Research Paper

Determinants of Inflation In Cambodia

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Abstract

This research examines the determinants of inflation in Cambodia from December 2004 to December 2016 on monthly basis. Headline inflation and food inflation in Indonesia, Thailand, and Vietnam are considered as the important variables to determine inflation in Cambodia since Cambodia imported a lot of food from these countries. Other examined drivers of inflation are narrow money, nominal effective exchange rate, output gap and fiscal revenue and expenditure. Ordinary Least Square (OLS) is used to see the relationship of dependent variables and independent variables. Vector Error Correction Model (VECM) is employed to capture the long-run and short-run relationship of inflation. The result from OLS and VECM suggested that food inflation and headline inflation of trading partners have positive impact on food inflation and headline inflation in Cambodia in the long-run. Narrow money interacting with dummy variable, government revenue to GDP, and nominal effective exchange rate also fuel inflation in the long-run based on VECM. In the short-run, the speed of adjustment of food inflation and headline inflation is very fast and has similar coefficient. It implies that the convergence of the explanatory variables in food and headline inflation can adjust quickly to long-run equilibrium.

Keywords: Inflation, unit root test, Vector Error Correction Model (VECM)

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I.   Introduction

Cambodia experienced very high inflation during global financial crisis which severely slowed down economic growth but managed to stabilize inflation in the last 5 years. Economic theories indicate many factors that influence inflation, yet it is complicated to figure out and distinguish the causes of inflation in reality. Therefore, it is crucial to study in depth and breathe about the determinants of inflation so that an effective policy can be designed to curb with inflation. According to Ginting and Bird 2009, inflation in Cambodia is affected by the food inflation and headline inflation of trading partners (Thailand and Vietnam). So far, only this paper is written about inflation in Cambodia, so I adopt similar model and expand the scope of this study further. The detail of the model and methodology will be discussed in section IV.

The objectives of my study are to investigate the relationship between inflation and the explanatory variables, capture short-run and long-run effects of inflation in Cambodia, and draw policy implications.

To investigate the determinants of inflation in Cambodia, demand side, fiscal side, and monetary factor will be considered. Demand side focuses on domestic food consumption because food weight in the CPI basket is accounted for 45% and Cambodia tends to rely on food imports from neighboring countries. In this regard, food inflation and headline inflation of trading partners (Indonesia, Thailand, and Vietnam) coupled with nominal effective exchange rate (NEER) in Cambodia are the independent variables. Fiscal side includes government revenue and government spending to GDP. Monetary factor refers to narrow money (M1) and output gap is used as the dummy variable to capture the sate of economic overheating. Ordinary Least Square (OLS) and Vector Error Correction Model (VECM) are employed to get the result.

Based on the findings, food inflation and headline inflation of trading partners have influence on food inflation and headline inflation in Cambodia in the long-run, evidenced from both OLS and VECM. This proves the dependence of Cambodia's food imports from trading partners. The rise in M1 interacting with dummy variable, NEER, and government revenue to GDP also puts inflationary pressure in the long-run as captured by VECM. In the short-run, the speed of adjustment of food inflation and headline inflation equation (in section V) is fast and both coefficients are almost equal which imply that they will converge to the long-run quickly.

This paper is structured to different sections—section II: overview of monetary policy in Cambodia, section III: literature review, section IV: data and methodology, section V: findings, and section VI: conclusion and future work.

II.   Overview of Monetary Policy in Cambodia

Managing inflation is a challenging task for monetary authority in Cambodia due to high degree of dollarization. Reserve requirement and exchange rate intervention are the only tools to influence money supply in the market. Open market operation (OMO) is under developed and inter-bank market is not so active. Thus, understanding recent development of monetary policy will shed some light on how the central bank manages to stabilize inflation.

So far, Negotiable Certificate of Deposits (NCDs) was launched by the National Bank of Cambodia (NBC) to enhance inter-bank market, expand monetary policy tool, encourage financial intermediation, and meet the needs of the market. This financial instrument allows banks to invest their excess liquidity in this instrument with interest bearing and it can be used as collateral for any facilities at NBC. This tool serves as the liquidity absorption both in Khmer Riel (KHR) and USD from banking system.

NBC develops liquidity providing collateralized operation (LPCO) to provide liquidity in KHR to qualified financial institutions with a specific interest rate based on auction activity and NCD is used as the collateral. By this means, financial institutions can provide more loans in local currency with reasonable lending rate.

Interest rate ceiling not exceeding 18% per annum for loan is required for microfinance depositing-taking institutions to comply because of complaints about charging too high lending rate arising from the public. New minimum registered capital requirement for financial institutions is also imposed and it will be effective from 2018. This regulation is seen as the response to rapid credit growth especially to cool down credit to real estate sector which is concerned with over supply.

III.   Literature Review

Inflation is not a new phenomenon in economy and there have been many theories regarding inflation since 1700 until the present. The famous economists in terms of classical theory—the balance of power in economic circles include Adam Smith, David Ricardo, Jean-Baptiste Say, and Irving Fisher. However, classical theory doesn't work during the great depression. Thus, there exist Keynesian theory, which is about employment, interest rate, and money; those economists include John Maynard Keynes, Roy Forbes Harrod, and Sir John Richard Hicks. Again, these theories cannot tackle economic problem when stagflation arose. Thus, monetarist theory is created and closely linked with classical theory; this theory is concerned with inflation expectation, and Phillip Curve. This theory is from Friedrich August Hayek and Milton Freidman.

1. Theoretical Study

Quantity of money stated that the change of general prices is caused by the change in quantity of money. This claim is represented in Fisher equation: MV=PY. If velocity (V) and output(Y) are constant, the increase of money (M) will cause the increase of prices (P). Demand pull theory is concerned with aggregate demand as the determinant of inflation. Aggregate demand includes consumption, investment and government expenditure. If aggregate demand is higher than aggregate supply, it generates output gap which fuels inflationary pressure. Cost push theory occurs when labor union puts pressure on employers to increase wage. Consequently, labor becomes more expensive, so does the cost of production.

Price of products increase in response to higher wage; it results in inflation. New neoclassical synthesis (NNS) is about the IS and LM model introduced by of neoclassical synthesis which allows Keynesian and real business cycle to work under this mechanism. IS is about

investment or saving, and LM defines as the demand and supply of money. The new IS-LM refers to decision making of households and firms and their future expectation. IS refers to expected output growth to real interest rate and LM is related to aggregate supply and Phillip curve which is concerned with inflation expectation in the future and output gap. The new political macroeconomics of inflation does not only concern about economic issues, it's also about non-economic factors including independence of central bank, political process, and culture in the process of inflation (Totonchi, 2011).

2. Empirical Study

Khan & Schimmelpfenning (2006) study inflation in Pakistan by taking account of monetary theory and structuralist supply-side. The explanatory variables include money supply, credit to provide sector, exchange rate, and wheat support prices. Noticeably, wheat's weight in the CPI basket is 50% and wheat and wheat-related products account for 5.1%. This study employs ADL (Autoregressive Distributed Lag) and VECM (Vector Error Correction Model). The result reveals that wheat support price has short-run effect on inflation and it has medium term effect if monetary policy is used to accommodate, so wheat support price does not explain headline inflation much. Interestingly, monetary facts contribute to inflationary pressure with 1year lag.

Research conducted by Sahaduhhen (2012) is about the determinants of inflation in India by using OLS and later VECM to capture short-run and long-run relationship of variables. Independent variables consist of wholesale price index, GDP, broad money, prime lending rate, and bilateral exchange rate. The result suggests that GDP and broad money have positive impact on inflation in long run; however, prime lending and exchange rate have negative impact.

Another study about inflation dynamic in India by Kumar (2013) is conducted but different variables are used; it comprises of consumer price index (CPI), index of industrial production (IIP), broad money (M3), and import indices (IMP). VECM is employed for this research. Based on the result, money supply is the most important factor explaining inflation and import index also contributes to inflation to some extent. However, IIP negatively contributes to inflation. With regard to cointegration relationship, inflation is largely stable with CPI and import index, yet it is not stable with money supply and IIP.

Kandil &Morsy (2009) also study inflation in GCC country (oil-rich Gulf Cooperation Council), which includes Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. The long-run explanatory variables consist of domestic price level, weighted average of price in major trading partners, NEER, broad money, and government expenditure. International food price and output gap are added for short-run relationship. VECM is employed in this research. The result reveals that inflation in major trading partners is the dominant factor explaining inflation, and government expenditure contributes to higher inflation in the short-run. To some extent, supply-side bottlenecks put less pressure on inflation although government spending increases.

There is one study on explaining inflation in Cambodia by Ginting and Bird (2009). This study analyzes price development of neighboring countries (Thailand and Vietnam) in terms of food and headline inflation, which tries to convince that inflation in Cambodia is influenced by these two important trading partners. It also examines the short-run and long-

run relationship of explanatory variables on inflation by employing VECM. Factors that considers in explaining inflation in Cambodia include international and food inflation (Thailand and Vietnam), nominal effective exchange rate (NEER), narrow money (M1), and output gap which is used as dummy variable. Be noticed that, there are two equations in the long-run relationship—headline inflation, and food inflation. The result indicates that food inflation and headline inflation in Cambodia is influenced by food inflation and headline inflation of trading partners in the short-run and long-run. Money growth also fuels inflation when the economy is overheating.

IV. Data and Methodology

1. Data

Time series data from December 2004 to December 2016 is used for this study. All data is converted into logarithm term and find month on month growth rate except government revenue to GDP and government expenditure to GDP since they are already expressed in percentage. Data has been collected from various sources and basically divided into two parts—Cambodia data and international data. Cambodia data including headline inflation, food inflation, core inflation, nominal effective exchange rate (NEER), government revenue, government expenditure, narrow money (M1), and real GDP are collected from the National Bank of Cambodia. While international headline inflation and international food inflation are collected from IMF, Bureau of Trade and economic indices (Thailand), GSO (General Statistic Office Vietnam), Indonesia Statistics, and World Integrated Trade Solution.

Table 1: Data		
Variable	**Description**	**Data sources**
$\pi_t^{Headline(Cam)}$	Cambodia Headline inflation	National Bank of Cambodia
$\pi_t^{Food(Cam)}$	Cambodia Food inflation	
$\pi_t^{Int'infl}$ and $\pi_t^{Int'food}$	International inflation and international food inflation	IMF, Bureau of Trade and economic indices (Thailand), GSO (General Statistic Office Vietnam), Indonesia Statistics, World Integrated Trade Solution
M1	Narrow Money	National Bank of Cambodia
NEER	Nominal Effective Exchange Rate	
Dummy	Output gap	
Gvt Rev and Gvt Exp to GDP	Government Expenditure and Revenue to GDP	

While collecting data, I encounter some problems. One of which is Indonesia statistic. Within the same government website, food index has different figures in economic indicator report and consumer price index report in 2008. I observed that there are two spikes in food inflation (MOM) -32.39 % and -34.6 in June 2008 January 2014 respectively, so I put the estimate of food inflation in Indonesia to avoid huge fluctuation.

2. Calculation of select variables

There involve some calculations to get output gap, international inflation, and international food inflation. First, output gap is derived from real GDP minus potential GDP; HP filter is applied to get trend which is the potential GDP. Output gap is used as dummy variable. Dummy equals 1 when real GDP is greater than the potential GDP; otherwise dummy equal zero.

To obtain international food inflation, food index of Indonesia, Thailand, and Vietnam are collected. Value of food imports is gathered and calculated the share of import of each country by normalizing into 1. The share of food imports is used as the food weight for each country. Next, multiply food weight with CPI of each country to get the new index then sum up the index of these three countries to get the combined index, so finally international food inflation is calculated. In the same vein, to get international inflation, consumer price index (CPI) is collected from these counties. Next, find the average of the CPI of the 3 countries then international inflation can be calculated.

Be noticed that the food weight can be calculated by collecting the value of Cambodia food imports of top ten commodity from Indonesia, Thailand, and Vietnam then calculate the commodity weight of each country by normalizing into 1. Nonetheless, it is very time consuming to construct data this way and data on monthly basis is not available.

3. Methodology

Ginting &Bird (2009) uses error correction model (ECM) to capture the short-run and long-run relationship. The explanatory variables include international inflation and international food inflation (Thailand and Vietnam), NEER, narrow money, and output gap as the dummy variable, but NEER is dropped from all equations since it is not significant. However, this study does not include the fiscal side in the analysis. Therefore, fiscal side will be included to make my study more comprehensive. Given that Cambodia's value of food imports from Indonesia is the highest from 2004 to 2015 (world integrated trade solution, 2017), Indonesia is also included in the trading partners. Ginting &Bird use monthly data from December 2003 to July 2008 and all variables are year on year (YOY) percentage change.

In my study, I use time series data --month on month percentage change (MOM) from December 2004 to December 2016. First, I use OLS to get long-run relationship and it consists of two equations—food inflation and headline inflation. Next, to obtain dynamic relationship of inflation and explanatory variables in each equation, Vector Error Correction Model (VECM) has been employed. The result is generated from E-view program.

Basic form of OLS regression:

$$\pi_t^{Cambodia} = (\pi_t^{Int'\,infl}, NEER_t, M1_t, GVT_t, D_t)$$

$\pi_t^{Cambodia}$: Month on month change of headline inflation Cambodia

$\pi_t^{Int'\,infl}$: Month on month change of international inflation (including Indonesia, Thailand and Vietnam)

$NEER_t$: Nominal effective exchange of local currency (Khmer Riel) against
trading partners (Indonesia, Thailand and Vietnam)

GVT_t: government revenue to GDP and government expenditure to GDP (%)

D_t : Dummy variable; output gap equal 1 when actual GDP greater than potential
GDP and it equals zero, otherwise

Sign Expectation:
I expect that all coefficients in the explanatory variables have positive sign.
- If international inflation increases, headline inflation in Cambodia will increase
- The rise in international food inflation suggests the increase in food inflation in
Cambodia
- If NEER surges, it means local currency is depreciated and fuels domestic
inflation
- The rapid growth of M1 will have positive impact on inflation especially during
economic overheating
- Government revenue rises, it means domestic price is getting higher
- The increase of government spending should put inflationary pressure as well

Vector Error Correction Model (VECMC) Representation

Long-run dynamic:

$$\pi_t^h = \alpha_0 + \alpha_1 \pi_t^f + \alpha_2 (Gvt\ rev/GDP)_t + \alpha_3 (Gvt\ expen/GDP)_t + \alpha_4 \Delta M1_t * D_t + \alpha_5 \Delta NEER_t + \mu_t$$

Short-run dynamic**:**

$$\Delta\pi_t^h = \sum_{i=1}^{k} a_1 \Delta \pi_{t-i}^h + \sum_{i=1}^{k} a_2 \Delta \pi_{t-i}^f + \sum_{i=1}^{k} \mathbf{a_3}(\Delta\Delta\mathbf{M1_{t-i}}) * D_{t-i}$$

$$+ \sum_{i=1}^{k} a_4 \Delta(Gvt\ rev/GDP)_{t-i} + \sum_{i=1}^{k} a_5 \Delta(Gvt\ expen/GDP)_{t-i} + \sum_{i=1}^{k} a_6 \Delta\Delta NEER_{t-i}$$

$$+ a_7 (ECM_{t-1}) + \mu_t$$

π_t^h represents two types of inflation –headline inflation and food inflation in Cambodia; π_t^f
represents international headline inflation and international food inflation. K is the number of
lags. The main purpose of separating equations into two is to observe if food inflation and
headline inflation in Cambodia behave the same way because headline inflation includes all
items. Both equations have the same explanatory variables—government revenue to GDP,
government expenditure to GDP, M1 multiply dummy, and NEER. But the difference is that
in food inflation equation, international food inflation is included in the explanatory variable
while in headline inflation equation, international headline inflation is included.

V.   Findings

1.   Preliminary test

First and foremost step, seasonal adjustment X12 is applied to all data to clean up non-linearities particularly outliers and irregular components Findley D. et al, (1998). All data is checked if it's stationary by using unit root test so called Augmented Dickey Fuller (ADF) tests. If it is not stationary, cyclical component is controlled and check unit root test again. The result suggested that all variables except government revenue to GDP are stationary at level. Using the same test but for trend and intercept, government revenue to GDP is still not stationary. So, Phillips-Perron test for trend and intercept is applied and it becomes stationary.

Now, all data is stationary, so OLS will be employed to generate long-run relationship. VECM will be employed to obtain dynamic relationship of inflation and explanatory variables in each equation and lag length selection will be checked and chosen based on Akaike information criterion (AIC).

2.   Estimation Result

a.   Ordinary Least Square Method (OLS):

❖ **Equation 1**

$$\pi_t^{Food(Cam)} = 0.003 + 0.11\pi_t^{Int'food} - 0.0016(Gvt\ exp/GDP)_t$$
$$\quad\quad [2.46]\quad [2.54]\quad\quad\quad\quad [-1.66]\quad\quad\quad\quad\quad \text{t-statistic}$$
$$+\ 0.0009(Gvt\ rev/GDP)_t + 0.12\Delta M1_t * D_t + 0.09\ \Delta NEER_t\ (1)$$
$$\quad\quad [0.90]\quad\quad\quad\quad\quad\quad [2.06]\quad\quad [0.78]\quad\quad\quad \text{t-statistic}$$

$$R^2\text{: } 0.10$$

❖ **Equation 2**

$$\pi_t^{Headline(Cam)} = -0.0004 + 1.0015\pi_t^{Int'infl} - 0.0006(Gvt\ exp/GDP)_t$$
$$\quad\quad\quad [-0.41]\quad\quad [5.95]\quad\quad\quad\quad [-1.03]$$

$$+\ 0.0009(Gvt\ rev/GDP)_t + 0.08\Delta M1_t * D_t + 0.012\Delta NEER_t\ (2)$$
$$\quad\quad [1.36]\quad\quad\quad\quad\quad\quad [2.07]\quad\quad\quad\quad [0.17]$$

$$R^2\text{: } 0.25$$

The result of equation 1 suggested that international food inflation and narrow money interacting with dummy have positive coefficients and significant at 5% level. If international food inflation increases by 1%, food inflation in Cambodia will increase by 0.11%. When actual GDP is greater than potential GDP, 1% increases of narrow money will increase food inflation in Cambodia by 0.12%. Government revenue and expenditure to GDP and nominal effective exchange rate are not statistically significant.

With reference to the equation 2, it is shown that international inflation and narrow money with dummy have positive coefficients and statistically significant at 5% level. This implies that if international inflation increases by 1%, the headline inflation in Cambodia will increase by 1%. When economy is overheating (dummy equal 1), the increase of narrow money by 1% will cause inflation to increase by 0.08%. In contrast, nominal effective exchange rate (NEER), government revenue and expenditure to GDP are not statistically significant.

b. Vector Error Correction Model (VECM)

Long-run dynamic:

❖ **Equation 3**

$$\pi_t^{Food(Cam)} = 0.003 + 0.50\pi_t^{Int'food} - 0.006(Gvt\ exp/GDP)_t + 0.006\ (Gvt\ rev/GDP)_t$$
$$[7.19] \qquad\qquad [-4.64] \qquad\qquad [4.87]$$

$$+0.10\Delta M1_t * D_t + 1.27\ \Delta NEER_t$$
$$[1.24] \qquad\qquad [6.38]$$

❖ **Equation 4**

$$\pi_t^{Headline(Cam)} = 0.0007 + 1.12\pi_t^{Int'infl} - 0.0037(Gvt\ exp/GDP)_t$$
$$[4.53] \qquad\qquad [-3.24]$$

$$+0.004\ (Gvt\ rev/GDP)_t + 0.19\Delta M1_t * D_t + 1.00\Delta NEER_t$$
$$[4.42] \qquad\qquad [2.91] \qquad\qquad [6.04]$$

The long-run dynamic in equation 3 suggested that international food inflation, government revenue to GDP, government expenditure to GDP, and nominal effective exchange have positive impact on food inflation in Cambodia, but government expenditure to GDP does not behave in the same way. If international food inflation rises by 1%, food inflation in Cambodia will increase by 0.5%. According to ministry of economic and finance (MEF) report on macroeconomic monitor mid-year assessments 2016, Cambodia fails to maintain production of vegetables and aquaculture which results in importing from other countries to meet domestic demand. Thus, this finding is supported the claim of MEF. If the NEER increases by 1%, food inflation in Cambodia will increase by 1.27% which is not a surprise. When excess demand occurs, M1 will fuel inflation by 0.1% if M1 surges by 1%. Government revenue to GDP is also significant at 5% level, but it only boosts inflation by 0.006% if it increases by 1%. At the end of 2013, the government has strengthen tax collection by improving tax administration, raising awareness and providing incentives to tax payers, so tax revenue is increased and this reflects that people cannot escape from paying tax so it stirs up domestic price. However, this effect is still small compared to the coefficient of other variables. Besides, the government expenditure has negative coefficient which is opposite from the economic theory, yet this sign is reasonable based on the same report from MEF. Generally, the government expenditure to GDP increases in a slower pace from 2014-2016. Government wage expenditure to GDP increased from 5.8% to 7.4% in 2014 and 2016 respectively because of the government announcement regarding the increase of the civil

servant wage and this is one part of public administrative reform. At the same time, government capital expenditure to GDP decreased from 8.8% to 7.8 % in 2014 and 2015 respectively to accommodate rise in wage. The implementation so called Full Program Budgeting also one reason that delays the procedure of expenditure approval.

In equation 4, all variables have positive impact on inflation expect government expenditure to GDP. If international inflation surges by 1%, headline inflation in Cambodia will increase by 1.12%. This coefficient is bigger than the coefficient in international food inflation and it is logical since headline inflation covers all items. The remaining variables interpret the same way as mentioned in the equation 3.

Compared with the study by Ginting and Bird (2009), the coefficient of international food inflation is greater than my study by 0.5% while the coefficient of international inflation is very similar. Most notably, my study indicates that NEER influences headline and food inflation in Cambodia, yet it is contrasting with Ginting and Bird's findings.

Short-run dynamic:

❖ **Equation 5**

$$\Delta\pi_t^{Food(Cam)} = -0.03\Delta\pi_{t-1}^{Food(Cam)} + 0.19\Delta\pi_{t-2}^{Food(Cam)} + 0.14\Delta\pi_{t-3}^{Food(Cam)} - 0.31\Delta\pi_{t-1}^{Int'\ food}$$
$$\quad\quad [-0.32]\quad\quad [\ 2.01]\quad\quad\quad [\ 1.70]\quad\quad\quad [-5.18]$$
$$-0.16\Delta\pi_{t-2}^{Int'\ food} - 0.06\pi_{t-3}^{Int'\ food} - 0.01(\Delta\Delta M1_{t-1})*D_{t-1} - 0.02(\Delta\Delta M1_{t-2})*D_{t-2}$$
$$\quad [-2.93]\quad\quad\quad [-1.45]\quad\quad\quad [-0.23]\quad\quad\quad [-0.33]$$

$$-0.005(\Delta\Delta M1_{t-3})*D_{t-3} - 0.001\Delta(Gvt\ rev/GDP)_{t-1} - 0.001\Delta(Gvt\ rev/GDP)_{t-2}$$
$$\quad [-0.09]\quad\quad\quad\quad [-0.72]\quad\quad\quad\quad [-0.76]$$
$$-0.002\Delta(Gvt\ rev/GDP)_{t-3} + 0.002\Delta(Gvt\ expen/GDP)_{t-1} + 0.002\Delta(Gvt\ expen/GDP)_{t-2}$$
$$\quad [-1.40]\quad\quad\quad\quad [\ 2.55]\quad\quad\quad\quad [\ 1.85]$$

$$+0.001\Delta(Gvt\ expen/GDP)_{t-3} - 0.64\Delta\Delta NEER_{t-1} - 0.41\Delta\Delta NEER_{t-2}$$
$$\quad [1.81]\quad\quad\quad\quad [-4.43]\quad\quad\quad\quad [-3.16]$$
$$-0.12\Delta\Delta NEER_{t-3} - 0.75(ECM_{t-1})$$
$$\quad [-1.24]\quad\quad\quad [-6.28]$$

❖ **Equation 6**

$$\Delta\pi_t^{Head(Cam)} = -0.15\Delta\pi_{t-1}^{Headline(Cam)} + 0.05\Delta\pi_{t-2}^{Headline(Cam)} - 0.24\Delta\pi_{t-1}^{Int'\ infl}$$
$$\quad\quad [-1.53]\quad\quad\quad [\ 0.61]\quad\quad\quad [-1.33]$$

$$+0.013\Delta\pi_{t-2}^{Int'\ infl} - 0.01\Delta\Delta M1_{t-i}*D_{t-1} - 0.21\Delta\Delta M1_{t-i}*D_{t-2} + 0.0006\Delta(Gvt\ rev/GDP)_{t-1}$$
$$\quad [\ 0.07]\quad\quad [-0.43]\quad\quad\quad [-0.72]\quad\quad\quad [\ 0.50]$$

$$+0.0004\Delta(Gvt\ rev/GDP)_{t-2} + 0.0008\Delta(Gvt\ expen/GDP)_{t-1}$$
$$\quad [\ 0.39\ ]\quad\quad\quad\quad [\ 1.28]$$

$$+0.0002\Delta(Gvt\ expen/GDP)_{t-2} - 0.23\Delta\Delta NEER_{t-1} - 0.12\Delta\Delta NEER_{t-2} - 0.43\ ECM_{t-1}$$
$$\quad [\ 0.39]\quad\quad\quad\quad [-2.63]\quad\quad\quad [-1.80]\quad\quad\quad [-4.57]$$

The speed of adjustment or error correction terms of food inflation and headline inflation are 0.41 and 0.43 respectively. Both coefficients are negative and significant so short-run relationship exists. This implies that the speed of adjustment is fast to converge in the long run. Although some coefficients in equation 5 and 6 are negative in short-run, the speed of adjustment is fast, so it will converge and have positive effect on headline inflation and food inflation in the long-run. It takes some months for some variables to have positive impacts on inflation. In equation 5, I test lag up to 4 ; some variables have positive coefficient and they are significant. From lag 6, most of variables have positive coefficient and significant especially narrow money. Likewise, lag up to 6 is tested in equation 6 and it is shown that most variables become significant and have positive coefficient. In light of robustness check, quarterly data is used to generate the result and different lags are also applied, but the result does not change much.

In contrast, the research conducted by Ginting and Bird indicated that the speed of adjustment of headline inflation and food inflation is 0.13 and 0.18 respectively, and the coefficient of international food is higher than international inflation (0.49 and 0.72). They conclude that speed of adjust of food inflation moving from trading partners changes quicker than headline inflation. In my research's finding, the speed of adjustment is bit bigger and the coefficient of international food inflation and international inflation are not positive in the short-run. The result of Ginting and Bird is somehow contrasting with my study.

VI.   Conclusion and Future work

Based on OLS and VECM analysis, food inflation and headline inflation of trading partners (Indonesia, Thailand, and Vietnam) have positive impact on food inflation and headline inflation in Cambodia. To be specific, result generated by OLS indicated that international food inflation and M1 during economic overheating boost food inflation in Cambodia. Similarly, international inflation and M1 interacting with dummy have influence on headline inflation in Cambodia. The coefficient of international headline inflation is greater than the food inflation and it is true since headline inflation includes all items and one of which is food item. To capture long-run and short-run dynamic of inflation, VECM is employed. The long-run relationship generated from VECM and OLS are somehow consistent. Long-run relationship suggested that headline inflation and food inflation in Cambodia are influenced by international inflation and international food inflation respectively plus other variables such as M1 interacting with output gap, nominal effective exchange rate, and government revenue to GDP. Again, the coefficient of international inflation is larger than the coefficient of international food inflation. In the short-run relationship, the speed of adjust of headline inflation and food inflation are 0.43 and 0.41 respectively, which suggests that they will converge to the long-run very quickly although some variables have negative coefficients. It takes some months to move toward long-run and have positive impact on inflation.

Although the explanatory variables in this paper can explain inflation in Cambodia to some extent, there remain other factors to be considered. First, extreme weather causes the rise of local food price which stimulates inflation in the country. For instance, in 2013 Cambodia experienced serious flood from Mekong river and too much rainfall but encountered drought in some provinces; as a result, the growth in agriculture dropped from 4.3% to 1.6% (National Institute of Statistics, 2016). In addition to extreme weather, the sudden plummet of global oil price at the end of 2014 lowers the inflation in Cambodia to1.22% in 2015.

Cambodia imports 100% of oil from other countries, so the change in oil price directly affect price in Cambodia. Lastly, rapid credit growth can contribute to inflation as well especially when most credit goes to non-productive sectors, particularly real estate.

Based on the findings, nominal effective exchange rate against trading partners is one of factors that influence headline and food inflation in Cambodia in the long-run. In this regard, exchange market intervention still serves as the effective tool to stabilize the exchange rate so as to minimize the effect on inflation. Evidently, the newly released NBC semester report 2017 revealed that NBC purchased US dollars 65 times ($479.4 million) then converted into local currency and injected in the circulation in order to stabilize the exchange rate.

Besides, fiscal management is crucial to ensure fiscal sustainability in the near future. Although the net effect between government revenue and government expenditure has almost zero coefficient in my finding, the increase of government expenditure on public wage will be the pressure for the government. Therefore, the government should accumulate more tax revenue by improving tax administrative and reforms.

In light of food imports, Cambodia limited the number of live pigs imports to 1,250 per day from Thailand and Vietnam temporarily and closely cooperated with private sector to combat pig smuggling near the border after the price of domestic-raised live pigs dropped sharply (Phnom Penh Post, 2017). In addition to the drop of domestic-raised pigs, some agricultural products for exports also face lower market price and government intervention is needed to save farmers. Nonetheless, government intervention will make the domestic food more expensive in the future, so it contributes to higher inflation.

Currently, rapid credit growth can put inflationary pressure too but it is expected to stay moderate in 2017 because NBC has implemented certain macroprudential measures – increasing liquidity coverage ratio in accordance with the guided timeline, rising registered minimum capital requirements, bank-specific prudential measures for institutions that take excessive risks, and liquidity-providing collateralized operation in order to provide low funding cost in local currency (IMF article IV visit, 2017).

The current fiscal policy and monetary policy are on the right track to maintain price stability and safeguard financial system, so stringent policy implementation is essential to achieve macroeconomic stability but the contingency plan must be in place to meet future distress.

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