER_{t-i} \\
&+ \sum_{i=0}^{l} \beta_4 \Delta lnODA_{t-i} + \sum_{i=0}^{l} \beta_5 \Delta lnTL_{t-i} + \sum_{i=0}^{l} \beta_6 \Delta CS_{t-i} + \delta_1 lnEX_{t-1} \\
&+ \delta_2 lnINF_{t-1} + \delta_3 lnRER_{t-1} + \delta_4 lnODA_{t-1} + \delta_5 lnTL_{t-1} + \delta_6 CS_{t-1} \\
&+ \varepsilon_t
\end{aligned} \tag{2}
$$

Where Δ denotes the different operators; α_0: presents drift constant; l is the optimal lag length; i is number of lags; the β_j (1,..6) with the summation signs corresponds to the short run dynamics of the variables; $\delta_1(1,\dots6)$: depicts the long run relationship of variables; ε_t is the Gaussian white noise.

To obtain the ARDL bounds testing approach, several steps and procedures are conducted. The F-test is used to test the existence of the long run relationship among the variable which the null hypothesis would be formed:

$$H_0: \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = 0 \text{ ; No co-integration}$$

$$H_A: \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq \delta_6 \neq 0 \text{ ; Co-integration}$$

To decide which variables, have co-integration or no co-integration or inclusive, F-statistic value is used to compare with the critical value in the lower bound and upper bound (Pesaran et al, 1999). The null hypothesis of no co-integration would be rejected, which indicates the existence of long run relationship among the variables, unless the estimated F-statistics are greater than upper bound value (Uko, A. K. & Nkoro, E., 2016). Conversely, if the F-statistic value is lower than critical bound value, the null hypothesis of no co-integration could not be

rejected. Even so, there is a case that the selected variables do not share the long run relationship if the F-statistic value falls with the upper and lower bound critical value which creates the inclusive to either accepted or rejected the null hypothesis.

If there is the evidence of existence of long run relationship (co-integration) of the variables, the following long run model (equation 3) is estimated:

$$lnEX_t = \alpha_0 + \sum_{i=0}^{l} \delta_1 lnEX_{t-i} + \sum_{i=0}^{l} \delta_2 lnINF_{t-i} + \sum_{i=0}^{l} \delta_3 lnRER_{t-i} + \sum_{i=0}^{l} \delta_4 lnODA_{t-i}$$

$$+ \sum_{i=0}^{l} \delta_5 lnTL_{t-i} + \sum_{i=0}^{l} \delta_6 CS_{t-i} \tag{3}$$

Lastly, if there is existence of long-run relationship, the Error Correction Model is employed to obtain the short-run dynamic coefficient, which ECM (t-1) indicates the correction mechanism in stabilizing the disequilibrium in the model, called speed of adjustment or feedback effect (Uko, A. K. & Nkoro, E., 2016). Hence, the ARDL specification of short run dynamics can be derived:

$$\Delta lnEX_t = \alpha_0 + \sum_{i=0}^{l} \beta_1 \Delta lnEX_{t-1} + \sum_{i=0}^{l} \beta_2 \Delta lnINF_{t-1} + \sum_{i=0}^{l} \beta_3 \Delta lnRER_{t-1}$$

$$+ \sum_{i=0}^{l} \beta_4 \Delta lnODA_{t-1} + \sum_{i=0}^{l} \beta_5 \Delta lnTL_{t-1} + \sum_{i=0}^{l} \beta_6 \Delta CS_{t-1} + \gamma ECM_{t-1}$$

$$+ \varepsilon_t \tag{4}$$

To ascertain the goodness of fit of the ARDL model, a number of diagnostic tests including serial correlation test (Godfrey, 1978), normal distribution (Jarque & Bera, 1980), heteroscedasticity (White, 1980); ARCH (Engle, 1982) are employed and the cumulative sum of recursive residuals (CUSUM) is used to determine the stability of the model.

5. Result and Discussion

5.1 Unit Root Test Results

Upon the unit root test results from ADF test, all variables are free from the non-stationary at level I (2) which conforms with the ARDL model specification. The test results from the

table 2 pinpoint that EX, RER, ODA, TL are integrated order at I (1) whereas there is only INF that is integrated order at both I(0) and I(1).

Table 2: Result of unit root test using ADF (Augmented Dickey-Fuller) test

Variables	Level		1st Difference		Conclusion
	Constant	Constant and Trend	Constant	Constant and Trend	
lnEX	-2.6461	-3.2614	-3.8085*	-4.4983*	I(1)
lnINF	-3.7880*	-3.6449**	-3.8085*	-4.4983*	I(0), I(1)
lnRER	-2.6461	-3.2614	-3.0206**	-3.6584**	I(1)
lnODA	-2.6665	-3.2977	-3.8867*	-4.6162*	I(1)
lnTL	-2.6461	-3.2614	-3.8085*	-3.6584**	I(I)

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

5.2 The Result of Long Run Relationship`

Table 3 shows that there are the presences of the long-run relationship among EX and its determinants (INF, ODA, RER, TL). All model series have the long run-relationship among the variables at 1% significance level which are determined by the computed F-statistic values.

Table 3: Co-integration test result (bounds test)

Model series	F-statistic	Significance Level	Bound critical values		Decisions
			I(0)	I(1)	
$DlnEX_t$	9.019691	1%	3.41	4.68	Co-integrated
$DlnINF_t$	12.88273	1%	3.41	4.68	Co-integrated
$DlnODA_t$	7.381911	1%	3.41	4.68	Co-integrated
$DlnRER_t$	12.98563	1%	3.41	4.68	Co-integrated
$DlnTL_t$	9.293609	1%	3.41	4.68	Co-integrated

5.3 Long Run Relationship Analyses

In the table 4, the results are generated from ARDL model (1, 1, 1, 1, 1) estimated the long-run coefficients of the variable in the study. The estimated results reveal that the INF and ODA have statistically negative significant long-run relationship with the export which

implies that the rise of INF and ODA hampers the improvement of Cambodian export performance from the status quo of the trade deficit. Aligning with previous findings, the official and foreign aid in creating dependency, fostering corruption, encouraging currency overvaluation harm the export performance of the country (Moyo, 2010; Elbadawi, 1999; younger, 1992; White & Wignaraja, 1992; and Van Wijnbergen, 1986). Meanwhile, inflation causes export to more expensive reduced the competitiveness of an exporting economy as foreign consumers would substitute in favor of alternative lower-price products (Epaphra, 2016). However, unexpected results of positive relationship between crises with export performance of Cambodia would be explained that insignificant impact of 1997 ASEAN financial crisis on Cambodia since the economic ties between Cambodia with Thailand, Malaysia and Indonesia was relatively small. Also, even the most country experience negative impact of 2008 world financial crisis, Cambodian economy and export growth still obtained the positive growth as government stimulated both fiscal and monetary policy to subsidy and maintain its economic stabilization (Jalilian, et al, G.,2009). Remarkably, Trade liberalization also obtains the positive long-run relationship with export which it is also consistent with the existing literatures embarked liberalization in improving the countries' export performance (Ahmed, 2000; Thomas et al, 1999; Joshi & Little, 1996; Helleniner, 1994; and Weiss, 1992). Therefore, unexpected positive and statistically insignificant long-run relationship of RER exists. This finding is contrast to most economic literatures which confirmed the significant relationship between the RER and EX. However, this result conforms to Rodrik (2009)'s study which indicated the insignificant effect of real exchange rate on exports. Also, other studies of Eichengreen and Gupta (2015), Haddad and Pancaro (2010), and Eichengreen (2008) confirmed that exchange rate depreciation causes export and economic growth only in the short term, not the long term.

Table 4: Long-run coefficient using ARDL model (1, 1, 1, 1, 1)

Dependent Variable: Export (EX)	Coefficients	SE	t-statistic	Prob.
$lnINF_t$	-0.585	0.221	-2.641	0.027**
$lnODA_t$	-0.792	0.338	-2.341	0.044**
$lnRER_t$	0.001	0.001	1.026	0.332
$lnTL_t$	0.513	0.034	15.152	0.000*
CS	13.085	4.831	2.708	0.024**
C	-2.941	2.653	-1.109	0.296

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

5.4 Short Run Relationship Analyses

The results of the short-run relationship estimated by ARDL model depicts that there are the significant negative relationship of D (ln INF) and D (ln RER) with D (ln EX). The negative relationship between RER and EX indicates the real exchange rate reduced the export performance of a country. It is on the par with the existing literatures that exchange rate has negative impact on the export of a country which already proved by the study of Doroodian (1999), Arize (2000), Sauer & Bohara (2001); and Doganlar (2002). The results still confirm that there is positive and statistically significant relationship in the short run among D (ln TL) and dummy variable of Crisis with EX. Therefore, the insignificant relationship between ODA and EX could be explained the effectiveness of official development assistant which is subjective to several factors might not be effective in the short run. As World Bank (2005) specified the factors such as investment and improvement in the trade facilitating infrastructure—roads and ports—have influences or offset on the relationship among these two variables. Also, others studies investigate the role of geographical characteristic of economy (Collier, 2008) and degree to vulnerability to external shocks—price shocks or extreme events (Collier & Dehn, 2001; Guillaumont & Chauvet 2001;2002) has been supported that the effectiveness of ODA on export performance depends on other factors. In addition, the 10% significant level and negative sign coefficient of ECM (t-1) for the selected models indicates the relative speed of adjustment exist to bring the long run equilibrium in the selected model which confirms that the model is corrected from the short run toward the long run equilibrium at adjustment rate of 92%.

Table 5: Short-run coefficient using ARDL model (1, 1, 1, 1, 1)

Dependent Variable: Export (EX)	Coefficients	SE	t-statistic	Prob.
$DlnINF_t$	-0.121	0.051	-2.380	0.055**
$DlnODA_t$	-0.061	0.188	-0.322	0.758
$DlnRER_t$	-0.002	0.001	-1.976	0.096***
$DlnTL_t$	0.527	0.027	19.796	0.000*
CS	3.925	0.767	5.120	0.002*
C	0.230	0.218	1.055	0.332
ECM_{t-1}	-0.928	0.411	-2.261	0.065***

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

5.5 Diagnostics Test Result

To ensure the non-existing of spurious regression and results, a number of several diagnostic tests are conducted to the ARDL projections. The results from the table 6 reveal the accepted null hypothesis of no serial correlation, no heteroscedasticity and normal distribution. Additionally, the stability test from figure 1 also confirms that model is stable. Henceforth, it could be confirmed from the test that the selected model of ARDL bound testing approach is reliable to determine the Cambodian export performance.

Table 6: Diagnostic tests for selected ARDL model (1, 1, 1, 1, 1)

Test series	Coefficient	Prob.
Serial Correlation LM test	3.2156	0.07
Normality Test (Jarque-Bera test)	0.8014	0.66
White Heteroskedasticity	10.6884	0.46
ARCH (Autoregressive Conditional Heteroskedasticity)	2.4145	0.12

Source: Author's calculation using Eviews 9

Figure 1: Plot of CUSUM for ARDL Model (1, 1, 1, 1, 1)
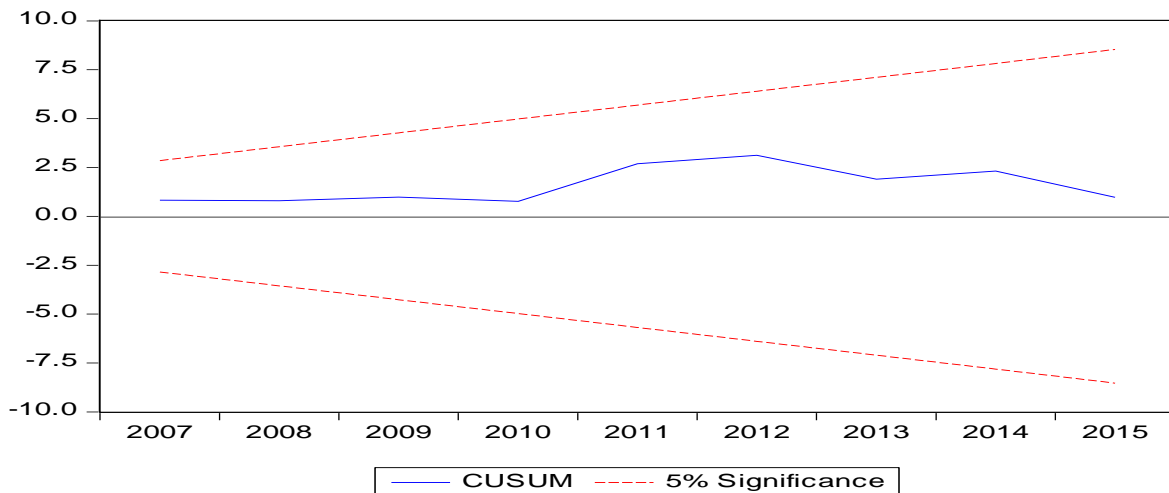
Conclusion

The empirical study investigates the factors affecting the Cambodian export performance in the short run and long run relationship through the period of 1993-2015 by employing ARDL bound testing approach.

The results reveal that there are the presences of the long run relationship among EX and its determinant factors (INF, ODA, RER, and TL) across all the models. The significant negative relationship between EX and INF in both short and long run implies that an increase in the relative price of commodities in the form of the inflation pressures the export to be underperformance. Though the current inflation rate of Cambodia is still manageable, it is higher than its peers which would erodes its competitiveness in the post-ASEAN integration. Meanwhile TL which obtains positive relationship with EX empirically supports the liberal neo-classical notions on the positive impact of free-trade on the country's export performance proved by the increase share of export to Cambodia's GDP. Even so, it is questionable the negative impact on the current trade deficit performance of Cambodia. Meanwhile the RER does the negative impact on the export performance in the short run only; conversely, ODA obtains the significant positive relationship in the long run, not the short run. More importantly, the significant and negative coefficient of ECM_{t-1} indicates the relative speed of adjustment to achieve the long run equilibrium.

The results from this study suggests that Royal Government of Cambodia and policymakers prioritize to maintain inflation rate and real exchange rate, which negative associate the export performance and competitiveness of the country, at an optimum level. As a dollarized economy, the improvement of role of monetary policy shall be considered to keep them manageable and stabilize the export performance in Cambodia. Moreover, since Cambodia already graduated from the Least Developing Country, the government shall be proactive in response to the upcoming decrease of ODA to the country. This study also provides concrete evidence for policymakers in enhancing the trade liberalization by conducting the feasible policies and action plans in facilitating the liberalization process—improving physical infrastructures, regulations, and tax rate and services. Most importantly, this study contributes to literature review in the case of Cambodia.

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