THE IMPACT OF MONETARY POLICY ON ECONOMIC GROWTH IN CAMBODIA: BAYESIAN APPROACH

Monorith Sean

Chiang Mai University, Thailand

Abstract

This research paper aims to study the significance of monetary policy in the contribution to the economic growth of Cambodia. This study employs the data in the period of 2000-2018 consisting in total 19 years. Once the GDP of Cambodia is characterized as the limited dependent variable, the Tobit model is an appropriate model to be used. However, due to the limited data which only consists of 19 observations, this study uses Bayesian inference. The combination between Tobit model and Bayesian inference is known as Bayesian Tobit Model. The Bayesian Tobit Model with Markov chain Monte Carlo simulation uses Gibbs sampling to sample all conditional posterior distributions. The empirical results illustrate that money supply which represents the monetary policy tool is statistically indicated a positive correlation with GDP in Cambodia. Moreover, the inflation rate and exchange also revealed a positive relationship with GDP. The interest rate, on the other hand, is confirmed negatively insignificant with GDP which represents economic growth in Cambodia. Based on statistical results, the National Bank of Cambodia plays a vital role in authorizing the monetary policy in Cambodia.

Corresponding author:
monorithsean007@gmail.com

Introduction

Monetary policy plays an important role in promoting economic growth of a country. Monetary policy is implemented by each central bank of each nation. It generally comprises of three effective tools, namely reserve requirement ratio (RRR), discount rate and operation market. These three tools are implemented in order to control and manage the money supply in the economy so as to ensure the price stability by making the inflation rate and exchange rate stable.

In Cambodia, the National Bank of Cambodia (NBC) plays a significant role as the central bank to authorize the monetary policy to ensure Cambodian economic growth. There are three principal missions of NBC, namely financial stability, monetary stability and growth and development (Serey, 2017). NBC plays an important central agent to manage the financial sector in Cambodia such as microfinance commercial bank and other financial institutions to ensure the financial stability. Importantly, NBC effectively conducts monetary policy by managing the money supply in the context of a high dollarized economy.

Cambodia has remarkably achieved the growth of around 7% for the last two decades through conducting the monetary policy by NBC. Over the period 2000-2016, the money supply dramatically increased due to the potential performance of the Cambodian economy (NBC, Annual Report, 2016). Figure 1 illustrates the money supply (M2) by NBC during the period 2000-2018.

Money supply increased remarkably from 13% to 78.1% of GDP for the year of 2000 and July 2018, respectively. From this point of view, the money supply is taken to be the major duty of NBC in conducting monetary policy in Cambodia. Moreover, GDP increases dramatically from 3.65 to 24.4 billion USD as in 2000 and 2018, respectively. The significance of monetary measures is necessary to elaborate the function of monetary policy and the impact on economic growth in Cambodia. To behold whether the monetary policy would effectively contribute Cambodian economic growth, this paper aims to investigate the role of monetary policy in contributing to Cambodian economic growth. In other words, this research paper examines the influence of monetary policy through money supply in the economic growth of Cambodia. Moreover, this research also beholds the relationship of money supply on the other variables such as inflation, exchange rate and interest rate in Cambodia.

Figure 1: Money Supply and GDP in Cambodia
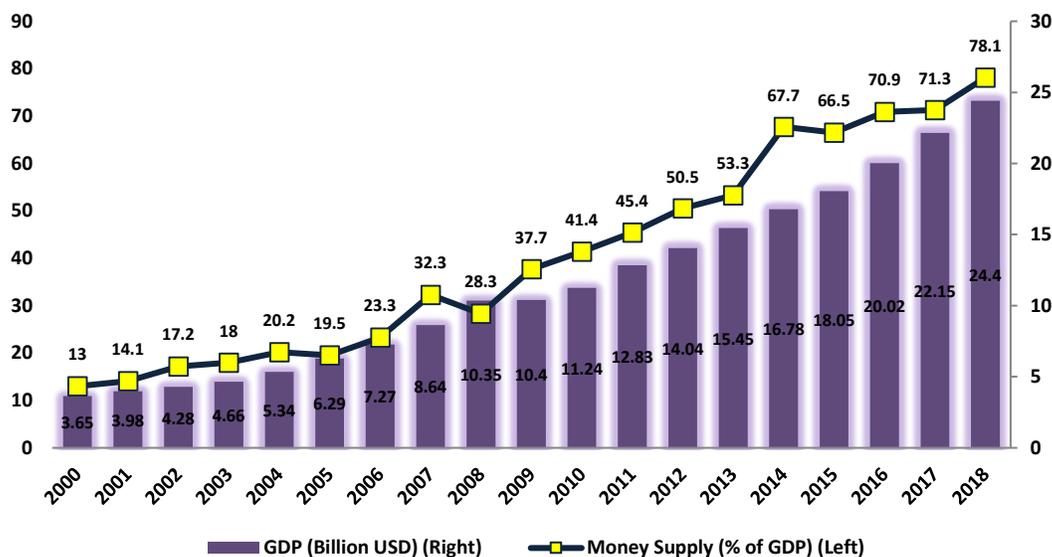
Source: National Bank of Cambodia
Note: 2018 is estimated year for GDP and as in July 2018 for money supply

1. Literature Review

Many empirical studies on this area have been conducted. (Rehman, & Ahmed, 2002) studied the impact of monetary policy on sustainable growth in the economy of Pakistan through the money multiplier approach. The empirical result revealed that monetary stock (M2), which is money supply, is an effective tool to influence and control the monetary assets in Pakistan. (Ferdiun, 2005), who studied the impact of monetary policy on economic instability in Turkey, confirmed that monetary policy effectiveness in Turkey's economic manages and controls over inflation and exchange rate stability. (Hameed, 2010) who also studies the impact of monetary policy on economic growth has indicated that money supply, inflation and interest rate played a major significant role on GDP growth in Pakistan. Moreover, (Dilshad, et al. 2016) also illustrated that money supply and exchange rate were positive significant factors that impacted on the economic growth in Pakistan while interest rate was found to be negatively insignificant. (Palesa, et al. 2014) revealed that money supply

indicates the monetary policy has a positive impact on economic growth. Exchange rate and inflation rate also indicate positive impact on economic growth in South Africa as well. (Agbonlahor, 2014) indicated that money supply positively influences GDP growth in United Kingdom. Moreover, the money supply also statistically impacts on inflation and exchange rate in United Kingdom. (Bentum-Ennin, 2014) who studied the international reserve accumulation and economic growth in Africa, indicated that there was a positive correlation of foreign reserve with GDP growth. Moreover, he also confirmed that the money supply also revealed to have a positive correlation with GDP growth in Africa for his research. (Amarasekara, 2007) who studied the impact of monetary policy on economic growth in Sri Lanka, indicates that the appreciation of the exchange rate displays a correlation with economic growth in Sri Lanka. (Moolio, et al. 2015) studied the impact of monetary policy on economic growth in Cambodia. He confirmed that money supply has little effect on economic growth since Cambodia is still in a dollarized economy. The interest rate is statistically found to be insignificant with economic growth in Cambodia.

2. Data Collection

This paper employs secondary data which consists of 19 years that is 2000-2018. All sources of data of each variable are mainly extracted from the Asian Development Bank indicator. Furthermore, it is also taken from the World Bank indicator as well as from the National Bank of Cambodia.

3. Research Methodology

Since the GDP of Cambodia is confirmed to be a limited dependent variable, where it takes only non-negative value, this study uses the Tobit model. However, due to the limited data which is only 19 observations, this paper introduces the Bayesian inference. Hence, the combination of Tobit model and Bayesian inference is called Bayesian Tobit Model. The Bayesian Tobit Model was proposed by (Chib, 1992). With this model, the posterior distribution will be computed through Gibbs sampling by sampling all conditional posterior distributions. Markov chain Monte Carlo (MCMC) simulation is used to approximate the posterior distribution. So, the Markov chain diagnostic test is an essential tool to ensure the stationary and convergence in the chain to reach the desired posterior distributions. Last but

not least, MCMC plot is also a significant feature that is illustrated in this study to statistically demonstrate the posterior distribution of each variable and variance.

As the objective of the study, the regression could be written as:

$$GDP_t = \beta_0 + \beta_1 MONS_t + \beta_2 INFL_t + \beta_3 EXCH_t + \beta_4 INR_t + \beta_5 FR_t + \varepsilon_t \qquad (1)$$

Where

- *GDP*: Cambodia Gross Domestic Product (In billion USD)
- *MONS*: Money Supply (M2) measure in percentage of GDP
- *INFL*: Inflation rate represents by Consumer Price Index (CPI %)
- *EXCH*: Exchange Rate (Riel/ USD)
- *INR*: Interest Rate (Money Rate)
- *FR*: Foreign Reserve (In billion USD)

Equation 1 is the main equation that is estimated through Bayesian Tobit Model. Based on equation 1, it is clearly demonstrated that all explanatory variables have correlation with GDP growth in Cambodia. In other words, this regression is beheld as the impact of monetary policy variable influences on the economic growth and the other macroeconomic variables.

If (1) is transformed into basic linear regression, it could be written as:

$$y^* = x_i'\beta + \varepsilon_i \qquad (2)$$

where y^* is limited dependent variable. It is observed unless it exceeds the value of the below censored. In this study, the below censored is 3.65^1. $\beta = (\beta_1, \ldots \ldots \beta_n)$ is a vector of regression parameter (the coefficient of the explanatory variables) and $x_i = (x_1, \ldots \ldots x_n)$ is a vector of explanatory variables.

To be convenient in using Bayesian Tobit Model, we assume that the prior distribution of (β, σ^2) is conditionally multivariate normal distribution and inverse gamma distribution (*IG*), respectively.

---

[1] The GDP of Cambodia for the first year (2000) of the study is 3.65. It is chosen to be below censored since it is the smallest amount and GDP is restricted to be non-negative value.

$$\beta|\sigma^2 \sim N(\beta_0, \sigma^2 B_0), \ \sigma^2 \sim IG(\frac{n_0}{2}, \frac{S_0}{2}) \tag{4}$$

where β_0 is $K \times 1$ known constant vector, B_0 is a $K \times K$ known constant matrix, and n_0 and S_0 are shape and scale of parameters respectively. If $y^* = (y_1^*, y_2^*, \ldots \ldots y_n^*)'$, and $x_i' = (x_1, x_2, \ldots \ldots x_n)$ and $\varepsilon_i = (\varepsilon_1, \varepsilon_2, \ldots \ldots \varepsilon_n)' \sim N(0, \sigma^2)$, $n_1 = n_0 + n$. Given y^*, we obtain the joint posterior distribution by Bayes' Theorem:

$$\pi(y_c^*, \beta, \sigma^2|y_0) \propto \pi(y_c^*, y_0|\beta, \sigma^2)\pi(\sigma^2)\pi(\beta) \tag{5}$$

Then we obtain joint posterior distribution of $\pi(y_c^*, \beta, \sigma^2|y_0)$ given by:

$$\pi(y_c^*, \beta, \sigma^2|y_0) \propto (\sigma^2)^{-\left(\frac{n_1}{2}+1\right)} \times exp\left\{-\frac{1}{2}\sum_{i=1}^{n}\frac{1}{\sigma^2}(y_i - x_i'\beta)^2\right\}$$

$$\times exp\left\{-\frac{1}{2}(\beta - \beta_0)'\frac{1}{\sigma^2 B_0}(\beta - \beta_0) - \frac{S_0}{2\sigma^2}\right\} \tag{6}$$

Conditional Posterior distribution of β

$$\pi(\beta|y_c^*, \sigma^2, y_0) \propto exp\left\{-\frac{1}{2}\sum_{i=1}^{n}\frac{1}{\sigma^2}(y_i - x_i'\beta)^2 - \frac{1}{2}(\beta - \beta_0)'\frac{1}{\sigma^2 B_0}(\beta - \beta_0)\right\}$$

$$\times exp\{-\frac{1}{2}(\beta - \beta_1)'\frac{1}{\sigma^2 B_1}(\beta - \beta_1)\} \tag{7}$$

where $B_1^{-1} = B_0^{-1} + \sum_{i=1}^{n}\tilde{x}_i'\tilde{x}_i$, $\beta_1 = B_1(B_0^{-1}\beta_0, + \sum_{i=1}^{n}\tilde{x}_i'\tilde{y}^*_i)$

Conditional Posterior distribution of σ^2

$$\pi(\sigma^2|y_c^*, \beta, y_0) \propto (\sigma^2)^{-\left(\frac{n_1}{2}+1\right)}exp\left\{-\frac{1}{2\sigma^2}[\sum_{i=1}^{n}(y_i - x_i'\beta)^2 + S_0]\right\}$$

$$\times exp\left\{-\frac{S_1}{2\sigma^2}\right\} \tag{8}$$

The conditional posterior distribution of (7) and (8) could be written as

$$\beta|\sigma^2, y^* \sim N(\beta_1, \sigma^2 B_1) \tag{9}$$

$$\sigma^2|y^* \sim IG(\frac{n_1}{2}, \frac{S_1}{2}) \tag{10}$$

Let $y_c^* = \left(y_{c,1}^*, y_{c,2}^*, \dots\dots, y_{c,n-k}^*\right)'$ and $y_0 = (y_{0,1}, y_{0,2}, \dots\dots, y_{0,k})'$ denote $(n-k) \times 1$ and $k \times 1$ vectors of censored dependent variables and observed dependent variables, respectively. Then, we sample from the conditional posterior distributions using Gibbs Sampling:

Algorithm Gibbs Sampling (Standard Tobit Model)

1) Initialize $\beta \ and \ \sigma^2$.

2) Sample $y_c^* | \beta, \sigma^2, y_0$

Generate $y_{c,i}^* | \beta, \sigma^2 \sim TN_{(-\infty,d)}(x_i'\beta, \sigma^2)$, $i = 1,2, \dots\dots, n-k$, for censored observations, where $TN_{(a,b)}(\mu, \tau^2)$ denotes a normal distribution N (μ, τ^2) truncated on the interval (a,b). d is the threshold where y is observed.

3) Sample $(\beta, \sigma^2) | y_c^*, y_0$

      3.1 Sample $\sigma^2 | y_c^*, y_0 \sim IG\left(\frac{n_1}{2}, \frac{S_1}{2}\right)$

      3.2 Sample $\beta | \sigma^2, y_c^*, y_0 \sim N(\beta_1, \sigma^2 B_1)$

4) Go to 2 and Repeat.

To ensure the stationary and convergence, we employ the diagnostic test through accessing many useful tests such as Geweke Test, Raftery and Lewis Test, Heidelberger and Welch Test which offer essential information about the stationary process that is the basic idea in time series data; the test also indicates how fast and good in terms of mixing in the chain to ensure the desired posterior distributions. The autocorrelation is also accessed to ensure the stationary since higher autocorrelation of each parameter indicates poor mixing and non-convergence.

4. Empirical Results

After running a single chain with very long iteration precisely $500,000^2$ iterations with 50,000 as burn-in consequence, the final summary output is statistically provided below.

---

[2] Once very long chain will ensure the stationary and convergence suggested by (Geyer, 1992)

Table 1: MCMC summary output (Posterior mean plus standard errors)

Description	Mean	Standard Deviation	Naïve SE	Time-series SE
Intercept	11.230	6.004	0.008	0.009
MONS	0.073	0.038	0.00005	0.00006
EXCH	-3585	2586	36.57	44.48
INFL	0.059	0.058	0.00003	0.00003
INR	-0.149	0.231	0.0003	0.0007
FR	0.227	0.381	0.00005	0.00006
Sigma2	0.281	0.141	0.0002	0.0003

Source: Author's own calculation (R program)

Table 2: MCMC summary output (Quantiles for each variable)

Description	2.5%	25%	50%	75%	97.5%
Intercept	-0.974	7.472	11.310	15.080	22.933
MONS	-0.004	0.049	0.073	0.097	0.147
EXCH	-8584	-5254	-3635	-1975	1704
INFL	0.006	0.042	0.059	0.075	0.109
INR	-0.671	-0.280	-0.125	0.007	0.244
FR	0.153	0.203	0.227	0.251	0.304
Sigma2	0.120	0.890	0.248	0.338	0.640

Source: Author's own calculation (R program)

Table 1 and 2 display the posterior mean plus standard errors and quantiles of each variable and variance, respectively. Table 1 and 2 are corrected and reliable unless the Markov chain diagnostic test and MCMC plots confirm the chain has converged.

Table 3: Geweke Diagnostic Test

Fraction in 1st window = 0.1
Fraction in 2nd window = 0.5

Inter	MONS	EXCH	INFL	INR	FR	Sigma2
-0.640	0.263	0.562	-0.308	-0.178	-0.200	-0.776

Source: Author's own calculation (R program)

The Geweke test takes two non-overlapping parts (first 0.1 and last 0.5 proportion) of the Markov chain and compares the means of both parts, using the difference of means test to see if the two parts of the chain are from the same distribution. The test statistic is a standard Z-score with the standard errors adjusted for autocorrelation. Z statistic approaches to N (0,1) if the chain has converged and two means are equal.

Table 4: Raftery and Lewis Diagnostic Test

Quantile (q) = 0.025
Accuracy (r) = +/ - 0.005
Probability (s) = 0.95

Description	Burn-in (M)	Total (N)	Lower bound (N-min)	Dependence factor (I)
Intercept	6	11586	3746	3.09
MONS	6	11955	3746	3.19
EXCH	2	3939	3746	1.05
INFL	6	11532	3746	3.08
INR	15	22030	3746	5.88
FR	2	3919	3746	1.05
Sigma2	4	7772	3746	2.07

Source: Author's own calculation (R program)

Table 4 displays the Raftery and Lewis test. The test explores the number of burn-in which should be discarded and the total number of iteration should be run as well as the dependence factor which indicates non-convergence if all "I" of each variable and variance except interest rate that is not greater than 5.0.

Table 5: Heidelberger and Welch Diagnostic Test

Description	Stationary Test	Start Iteration	p-value
Intercept	Passed	1	0.567
MONS	Passed	1	0.807
EXCH	Passed	1	0.626
INFL	Passed	1	0.297
INR	Passed	1	0.897
FR	Passed	1	0.705
Sigma2	Passed	1	0.452

Description	Half-width Mean Test		Half-width
Intercept	Passed	11.230	0.018
MONS	Passed	0.073	0.000
EXCH	Passed	-3585	8.720
INFL	Passed	0.059	0.000
INR	Passed	-0.149	0.001
FR	Passed	0.227	0.000
Sigma2	Passed	0.281	0.000

Source: Author's own calculation (R program)

The Heidelberger and Welch Test is used to test the pass of the stationary process; "failed" indicates more iteration needs to be run in the chain. If it fails for the last half-width mean test it reports overall failure of the stationary test.

Table 6: Autocorrelation

Lag	Inter	MONS	EXCH	INFL	INR	FR	Sigma2
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	0.041	0.071	0.071	0.023	0.528	0.045	0.415
5	0.008	0.014	0.016	0.003	0.297	0.008	0.049
10	0.000	0.002	0.003	0.002	0.029	0.000	0.012
50	0.001	0.001	0.001	-0.000	-0.000	0.001	0.001

Source: Author's own calculation (R program)

Figure 2: Kernel Density Plot
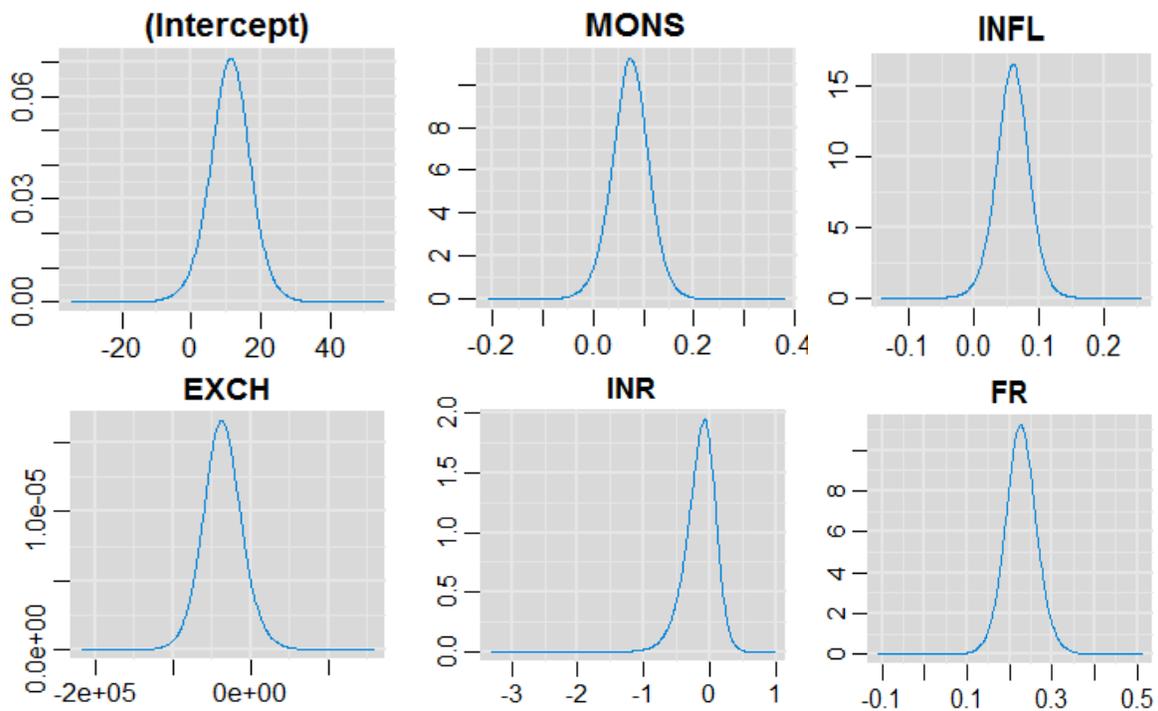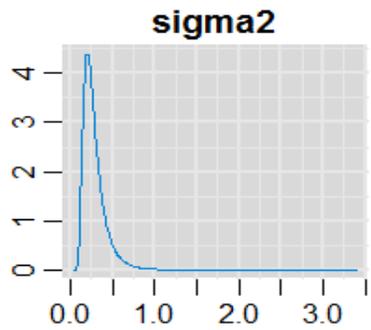
Figure 3: Running Mean Plot
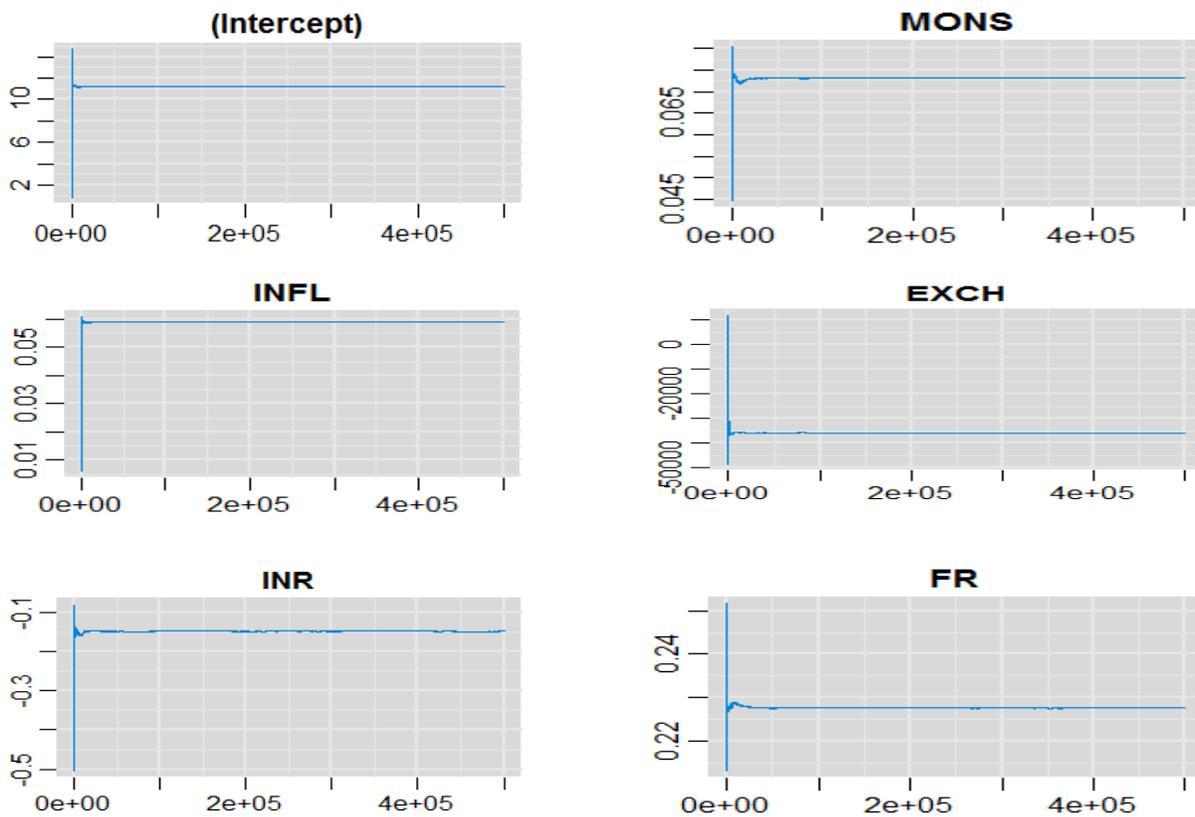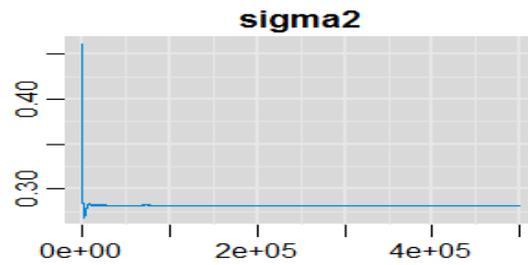
Figure 4: Trace Plots

FR

sigma2
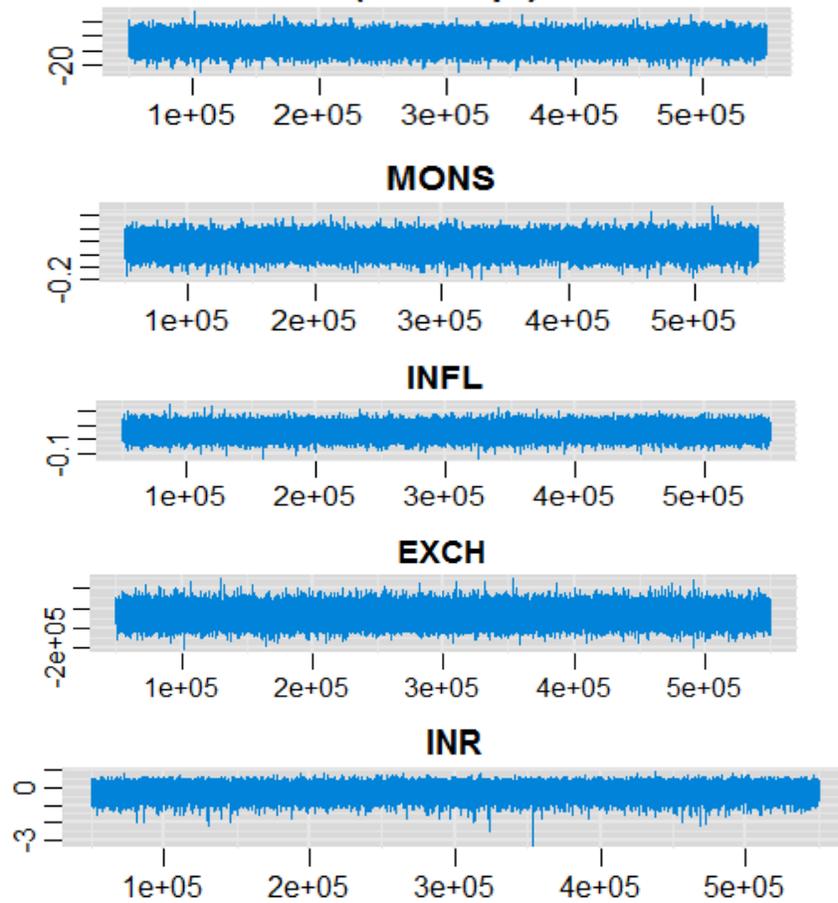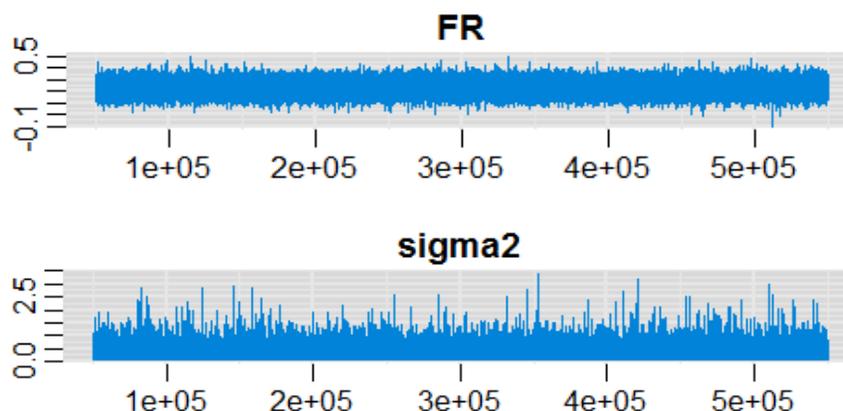
According to the diagnostic test, all variables and variance except interest rate confirms the convergence and good mixing in the chain. Precisely, the dependence factor "I" in the Raftery and Lewis test shows that all variables and variance less than 5.0.

Figure 2 demonstrates kernel density plots of each variable and variance. Kernel density shows the distribution of each variance and variance displaying the normal and inverse gamma, respectively. According to Figure 2, all variables except interest rate indicate normal distribution. Moreover, variance displays gamma distribution as the assumption in the prior. Figure 3 illustrates running mean plots. Running plot displays the convergence and stability of each variable and variance after burn-in consequence. Moreover, Figure 4 displays the trace plots. Trace plots illustrate the mixing of the chain. Based on Figure 4, all variables and variance demonstrate good mixing and convergence.

From these statistical results, money supply, exchange rate, inflation rate and foreign reserve significantly influence economic growth in Cambodia. However, interest rate is confirmed to be negatively insignificant with GDP which represents economic growth in Cambodia based on the Raftery and Lewis test and kernel density plot.

Based on Table 1, money supply has a positive relationship with GDP in Cambodia with the mean (0.073) and standard error (0.008). Furthermore, according to Table 2, shows that money supply displays a negative value for the first quantile with (-0.004) and ended up being a positive value (0.049), (0.073), (0.097) and (0.147) for 25%, 50%, 75% and 97.5%, respectively. However, money supply confirms positive correlation with GDP in Cambodia.

Exchange rate, on the other hand, displays a negative relationship with GDP. Based on Table 1, the exchange rate displays negative value mean (-3585) with standard error (36.57). Moreover, according to Table 2, the exchange rate displays negative value for the first 4 quantiles with the value (-8584), (-5254), (-3635), and (-1975) for 2.5%, 25%, 50% and 75%, respectively. The exchange rate, moreover, takes a positive value for the last quantile (1704) for 97.5%. However, the exchange rate indicates negative correlation with GDP in Cambodia.

Meanwhile, the inflation rate displays positive mean (0.059) with standard error (0.00003). The inflation rate, based on Table 2, displays all positive value (0.006), (0.042), (0.059), (0.075) and (0.010) for 2.5%, 25%, 50%, 75% and 97.5%, consecutively. The inflation rate indicates positive relationship with GDP overall.

Foreign reserve also confirms a positive correlation with GDP in Cambodia. According to Table 1, foreign reserve takes positive value with mean (0.227) with standard error (0.00005). Based on Table 2, foreign reserve takes the positive value (0.153), (0.203), (0.227), (0.251) and (0.304) for 2.5%, 25%, 50%, 75% and 97.5%, respectively.

Last but not least, the interest rate indicates a negative correlation with GDP in Cambodia. The interest rate takes the value with mean (-0.149) with standard error (0.0003). However, the interest rate is statistically insignificant correlation with GDP since the kernel density plot of this variable is not normal distribution and the dependence factor in the Raftery and Lewis test is greater than 5.0 which indicate non-convergence in the chain.

Discussion and Conclusion

Based on statistical results, money supply confirmed a positive correlation with GDP in Cambodia. The increase in money supply will enhance the economic growth in Cambodia. This positive correlation indicates that injecting more money in circulation could enhance the economic activity.

Inflation is also statistically revealed to have a positive correlation with GDP in Cambodia. The increase in inflation rate indicates the domestic consumption in Cambodia. This finding is confirmed differently from conventional wisdom that inflation is harmful for an economy. However, this result is strongly supported; (Gokal, & Hanif, 2004) indicates that the price of goods can increase without causing the output decline which can exhibit inflation display a

positive correlation with GDP. (Gul, et al. 2012) also confirmed that inflation has a positive correlation with GDP growth. However, the inflation in Cambodia for the past few years is maintained and preserved below 5% (NBC, Annual Report, 2016). This confirms the rate of inflation could jump up but in a manageable trend. The manageable rate of inflation is well-preserved by the NBC as the result of supply money to the economy with care in the context of high-dollarized economy (NBC, Dollarization in Cambodia: Evidence from a survey conduct in 2015-2016, 2016). So, money supply and inflation are two essential variables which indicate a positive impact on GDP.

Exchange rate, on the other hand, demonstrates negative impact on GDP in Cambodia. The depreciation of exchange rate would induce the economic growth. In this case, the decrease of the exchange rate means the depreciation of KHR or appreciation of USD could enhance economic growth. Since Cambodia is still characterized as a dollarized economy, the appreciation of USD could induce GDP growth. This finding is backed up with the work of (Amarasekara, 2007) which reveals that the appreciation of the exchange rate could induce economic growth. In the case of Cambodia, exchange rate of the KHR against USD has stabilized for the last two decades; the rate has been managed around 4000-4100 KHR/USD. This stability of exchange rate could be explained with the empirical result that the rate of exchange could increase or decrease in a stable and manageable trend.

Meanwhile, foreign reserve shows positive correlation with GDP in Cambodia. This finding supports the work of (Bentum-Ennin, 2014) who indicates that foreign reserve displays long run correlation with economic growth in Africa. In Cambodia, the increase in foreign reserve might result from the NBC purchases of foreign assets, which tends to induce the depreciation of the exchange rate of the KHR and reduce the volatility of the rate of exchange. Hence, from this point of view, foreign reserve is an essential package to achieve the price stability in Cambodia which is issued by NBC. Hence, the increase in foreign reserve could induce the GDP growth through ensuring the macroeconomic stability by increasing the liquidity and reducing the risk of suffering a speculative attack.

Last but not least, interest rate displays negative insignificance with GDP. This confirms that the interest rate has no influence on GDP in Cambodia. This result strongly supports (Moolio, et al. 2015) who confirmed that interest rate has no impact on GDP growth in Cambodia. The

increase or decrease of the rate of interest has no effect on the economy during the period of the study.

Based on the empirical results and findings, monetary policy has a great influence on the performance of the Cambodian economy. Money supply is generally viewed as the essential tool in implementing the monetary policy. In the case of Cambodia, monetary policy is quite challenging due to the dollarized economy. Since the NBC is the printer of KHR, the money supply has been handled with care as the amount of USD is fully transacted in the economy. According to the study, money supply, inflation, foreign reserve and exchange is found to have positive significance with GDP while the interest rate is confirmed insignificant with GDP. From this point of view, money supply plays an important role in contributing to the economic growth in Cambodia. Inflation is also considered as influencing the growth of Cambodian economy as well since it represents domestic consumption. Moreover, the exchange rate illustrates a negative relationship with the GDP in Cambodia. This negative correlation indicates that the depreciation of KHR or appreciation of USD could induce growth since Cambodia is still characterized as a dollarized economy. Foreign reserve reveals a positive correlation with GDP. More foreign reserve, the NBC could mitigate the risk and stabilize the price stability as the goal of monetary policy and enhance the growth at the end. Interest rate, on the other hand, is found to be negatively insignificant with the GDP. Interest rate is confirmed to be an ineffective tool in a dollarized economy such as Cambodia. In conclusion, this finding reveals that the increase in money supply could induce more inflation and cause the exchange rate of KHR to depreciate and enhance the GDP growth in the end. However, these results are explained due to the fact that Cambodia has remarkably accomplished macroeconomic stability for the last two decades. Therefore, in order to induce GDP growth, all significant variables must be well-reserved.

Therefore, the National Bank of Cambodia (NBC) plays an essential role in authorizing the monetary policy in Cambodia through increasing or decreasing money supply in order to ensure price stability as well as to promote economic growth.

References

ADB. (2017). *Key Indicators for Asia and the Pacific.* Asian Development Bank.

Agbonlahor, O. (2014). The Impact of Monetary Policy on the Economy of United Kingdom: Vector Error Correction Model (VECM). *European Scientific Journal.* 19-42.

Amarasekara, C. (2007). *The Impact of Monetary Policy on Economic Growth and Inflation in Sri Lanka.* Staff Studies.1-44.

Bentum-Ennin, I. (2014). International Reserve Accumulation and Economic Growth in The West African Monetary Zone. *International Research Journal of Marketing and Economics.* 31-56.

Chib, S. (1992). Bayes Inference in the Tobit Censored Model. *Journal of Econometrics,* 79-99.

Dilshad Ahmad, M. A., & Mohammad, A., & Usman, G,. (2016). Impact of Monetary Policy on Economic Growth Empirical Evidence of Pakistan. *International Journal of Applied Economic Studies.*1-9.

Ferdiun, M. (2005). Impact of Monetary Policy on Economic Instability in Turkey (1983-2003). *Prague Economic Papers, Vol 14, No 2.*

Geyer, C. (1992). Practical Markov Chain Monte Carlo. *Statistical Science, Vol 7, No 4.* 473-484.

Gokal, V., and Hanif, S. (2004). *Relationship between Inflation and Economic Growth.* Economics Department, Reserve Bank of Fiji, Suva Fiji.

Gul, H., Mughal, K., & Rahim, S. (2012). Linkage between Monetary Instruments and Economic Growth. *Universal Journal of Management and Social Sciences, Vol 2.* 69-76.

Hameed, I. (2010). Impact of Monetary Policy on GDP. *Interdisciplinary Journal of Contemporary Research in Business, Vol 3, No 1.* 1348-1361.

Moolio, Mardy Lut & Palaj (2015). The Impact of Monetary Policy on Economic Growth in Cambodia. *Journal of Management for Global Sustainable Development*. 40-63.

NBC. (2016). *Annual Report.* Phnom Penh: National Bank of Cambodia.

NBC. (2016). *Dollarization in Cambodia: Evidence from a Survey Conduct in 2015-2016.* Phnom Penh: National Bank of Cambodia .

Palesa, Chipote Precious & Makhetha-Kosi (2014). Impact of Monetary Policy on Economic Growth: A Case Study of South Africa. *Mediterranean Journal of Social Sciences. Vol 5, No 15*. 76-84.

Rehman, U. H and Ahmed, I. (2002). Impact of Monetary Policy on Monetary Assests in Pakistan a Money Multiplier Approach. *Pakistan Economics and Social Review, Vol XL, No 2*, 199-208.

Serey, C. (2017). *Roles of the Central Bank and Her Monetary Policy.* Phnom Penh: National Bank of Cambodia.

Appendix 1: Methodology of the Study