Applying Monetary Policies of Lao's Government to Export and Import Models in 1990-2018

Somnack Yawdhacksa*
National University of Laos

Alay Phonvisay
National University of Laos

ABSTRACT

This is a study on the effects of the monetary policies of the Government of Lao PDR (GoL) on the import and export models during 1990 to 2018. First, an overview of GoL's monetary policies is provided, which is followed by a study on the correlation between monetary policy variables on the one hand and export and import on the other during the same period. Annual time series data and Vector Augoregressive (VAR) analysis are used to test for data accuracy, lag selection, impulse response analyhsis, and variance decomposition effects. The following variables taken from Lao PDR are included: import, export, money supply, interest rate, inflation rate, national reserves, the exchange rate between Lao Kip and US dollar, and the exchange rate between Lao Kip and Thai Baht. The results show that the effects of monetary policies targeting to increase money supply, interest rate, inflation rate, and national reserves increase the import and export of Lao PDR. Based on these results, this study recommends that GoL should design export-led investment strategies and improve the targeted export commodities.

Keywords: Monetary policy; VAR model; Import; Export; Lao PDR.

1. INTRODUCTION

Lao People's Democratic Replublic (Lao PDR) has attained economic development by transiting from a centralzed economy to a market-based economic system since 1986. The Lao economy was steadily expanding, stabilizing, and changing its economic structure, enabling international trade to promote economic growth as well as financial stability. Although Lao PDR has experienced economic crisis between 1997 and 1999, its economic growth rate has remained at an average rate of 6.7% during 1990 to 2000, and up to 7.2% since 2000 to the present.

In developing economies, money plays a crucial role in driving the country toward achieving stability, flexibility and sustainability. The effect of monetary policy is its transmission mechanism that significantly affects import and export (Michael, et al. 2017; Odungweru and Ewubare, 2020). Many economists and researchers found evidence for monetary policy effectiveness and its impact on import and export based on data from different countries (Kim, 2001; and Baksh et al, 2016).

Despite the large body of literature on the effect of monetary policy on international trade and developing economies, most of the prior studies are on well-developed import and export systems and there has been a lack of consensus about the effect of monetary policy on import and export. Understanding how changes in monetary policy mechanism affect import and export variables assists policy makers in deciding

and selecting appropriate policy instruments for promoting investment and economic growth.

This study presents an empirical analysis of the effects of monetary policy on Lao PDR's import and export. The country's monetary policies mostly relied on direct instruments serving the international trade sectors and economic development. Few studies have examined the monetary policies of Lao PDR (Xaiyavong, 2015; Srithilat and Sun, 2017b), but the relationship between monetary policy and import and export was not thoroughly investigated. To the best of our understanding, past research has only examined the effects of monetary policy on import and export. This study is the first empirical study applying monetary policy variables to the import and export of Lao PDR. This study uses the Vector Autoregressive Model based on annual time series data over the period of 1990-2018.

This paper addresses two questions: (1) how does the implementation of monetary policy by issuing regulations, rules and orders related to monetary policy planning stimulate the foreign trade sector of Lao PDR and periodically affect export and import values? (2) how does the government use monetary policy, such as reducing or increasing money supply, interest rates, price index or inflation rate, and exchange rate of major currencies affect import and export?

1.1 OBJECTIVES OF THE STUDY

1. Studying the overall situation of how the use of monetary policy affects the import and export values of Lao PDR during 1990 to 2018.
2. Analyzing the relationship between monetary policy variables and Lao PDR's import and export values during 1990 to 2018.

1.2 HYPOTHESIS

Monetary policy has a positive impact on Lao PDR's import and export.

1.3 SIGNIFICANCE OF THE STUDY

1．Monitoring the formulation of monetary policy of the Government periodically, such as the issuance of regulations, rules, regulations and various legislations that the Government uses to stimulate the economy periodically, especially the foreign trade sector.
2. Monitoring the planning and use of the country's monetary policy to support the policy of mobilization of deposits, exchange rate policy, lending and provision of money to business units from time to time, which affect socio-economic development and foreign trade.
3．Monitoring the changing situation of foreign trade, especially exports and imports, which have changed according to the monetary policy from time to time, and how the direction has changed.

2. LITERATURE REVIEW

Michael *et al.* (2017), reported an empirical study on the effect of monetary policy variables on net export of Nigeria from 1981-2016 by using Autoregressive Distributed Lag (ARDL) tools for data anlysis. It was observed that the variables are related in both short and long term and that the currency has a positive effect on Nigeria's exports while interest rates, exchange rates, and foreign investment have a negative impact on imports.

Odungweru and Ewubare. (2020), studied the effect of monetary policies on foreign trade in Nigeria by using an Autoregressive Distributed Lag (ARDL) and the program of Eviews 9 analysis on time series data from 1980 to 2017. It was found that follow-up variables and independent variables have a long-term relationship and exchange rates as well as money laundering, have a positive effect on foreign trade.

Baksh, *et al.* (2016), investigated on the monetary transmission mechanism in small open economics in Barbados for theperiod of 1967-1992, using econometric methodology and ordinary least square (OLS), error correction model (ECM). It was found that interest rates are fundamental to monetary policy, affecting foreign trade and long-term relationships while income is irrelevant in the short term and expenditure is statistically significant.

Kim. (2001), studied the effects of monetary policy shocks on the trade balance in small open European countries. The period of sudty from 1976-1996, using data from France, Italy, and UK with VAR model and J-curve effect. It was found that the use of monetary policy affects to all three countries' foreign trade balance: a low exchange rate boosted exports, which in turn improved the trade balance.
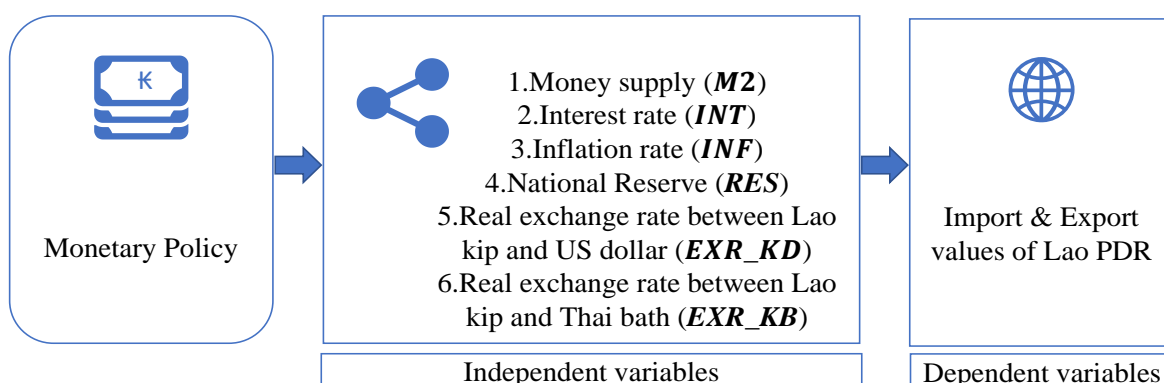Geiger. (2008), investigated on China's monetary policy instruments and their effectiveness using data from 1994-2006, with analysed with the econometric model. The study found that since China's monetary policy is based on instruments from the central bank, the People's Bank of China, and non-central bank policies, both remittances and interest rates affect foreign trade.

In the same line as the cited investigation, this research uses time series data, using monetary policy tools to analyze the impact on foreign trade, such as import and export values, such as testing the variability of the unit root test, ADF test, ECM model and VAR model. Unlike the cited papers, our approach focuses on specific periodic changes in the application of monetary policy of Lao PDR towards import and export values as well as the duration and the scope of the study and the nature of the variables.

2.1 CONCEPTUAL MODEL OF RESEARCH

Our approach is based on the conceptual model and results from the following references: Michael *et al.*, (2017), Odungweru and Ewubare (2020), Baksh and Craigwell (2016), Soyoung (2001) and Geiger (2008).

Figure 1. Flow chart of applying monetary policy effects to import and export values

Monetary Policy

1. Money supply (*M2*)
2. Interest rate (*INT*)
3. Inflation rate (*INF*)
4. National Reserve (*RES*)
5. Real exchange rate between Lao kip and US dollar (*EXR_KD*)
6. Real exchange rate between Lao kip and Thai bath (*EXR_KB*)

Independent variables

Import & Export values of Lao PDR

Dependent variables

3. DATA AND STABILITY TEST

3.1 ANALYSIS TOOLS AND RESULTS EXPANSION
Data analysis is divided into 2 types:
(1) Descriptive analysis aims at elucidating the relationship between dependent variables and independent variables in response to "objective 1" and
(2) Quantitative analysis aims at analyzing the relationship between dependent variables and independent variables in response to "objective 2" by using echometric tools and annual time-lapse data analysis tools.

3.2 DESCRIPTIVE ANALYSIS
Descriptive analysis aims at describing the relationship between the use of monetary policy and various economic variables, as well as other measures taken by the Bank of the Lao PDR or the Central Bank of Laos to regulate monetary, loan interest rates, inflation rates, national reserves and foreign exchange rate. Results are represented in a graph, comparing the variables in values and percentages.

3.3 QUANTITATIVE ANALYSIS
Quantitative analysis uses annual time series data using mathematical models such as finding the mean, maximum, minimum, standard deviation, and coefficient of the card in the form of a logarithm equation using the regression coefficient. In addition, dynamic tools will be used to analyze the data, such as Unit Roots testing, the introduction of the Vector Autoregressive Model (VAR), the most widely used model in the analysis of the use of monetary policy, and other tools that can analyze variables to find variant.

3.4 DATA ANALYSIS MODEL
In response, the second objective is the model of the impact on Lao PDR's export and import values as follows:
- **The Effects of Monetary Policy to Lao's Export Values:**

Based on literature review and related theories, the effect of the monetary policy on export is represented by the following equation:

$$EXP_t = f(M2, INT, INF, RSE, EXR_{KD}, EXR_{KB}) \tag{1}$$

Where, the economic model affecting Lao PDR's export values can be derived into an econometric model to analyze the relationship of the following variables:

$$\log(EXP_t) = \alpha_0 + \alpha_1 \log(M2_t) + \alpha_2 \log(INT_t) + \alpha_3 \log(INF_t) + \alpha_4 \log(RSE_t) + \alpha_5 \log(EXR_{KD_t}) + \alpha_6 \log(EXR_{KB_t}) + \varepsilon_t \tag{2}$$

Where:

EXP_t: export of Lao PDR	*M2*: Money supply
INT: Interest rate; INF: Inflation rate	*RES:* National reserves
EXR_{KD}: Exchange rate between Lao kip and US dollar	EXR_{KB}: exchange rate between Lao kip and Thai baht

- **The Effects of Monetary Policy to Lao's Import Values:**

Based on literature review and related theories, the effect of the monetary policy on import is represented by the following equation:

$$IMP_t = f(M2, INT, INF, RSE, EXR_{KD}, EXR_{KB}) \tag{3}$$

From equation (3), the economic model affecting Lao PDR's import values can be derived into an econometric model to analyze the relationship of the following variables:

$$\log{(IMP_t)} = \alpha_0 + \alpha_1\log{(M2_t)} + \alpha_2\log{(INT_t)} + \alpha_3\log{(INF_t)} +$$
$$\alpha_4\log{(RSE_t)} + \alpha_5\log{(EXR_{KD_t})} + \alpha_6\log{(EXR_{KB_t})} + \varepsilon_t \tag{4}$$

Where:

IMP_t: import of Lao PDR	*M2*: Money supply
INT: Interest rate; INF: Inflation rate	*RES:* National reserves
EXR_{KD}: Exchange rate between Lao kip and US dollar	*EXR_{KB}:* exchange rate between Lao kip and Thai baht.

3.4.1 ECONOMETRIC MODEL ANALYSIS TOOLS

After defining the model and equation according to the VAR Model of monetary policy, the relationship between the variables in the model will be studied by considering the results of the study in 3 steps as follows:

(1) The unit root test or ADF test and PP test of all variables will be used in the study;

(2) Select the appropriate Lag selection, the level according to the Akaike Information Criterion (AIC) method and the Schwarz Information Criterion (SIC) method;

(3) Analyze by using the Impulse Response Function and Variance Decomposition data using VAR Model analysis tools.

- **Vector Autoregressive Model (VAR) Model.**

The analysis of the model was a model used widely in research about the use of monetary policy because of the changing financial and currency mainly time series data, characteristics data without stationary (non-Stationary) and fluctuations in the time difference which cannot be recognized. Relations truth of variables that are used in the study are relevant in theory or relationship in the past (Lag).

The model used for this research is as follows:

$$By_t = \Gamma_0 + \sum_{i=1}^{p} \Gamma_i\, y_{t-1} + u_t \tag{5}$$

Where y_t: is vector of the Endogenous variable at time is a (n x 1)

$$y_t = (M2, INT, INF, RES, EXR_{KD}, EXR_{KB}) \tag{6}$$

B: Is coefficient matrix of endogenous variable at the present time y_t with (n x n) where value above diagonal is equal 1

Γ_0: Is the vector having constant value (n x 1)

Γ_i: Is coffecient matrix of Endogenous variable at the past time y_{t-i} size n x n

u_i: Is the error vector (Disturbance Term) and White Noise size n x 1

Such VAR models cannot be used in the form of Oridinary Least Square (OLS) because the endogenous contemporaneous effects allow the coefficient to be correlation with the disturbance term in the equation. Therefore, estimating the value with the least two forces will make the estimated relationship values less clear and wrong. Therefore, it is is necessary to convert the initial VAR model to reduced form by multiplying B^{-1} and to be able to rewrite the new model as follows:

$$y_t: A_0 + \sum_{i=1}^{p} A_i\, y_{t-1} + e_t \tag{7}$$

Where, $A_0 = B^{-1}\Gamma_0$

$A_i = B^{-1}\Gamma_i$

$e_t = B^{-1}u_t$

In equation (7), A_i is the same as $A_i(L)$ which is defined by its lagged value and other endogenous variable.

- Unit Root Test

This research analysis by using time series data. Generally, it requires a Unit Root Test to obtain an approximation of the mean and standard deviation of time (Unit Root).

Therefore, the data availability was tested by using Augment Dickey Fuller (ADF) (Dickey and Fuller, 1979) method to ensure that the data used in the model analysis are stationary at $I(1)$ that is suitable for VAR model. Data testing result are presented in table 2.

4.1 BASIC STATISTICAL VALUES OF THE VARIABLES USED IN THE MODEL AFFECTING EXPORT AND IMPORT VALUES

The basic statistical test to be used in the model seems to include both dependent and independent variables such as Export (EXP), Import (IMP), Money Supply ($M2$), Interest Rate (INT), Inflation Rate (INF), National Reserve (RES), the Exchange Rate between Lao kip and US dollar ($EXRkd$), the exchang rate between Lao kip and Thai baht ($EXRkb$). The basic statistical values such as maximum, minimum, average and standard deviations will be presented as shown in the table 1 below:

Table 1: The Basic Statistical Test Results

Variable	Maximum	Minimum	Average	Standard deviation
LAOEXP	5,294.71	79.00	1,321.31	1,540.99
LAOIMP	6,164.04	165.00	1,779.36	1,925.78
M2	80.950,23	44.34	18.295,97	25.395,19
INT	19.21	5.36	10.54	3.91
INF	134.01	0.07	16.56	27.97
RES	1,161.65	1.80	379.45	337.10
EXRkd	10,790.50	702.00	6,572.34	3,759.33
EXRkb	278.80	27.86	183.00	101.43

Source: Autor's calculation, 2021.

Table 2: The Results of ADF test and PP test

Variable	ADF test				PP test			
	Level		**Difference**		**Level**		**Difference**	
	Intercept	With Trend	Intercept	With Trend	Intercept	With Trend	Intercept	With Trend
LAOEXP	0.9671	0.9999	0.9989	0	1	1	1	0.0267
	6	5	6	4	16	18	16	0
LAOIMP	0.9995	0.9785	0.002	0.002	0.9997	0.9997	0.984	0.002
	0	2	0	0	2	2	2	0
M2	0.9999	0.9989	0.0371	0.0371	0.1031	0.0931	0	0
	2	4	0	0	3	2	0	0
INT	0.7027	0.7647	0.6646	0	0.7027	0.7117	0.6066	0.0001
	3	5	1	0	2	2	1	0
INF	0.0771	0.2215	0.1902	0.0346	0.0771	0.2215	0.1902	0
	3	2	1	1	3	5	1	0
RES	0.9964	0.8046	0	0	0.9139	0.0983	0	0
	1	1	0	0	2	3	0	4
EXRkd	0.3699	0.2125	0.3801	0.0001	0.9067	0.2078	0.3727	0.0001
	3	0	0	0	3	1	1	4
EXRkb	0.8576	0.5992	0.9503	0.0112	0.8909	0.6015	0.9202	0.0115
	0	0	0	0	2	2	2	4

Source: Autor's calculation, 2021.

Table 2 shows the result of testing time series data by using the unit root test at level or difference according to the ADF test and PP test analysis of all variables with a probability

of 0.05. The results show that: all the variables to be used in the model have the value of the data set of all the variables stationary at level I (1).

Therefore, this data set is suitable for testing the relationship of variables according to the VAR Model. By considering the relationship between the dependent and independent variables as shown in the table 2 above.

Table 3: Lag selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	40.32868	NA	2.00E-10	-2.46879	-2.13283	-2.36889
1	246.9301	290.7724	1.93E-15	-14.143	-11.45531*	-13.3438
2	327.1656	71.32046*	4.53e-16*	-16.45671*	-11.4174	-14.95824*

Source: Autor's calculation, 2021.

Table 3 shows that the appropriate Lag to use in analyzing the effect of monetary policy on export and import of Lao PDR using models VAR is only 2 because statistical test AIC, SC and HQ illustrate the importance of statiscal matching Lag = 2. So, 2 is appropriate to be used in the analysis.

4.2 RELATIONSHIP BETWEEN VARIABLES IN THE MODEL AND THE IMPACT OF MONETARY POLICY ON EXPORTS MODEL BY USING VAR MODEL

The impact or shock to monetary policy using the impulse response functtion are the effects of the central bank adopting an expansionary monetary policy by increasing money supply in the economy. The size of shock is measured by the standard deviation of the corresponding orthogonal error obtained from VAR model.

The analysis shows that only Lag term variable affects endogenous variables ($M2$, INT, INF, RES, EXR_{KD}, EXR_{KB}) to study by order of importance statistics and examination results to study the influence of Lag term variable. All models show that the value F-statistic variable groups have influence variables endogenous together with a range of significant statistics at 5%.

However, results of the VAR model analysis do not clearly show the relationship between dependent and independent variables. They are only a general representation of the relationship and cannot be concluded. Therefore, other econometric tools have been added to the parallel analysis, such as the Impulse Response Function analysis and the Variance Decomposition analysis, which brings the results of each variation analysis in detail.

4.2.1 IMPULSE RESPONSE FUNCTION ANALYSIS IN THE EXPORT MODEL

4.2.1.1 IMPLUSE RESPONSE OF INT, INF, RES, EXRkd, EXRkb and EXP to M2
The response of Lao export variables from the change in money supply volume in the system causes the average export value trend to grow positively throughout the study period (see Figure 2a). From 1992 to 1993, an average fluctuation is as high as 0.025 and decreased in 1994. After that, Lao exports tended to increase by an average of at least 0.025 until 2004, when exports began to decline compared to the average. From 2010 to 2015, exports were quite constant, with the benchmark average of 0.008, and continued to rise until the end of 2018. These observations can be correlated to the fact that central bank adopted an expanded monetary policy by increasing the amount of money which affects both directly and indirectly to Lao exports.

4.2.1.2 IMPLUSE RESPONSE OF INF, RES, EXRkd, EXRkb and INT to M2

In Figure 2c, one can observe the effect of the Lao economy changes withthe money supply shock, which had the immediate effect to the interest rate in 1996 which was found to be lower than the average of 0.015. After that, there was a reverse in the downward trend until the end of 1998.

4.2.1.3 IMPLUSE RESPONSE OF INT, RES, EXRkd, EXRkb and INF to M2

Figure 2d shows that when the government pursues an expanded monetary policy by increasing the volume of the economy, it has an immediate effect on inflation, resulting in lower inflation in 1993, standard deviation is below at 0.1, and continued to fluctuate sharply in the upward trend until 1995. Since 1996, it has been found that inflation has fluctuated in a downward direction until 2004, when it tended to increase and move towards a long-term average balance. The impact on inflation is not as effective as it should be because the inflation rate in Laos depends on many factors, such as production costs, because the country still relies on imports from neighboring countries, which are linked to the exchange rate, which is another factor that has a direct impact on inflation. On the other hand, the introduction of monetary policy by adding money supply volume to the system can be said to have no direct effect on inflation itself (Kyophilavong, 2013).

4.2.1.4 IMPLUSE RESPONSE OF INT, INF, EXRkd, EXRkb and RES to M2

Figure 2e shows that the use of the national reserve shock from the increase in the amount of money in the system has impact on the economy by affecting the national reserves by reducing the volatility from 0.03 to 0.01 in 1995, but the decline is still higher than the average. The volatility then increased until 2001 and continued to decline at a strong pace until 2009. After that, the volatility tended to decrease in a steady pace and move towards a long-term average balance.

4.2.1.5 IMPLUSE RESPONSE OF INT, INF, RES and EXRkd and EXRkb to M2

Figure 2f represents that the conduct of monetary policy magnified the impact on the exchange rate per US dollar, making value fluctuations reduced but still higher than the standard average from 1991 to 1999. From 2000 to 2002, there is volatility into the balance. From 2003 onwards, that the policy is there to respond to exchange rate per dollar in upward direction until 2009 and volatility continued downward and towards the balanced average in the long term.

The impact on the kip-to-baht exchange rate shows that from the beginning of the study, the exchange rate between the kip and the baht decreased to about 0.01, but was higher than the standard average, then continued to increase until 1997, and the exchange rate began to decline until 2000. After the exchange rate of the exchange rate from 2006 to 2011, the exchange rate between the kip and the baht changed in the upward direction and was higher than the standard average. From 2012 onwards, changes in the exchange rate between the kip and the baht tend to decrease until 2018 (see Figure 2g).

Figure 2: Impluse response of INT, INF, EXCHkd, EXCHkb and EXP to M2

Response to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E.
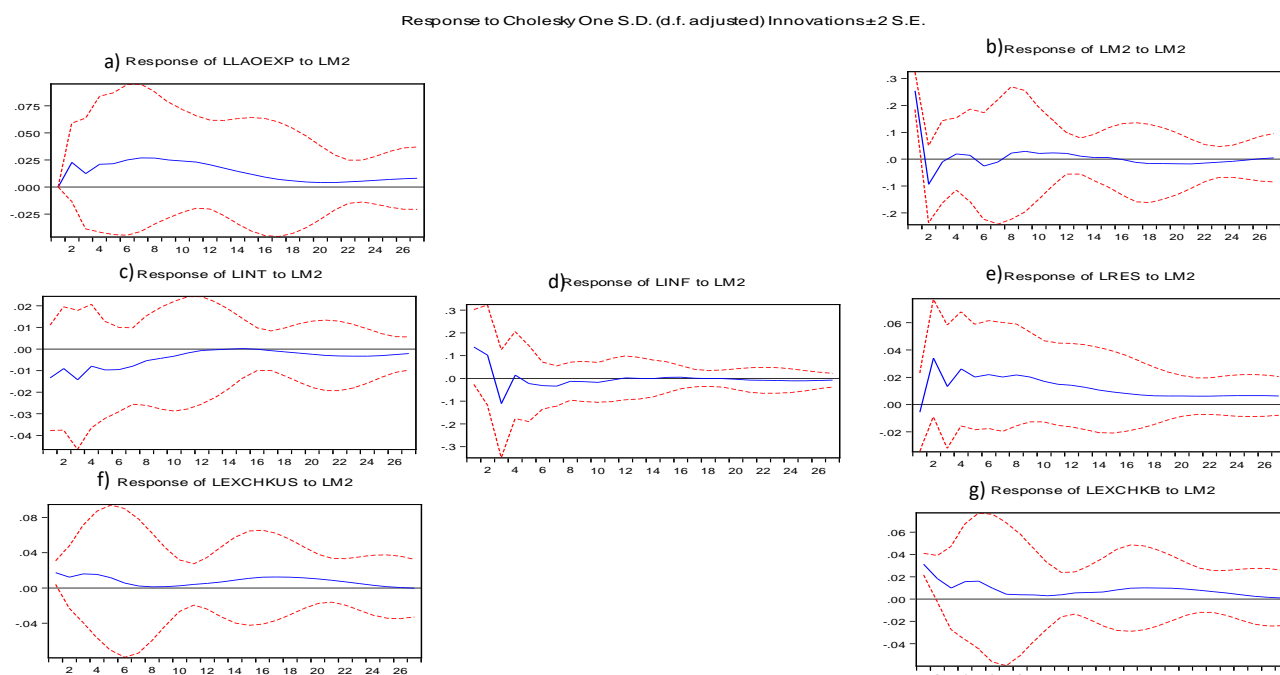
Source: Autor's calculation, 2021.

4.3 THE APPLICATION OF VARIANCE DECOMPOSITION MODELING ANALYSIS FOLLOW BY EXPORT IMPACT MODEL

4.3.1 THE VARIANCE DECOMPOSITION ANALYSIS ON EXPORT VARIABLES IN EXPORT MODELS

This part of the study will use the Variance Decomposition method to analyze how endogenous variables volatility of export (EXP), money supply (M2), interest rate (INT), inflation rate (INF) and exchange rate (EXRkd, EXRkb). These variables are not only determined by variables in the equation system but are also determined by other related economic variables. Therefore, it is assumed that other variables are outside the equation. When testing the variables of each variable using the variance decomposition method shown in Table 4, it was found that the variability components in the export variables that affect the variables in the export model are as follows:

During the first phase of the study, export volatility was 100% self-inflicted, but over time, exports underwent a self-sustaining effect as other variables began to gradually increase. The change in export variables was seen to be different from period to period, meaning that some periods tend to decrease while the other tend to increase, but in 2011, there was the share of exports by 58.31%, 7% money supply, 10.14% interest rate, 3.5% inflation rate, 10.73% national reserves, the exchange rate between Lao kip and US dollar was 6.36% and the exchange rate between Lao kip and Thai baht was 3.93%.

Table 4: The variance decomposition of export variables follow by export models

Period	S.E.	LLAOEXP	LM2	LINT	LINF	LRES	LEXRkd	LEXRkb
1	0.075014	100	0	0	0	0	0	0
2	0.121035	85.03437	3.534634	0.044706	9.522245	1.708621	0.095341	0.060078
3	0.154232	84.682	2.82777	0.468535	8.90809	1.054196	1.173162	0.886244
4	0.185239	81.52915	3.243839	4.952386	6.228809	0.731167	1.649941	1.664713
5	0.211497	80.17243	3.520521	7.068211	4.898601	0.611293	1.646167	2.082781
6	0.229283	78.28412	4.174528	8.932233	4.219702	0.631619	1.609802	2.147996

7	0.240809	76.15081	5.027853	10.53946	3.974504	0.644474	1.572204	2.0907
8	0.249017	73.69781	5.852616	12.26376	3.949043	0.74884	1.472274	2.015657
9	0.254609	71.53024	6.557539	13.20355	3.893894	1.390209	1.46933	1.95524
10	0.259082	69.17208	7.19509	13.37888	3.839286	2.872922	1.651821	1.889913
11	0.264213	66.75648	7.676652	13.12204	3.787702	4.608065	2.11942	1.929634
12	0.270886	64.69358	7.879355	12.55946	3.629695	6.173723	2.909454	2.154735
13	0.278782	63.0164	7.829928	11.85805	3.434787	7.57456	3.80113	2.48515
14	0.286997	61.67152	7.643967	11.23147	3.286766	8.737886	4.588136	2.840258
15	0.294419	60.62994	7.421547	10.75619	3.186298	9.581078	5.247753	3.177189
16	0.3003	59.78672	7.224175	10.44538	3.16474	10.15457	5.762588	3.461823
17	0.304313	59.12338	7.087859	10.2808	3.225736	10.50513	6.095149	3.681946
18	0.306476	58.67575	7.022048	10.20342	3.319981	10.66875	6.274442	3.835601
19	0.307309	58.41407	7.006667	10.16606	3.418014	10.72491	6.35359	3.916684
20	0.307647	58.31118	7.008671	10.1438	3.503519	10.73057	6.365984	3.936275
21	0.308172	58.36246	7.002829	10.123	3.547401	10.69622	6.344301	3.923791
22	0.309232	58.52188	6.977916	10.11496	3.542312	10.62567	6.314531	3.902727
23	0.310855	58.72142	6.935498	10.13782	3.508265	10.52705	6.28445	3.885503
24	0.312795	58.9077	6.889024	10.19447	3.465018	10.41036	6.255781	3.877648
25	0.31469	59.03643	6.855809	10.28263	3.428612	10.29208	6.227308	3.877131
26	0.316245	59.08407	6.847041	10.39367	3.409877	10.19153	6.195802	3.878013
27	0.317316	59.05572	6.864821	10.50471	3.408039	10.12703	6.163961	3.87572

Source: Autor's calculation, 2021.

4.3.2 THE VARIANCE DECOMPOSITION ANNLYSIS ON MONEY SUPPLY VARIABLE IN EXPORT MODELS

Table 5 shows that the volatility from the initial increase in money supply resulted in a volatility of 77.67% and continued to fall below 10% in 2006, causing exports to fluctuate by 38.42%; 10.66% interest rate; 4.86% inflation rate; 22.25% national reserves. The exchange rate between Lao kip and US dollar was 8.07% and the exchange rate between Lao kip and Thai baht was 6.25%. Fluctuations continuously declined until 2018, when the volatility of the currency was at 8.12%, seen as a continuation of the volatility of exports, interest rate, inflation rate, national reserves, the exchange rate between Lao kip and US dollar, and the exchange between Lao kip and Thai baht up to 42%, 10.55%, 4.61%, 19.78%, 8.43% and 6.47% respectively.

Table 5: The variance decomposition of money supply variable in export models

Period	S.E.	LLAOEXP	LM2	LINT	LINF	LRES	LEXRkd	LEXRkb
1	0.289261	22.32799	77.67201	0	0	0	0	0
2	0.359946	17.64077	56.91124	0.030889	2.030947	18.97143	3.422809	0.99191
3	0.383375	15.90844	50.2279	5.025195	2.234085	22.52519	3.200455	0.878737
4	0.422253	13.71988	41.61801	5.848964	2.138529	26.30331	8.428552	1.942759
5	0.55451	9.335703	24.20111	13.2136	2.532387	42.00454	7.505452	1.207213
6	0.673863	22.81555	16.53177	13.15295	1.968684	35.3809	6.723873	3.426284
7	0.775719	35.12378	12.49524	10.24432	1.67842	26.6999	7.442256	6.316097
8	0.823772	37.43954	11.1563	9.629423	3.197966	23.68432	8.105448	6.787009
9	0.846725	36.44674	10.68082	10.77824	5.056023	22.68761	7.814613	6.535952
10	0.850704	36.23604	10.6466	11.23969	5.050698	22.58442	7.744115	6.49844
11	0.851424	36.19904	10.70383	11.2567	5.042302	22.55769	7.743006	6.497434
12	0.855562	36.28832	10.66417	11.19573	5.273613	22.45181	7.69107	6.435288
13	0.864313	36.55264	10.46573	10.97142	5.320909	22.50061	7.859888	6.328808
14	0.881104	37.09053	10.0753	10.78938	5.122309	22.66494	8.0416	6.215932
15	0.904384	38.42096	9.567863	10.66311	4.86561	22.15448	8.070595	6.257375
16	0.926268	39.9287	9.12116	10.43611	4.642865	21.31138	8.158559	6.401237
17	0.941719	40.67764	8.839476	10.40376	4.605113	20.74393	8.270513	6.459577
18	0.95163	40.83615	8.685817	10.60779	4.70157	20.44497	8.267414	6.456284
19	0.95642	40.87732	8.628374	10.7817	4.730275	20.27417	8.238305	6.469861
20	0.958012	40.8391	8.632284	10.85188	4.758433	20.21106	8.223338	6.483904
21	0.959055	40.7592	8.646787	10.87137	4.823327	20.21885	8.207923	6.472539
22	0.961299	40.77147	8.629665	10.8275	4.850611	20.2469	8.224442	6.449421
23	0.965761	40.92443	8.563042	10.7384	4.811568	20.26256	8.270463	6.429542

24	0.972462	41.21755	8.451864	10.6485	4.745535	20.19684	8.313682	6.426032
25	0.97997	41.57303	8.32416	10.57157	4.675771	20.05266	8.361722	6.441084
26	0.986753	41.84995	8.210318	10.53791	4.629301	19.90373	8.409653	6.459139
27	0.99198	42.0049	8.126654	10.55949	4.617771	19.78275	8.433861	6.474571

Source: Autor's calculation, 2021.

4.3.3 THE VARIANCE DECOMPOSITION ANALYSIS ON INTEREST RATE VARIABLE IN EXPORT MODEL

Table 6 shows that fluctuations in interest rate policy changes in the first phase of the study were found to have an impact on the economy as high as 95.29%. Of these, the fluctuation of interest rates is seen in the higher rate of decline, from 1993 onwards, interest rates tended to decline steadily until 2018. The rate of volatility of the interest rate was at 30.62%, resulting in export volatility at 35.87%; 4.99% money supply, 3.48% inflation rate and 11.57% national reserves. The exchange rate between Lao kip and US dollar was 8.44% and the exchange rate between Lao kip and Thai baht was 5%.

Table 6: The variance decomposition of interest rate variable in export models

Period	S.E.	LLAOEXP	LM2	LINT	LINF	LRES	LEXRkd	LEXRkb
1	0.064229	0.375845	4.329037	95.29512	0	0	0	0
2	0.07503	18.23518	4.61864	70.37373	1.714549	0.159633	2.862166	2.036101
3	0.083568	18.36664	6.641296	67.3058	3.392202	0.13524	2.387586	1.771239
4	0.086746	18.78394	6.997525	65.0927	3.995145	0.856702	2.342308	1.931685
5	0.089523	17.63683	7.749738	61.80999	3.779895	4.606092	2.603279	1.814177
6	0.09319	18.48399	8.19342	57.0827	3.938279	7.134836	3.14715	2.019625
7	0.09877	21.72163	7.934591	50.93078	3.758908	8.345705	4.654559	2.653826
8	0.104802	24.60622	7.312293	45.33507	3.417636	9.969782	6.217788	3.141208
9	0.111225	27.12048	6.643798	40.78476	3.229462	11.57788	7.058969	3.584655
10	0.116777	29.51382	6.109187	37.43987	2.975955	12.15925	7.6923	4.109622
11	0.12086	30.9487	5.724478	35.29207	2.911822	12.28705	8.291773	4.544108
12	0.123481	31.38687	5.486825	34.22941	3.163975	12.35115	8.5745	4.807271
13	0.124688	31.43557	5.381828	33.85656	3.390097	12.32069	8.638886	4.976369
14	0.124968	31.35486	5.357729	33.76964	3.520155	12.27881	8.661793	5.057014
15	0.125148	31.39414	5.342657	33.67563	3.649224	12.24924	8.638168	5.050944
16	0.125706	31.81495	5.295374	33.3839	3.714038	12.17625	8.599702	5.01579
17	0.126756	32.5587	5.211783	32.91562	3.667266	12.08156	8.583868	4.981196
18	0.128274	33.47811	5.099836	32.36789	3.581172	11.95979	8.55357	4.959645
19	0.129983	34.44071	4.986728	31.82375	3.491397	11.77522	8.514819	4.967379
20	0.131523	35.22025	4.905949	31.40026	3.429251	11.56921	8.483632	4.991449
21	0.132678	35.68254	4.871681	31.17833	3.42221	11.39428	8.441019	5.009944
22	0.133385	35.87128	4.879395	31.11871	3.447582	11.27483	8.389797	5.018403
23	0.133721	35.8748	4.917155	31.12899	3.478492	11.23259	8.351669	5.016306
24	0.133892	35.79064	4.965334	31.13063	3.508552	11.26503	8.334679	5.005138
25	0.134104	35.72958	5.001167	31.05961	3.523206	11.34688	8.345514	4.994044
26	0.134484	35.75611	5.010552	30.88595	3.511282	11.45826	8.386348	4.991498
27	0.135062	35.87785	4.992074	30.62901	3.481509	11.57287	8.444479	5.002205

Source: Autor's calculation, 2021.

4.4 RELATIONSHIP BETWEEN VARIABLES IN THE MODEL AND THE IMPACT OF MONETARY POLICY ON IMPORT MODEL USING VAR MODEL

The analysis show that only lag term variable affects endogenous variables ($M2$, INT, INF, RES, EXR_{KD}, EXR_{KB}) to study by order of importance statistics and examination results to study the influence of Lag term variable. All models show that the value F-statistic variable groups have influence variables endogenous together with a range of significant statistics at 5%.

However, results of the VAR model analysis do not clearly show the relationship between dependent and independent variables. They are only a general representation of

the relationship and cannot be concluded. Therefore, other econometric tools have been added to the parallel analysis, such as the impulse response function analysis and the variance decomposition analysis, which brings the results of each variation analysis in detail.

4.4.1 IMPULSE RESPONSE FUNCTION ANALYSIS IN THE IMPORT MODELS

In this section, we will present the analysis of the variables according to the impulse response function model to analyze the impact of each variable as an effect of the monetary policy (shock) on which variables will affect the variables in the model.

Any currency will certainly impact the variables in monetary policy, not least so that the article will explain the change of monetary policy by using analysis of the response variable (Impulse Response Function) investigating the effect on import from the central bank monetary policy to expand amounts of money supply in the economic system which will affect both directly and indirectly variables such as imports, inflation, interest rates, national reserves and the exchange rate as a mean.

4.4.1.1 IMPLUSE RESPONSE OF INT, INF, RES, EXRkd, EXRkb and IMP to M2

The result (Figure 3a) shows that the average value of imports tends to grow positively over the course of the study and also fluctuates above the average volatility. Lao imports have increased since the beginning of the 1991 to 1995, with an average height of 0.03 and fell slightly in 1996. After that, imports tend to increase with an average of less than 0.025 until 2005 after which they began to decline, but higher than average and balance in the long-term average until late 2018. The central bank's expansion monetary policy with increasing the money supply seemed directly and indirectly impact to import.

4.4.1.2 IMPLUSE RESPONSE OF INF, RES, EXRkd, EXRkb and INT to M2

When the economy underwent a change in the money supply volume in 1991, interest rates were immediately affected. It was below the 0.03 average and fluctuated until the end of 1994 to fall below the 0.19 average. After that, interest rates tended to rise steadily but remained below the benchmark until 2010, after which interest rates adjusted and rebounded to the long-term benchmark (see Figure 3c).

4.4.1.3 IMPLUSE RESPONSE OF INT, RES, EXRkd, EXRkb and INF to M2

Figure 3d, demonstrates that when the government pursues an expanded monetary policy by increasing the volume of the economy, it has an immediate effect on inflation, resulting in a drop-in inflation in 1993 below the 0.1 level and continued to fluctuate sharply in the upward trend until 1995. Since 1996, it has been found that inflation has fluctuated in a direction that is lower than the standard average balance until 1998. So there is a tendency to increase and decrease according to the fluctuations and changes in economic policies. Since 2007, inflation rate has stabilized and reached a long-term average.

4.4.1.4 IMPLUSE RESPONSE OF INT, INF, EXRkus, EXRkb and RES to M2

Figure 3e, shows that the use shock increase money supply in the economy caused the reserve to increase by 6% from 1991 to 1993. After that period, it declined from 6% to 3%, but still higher than the average standard that changed with response rates up and down on political economy until 2008. The fluctuations chang in the direction and the constant into balance point average in the long term.

4.4.1.5 IMPLUSE RESPONSE OF INT, INF, RES and EXRkd and EXRkb to M2

Figure 3f shows that the expansion monetary policy has an immediatly effect on the exchange rate between Lao kip and US dollar: causing the exchange rate to depreciate but remain above the average level since 1991 and continued to fluctuate sharply until 1998. During the early years of the study period, the exchange rate from Lao kip to the Thai baht fell to around 0.01, but higher than the average standard after that. The volatility continues to change upward until 1997 and the exchange rate began to fluctuate at downward trend until the end of 1999. Since 2000, the exchange rate between Lao kip and Thai Baht was relatively stable compared to standard and progressed to the balanced average point in the long term (see Figure 3g).

Figure 3: Impluse response of INT, INF, EXRkd, EXRkb and IMP to M2

Response to Cholesky One S.D. (d.f. adjusted) Innovations ±2 S.E.
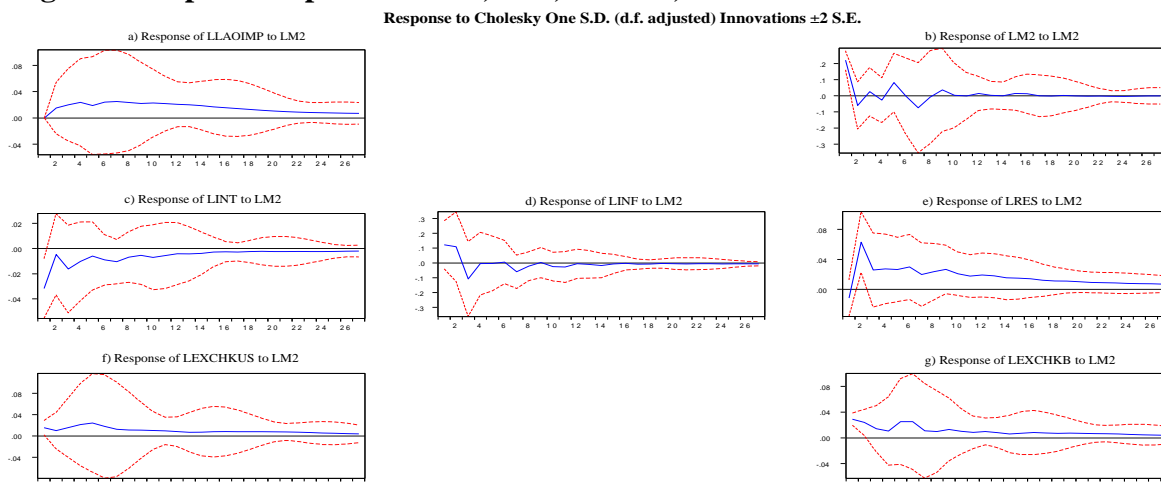
Source: Autor's calculation, 2021.

4.4.2 THE VARIANCE DECOMPOSITION ANALYSIS BY USING THE IMPORT MODELS

4.4.2.1 THE VARIANCE DECOMPOSITION ANALYSIS ON IMPORT VARIABLES IN THE IMPORT MODELS

Table 7 shows that in the first phase of the study period, the import volatility was 100%, but over time, the import volatility decreased, especially in 2000 by 60.69%, while other variables began to increase: 24.28% interest rate, 3.7% inflation rate, 1.67% national reserves, the exchange rate between Lao kip and US dollar was 0.7% and the exchang rate between Lao kip and Thai baht was 2.57%. The change in import variables seem to be different from period to period, meaning that some periods tend to decrease, some periods tend to increase, but in 2018, the import change accounted by 52%, 9.7% money supply, 23% interest rate, 3.6% inflation rate, 4.5% national reserves, the exchange rate between Lao kip and US dollar is 2.42% and the exchange rate between Lao kip ad Thai baht is 4.48%.

Table 7: The variance decomposition of import variables in the import models

Period	S.E.	LLAOIMP	LM2	LINT	LINF	LRES	LEXRkd	LEXRkb
1	0.082554	100	0	0	0	0	0	0
2	0.115431	93.61725	1.741379	0.643943	0.201286	3.247784	0.502432	0.045922
3	0.145632	83.76387	2.976763	8.045776	1.118233	3.08194	0.661379	0.352037
4	0.176614	74.85455	3.835115	14.8197	1.835842	2.608149	0.727834	1.318814
5	0.201567	70.40928	3.819866	18.56201	2.28849	2.00773	0.803687	2.108936
6	0.220424	66.39142	4.396195	21.20497	3.100774	1.721103	0.827835	2.357702
7	0.233705	63.52355	5.048698	23.02702	3.590067	1.542149	0.783985	2.484536

8	0.241806	61.83488	5.658554	24.013	3.70109	1.481786	0.735861	2.574826
9	0.246196	60.69722	6.262531	24.28922	3.780796	1.671913	0.721025	2.577296
10	0.248643	59.67911	6.977103	24.13406	3.816691	2.068573	0.795531	2.528939
11	0.250702	58.71628	7.617682	23.74113	3.762884	2.647624	0.984825	2.529573
12	0.253594	57.67021	8.111122	23.3609	3.688214	3.255701	1.250549	2.663311
13	0.257532	56.56842	8.471197	23.10154	3.622273	3.741153	1.552449	2.942974
14	0.261998	55.48829	8.697576	22.96394	3.594874	4.116851	1.849049	3.289426
15	0.266294	54.50511	8.820393	22.93541	3.606117	4.399882	2.09422	3.638869
16	0.26982	53.71191	8.919627	22.94918	3.62098	4.560817	2.271728	3.965755
17	0.272261	53.13898	9.036865	22.94435	3.634029	4.622546	2.38805	4.235189
18	0.273644	52.76212	9.168192	22.90961	3.647572	4.638729	2.453465	4.420312
19	0.274276	52.54417	9.303585	22.85557	3.651958	4.638283	2.48248	4.52395
20	0.27458	52.43251	9.429749	22.80509	3.64671	4.6315	2.490105	4.564342
21	0.274903	52.37514	9.529721	22.78432	3.638866	4.620643	2.486312	4.564993
22	0.275412	52.33555	9.597205	22.80391	3.633603	4.604338	2.477154	4.548242
23	0.276112	52.29047	9.638937	22.8593	3.634569	4.582519	2.465891	4.52832
24	0.276894	52.23425	9.66598	22.93532	3.641164	4.557368	2.453901	4.51202
25	0.277617	52.17335	9.689332	23.01028	3.650202	4.533704	2.442333	4.50079
26	0.278178	52.11332	9.718077	23.06638	3.659352	4.517722	2.432638	4.492511
27	0.27855	52.05695	9.755931	23.09558	3.666164	4.513734	2.42651	4.485129

Source: Autor's calculation, 2021.

4.4.2.2 THE VARIANCE DECOMPOSITION ANALYSIS ON MONEY SUPPLY VARIABLES IN THE IMPORT MODELS

Table 8 shows that the fluctuations from the first round of money supply have caused the volatility to reach as high as 62.55% and have continued to fall as low as 10% since 1998, causing other variables to fluctuate: import volatility by 26.7%, 24.73% interest rate, 2.19% inflation rate, 22.64% national reserves, the exchang rate between Lao kip and US dollar was 4.3% and the exchang rate between Lao kip and Thai baht was 8.83%. Volatility fluctuations continued to decline until 2018 at 7.67%, which led to a turnover of imports up to 28%, 26.97% interest rate, 5.4% inflation rate; 18.23% national reserves, the exchange rate between Lao kip and US dollar was 4.22% and the exchang rate between Lao kip and Thai baht was 8.92%.

Table 8: The variance decomposition of money supply variables in the import models

Period	S.E.	LLAOIMP	LM2	LINT	LINF	LRES	LEXRkd	LEXRkb
1	0.278188	37.44262	62.55738	0	0	0	0	0
2	0.338203	25.34365	45.44914	1.290551	3.305239	19.7706	4.073701	0.767122
3	0.355569	24.87058	41.62507	5.940197	2.994797	20.05874	3.725274	0.785341
4	0.411262	22.0145	31.52894	7.361969	2.291928	26.38265	7.758157	2.661849
5	0.556559	13.8442	19.37529	14.55487	4.218623	40.1835	6.155319	1.668192
6	0.684583	20.35956	12.80822	25.06148	2.846294	28.659	4.762675	5.502774
7	0.786433	26.70801	10.59025	24.73199	2.19315	22.64264	4.30035	8.833607
8	0.828629	27.25613	9.547787	25.11006	4.521112	20.41274	4.207323	8.944845
9	0.846066	26.64219	9.338473	25.78045	5.474605	19.93584	4.078435	8.750013
10	0.849278	26.67459	9.269095	25.90774	5.44043	19.82155	4.07537	8.811227
11	0.849999	26.66562	9.253469	25.91719	5.432236	19.80693	4.077158	8.847401
12	0.851426	26.63359	9.250602	25.83915	5.46044	19.88185	4.103733	8.830628
13	0.85713	26.64748	9.129249	25.69277	5.419656	20.20281	4.192993	8.715037
14	0.869331	26.85859	8.874792	25.93846	5.366167	20.12688	4.213074	8.622032
15	0.883893	27.42117	8.611003	26.21617	5.249233	19.54995	4.209713	8.742765
16	0.896106	27.85235	8.398734	26.3802	5.263524	19.04862	4.223536	8.833036
17	0.904689	27.97652	8.240115	26.57268	5.385138	18.76077	4.22126	8.843509
18	0.909659	28.02968	8.150572	26.72831	5.409509	18.59763	4.212388	8.871915
19	0.911948	28.06282	8.110149	26.79511	5.406692	18.50534	4.207018	8.912865
20	0.912679	28.05121	8.097199	26.81407	5.41822	18.48357	4.201464	8.934264
21	0.912917	28.04013	8.093774	26.80126	5.419938	18.50658	4.203199	8.935117
22	0.913764	28.05825	8.07919	26.79059	5.412017	18.52897	4.210199	8.920791

23	0.915648	28.11757	8.047004	26.80975	5.400454	18.49962	4.215741	8.90986
24	0.918179	28.20287	8.00467	26.84297	5.390979	18.42832	4.221009	8.909177
25	0.92078	28.27335	7.960206	26.88598	5.394153	18.35144	4.224708	8.910164
26	0.922989	28.3189	7.922201	26.93466	5.401016	18.28409	4.224635	8.914505
27	0.924512	28.34796	7.896147	26.97359	5.404224	18.23089	4.22258	8.924601

Source: Autor's calculation, 2021.

4.4.2.3 THE VARIANCE DECOMPOSITON ANALYSIS ON INTEREST RATE VARIABLES IN THE IMPORT MODELS

Table 9 shows that the modest fluctuations of interest rate policy changes have affected the economy as high as 72.25%. Of which, interest rate fluctuations changed at a slower pace, from 1999, interest rates tended to fall sharply to 49.4%, resulting in variables such as import fluctuations, money supply, inflation rate, national reserves, the exchange rate between Lao kip and US dollar, and the exchange rate between Lao kip and Thai baht of 16.36%, 17%, 4.14%, 6.2%, 2.93%, and 3.93% respectively. In addition, it was found that the fluctuation of interest rates continued to decrease until 2018. The interest rate fluctuations stood at 43.77%, with an effect of making imports fluctuation, money supply, inflation rate, national reserves, the exchange rate between Lao kip and US dollar, and the exchange rate between Lao kip and Thai baht of 21.72%, 13.33%, 4.45%, 6.45%, 3.77% and 6.53% respectively

Table 9: The variance decomposition of interest rate variables in the import models

Period	S.E.	LLAOIMP	LM2	LINT	LINF	LRES	LEXRkd	LEXRkb
1	0.067189	5.491444	22.25285	72.25571	0	0	0	0
2	0.075656	14.4283	17.94075	61.37338	2.796723	0.034079	1.086258	2.340512
3	0.082819	12.68441	18.81454	61.39359	4.060036	0.057271	0.910525	2.079635
4	0.085877	12.13766	18.91708	60.51574	4.408157	0.53449	0.986461	2.500418
5	0.087749	11.63228	18.57328	58.01124	4.262209	3.895985	1.186227	2.438777
6	0.090151	12.44592	18.59627	55.65099	4.080727	4.885859	1.544169	2.796063
7	0.094077	14.74763	18.30733	52.13355	3.768275	5.252908	2.311551	3.478757
8	0.099005	16.36685	17.00268	49.40304	4.144587	6.20519	2.939009	3.938648
9	0.104169	17.74834	15.62891	47.60811	4.231143	6.904569	3.288993	4.589929
10	0.108513	19.16846	14.81755	46.10274	4.095375	6.857515	3.591977	5.366386
11	0.111686	19.89705	14.23843	45.19688	4.215643	6.765167	3.788013	5.898821
12	0.113579	20.10431	13.89817	44.81996	4.375414	6.681934	3.84066	6.279549
13	0.114336	20.12549	13.85097	44.62383	4.392914	6.601352	3.855712	6.54973
14	0.114521	20.07231	13.91942	44.51353	4.40078	6.584187	3.860839	6.648932
15	0.114628	20.11958	13.95056	44.44878	4.397383	6.580696	3.85368	6.64932
16	0.114964	20.31281	13.91798	44.35486	4.384287	6.574434	3.843823	6.611807
17	0.115626	20.59678	13.81482	44.25013	4.389985	6.562015	3.826075	6.560202
18	0.116476	20.95329	13.65712	44.15557	4.388991	6.511809	3.803328	6.529888
19	0.117328	21.29618	13.49431	44.07117	4.398563	6.437424	3.78004	6.522308
20	0.118034	21.53344	13.37281	44.02068	4.429214	6.367094	3.754323	6.522438
21	0.118497	21.66245	13.30892	43.99913	4.454229	6.31741	3.731303	6.52655
22	0.118728	21.70891	13.29479	43.98332	4.467332	6.300799	3.717177	6.527676
23	0.118819	21.70247	13.31326	43.96115	4.473845	6.313316	3.713232	6.522719
24	0.118873	21.6828	13.3408	43.92264	4.472123	6.344892	3.719762	6.516992
25	0.118967	21.67588	13.35574	43.86484	4.465594	6.388089	3.734533	6.515331
26	0.11913	21.69058	13.35105	43.7949	4.458671	6.429547	3.753168	6.522083
27	0.119348	21.7239	13.33132	43.72222	4.453198	6.45796	3.772266	6.539141

Source: Autor's calculation, 2021.

5. CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

The period from 1990 to 2018, Lao PDR had the highest export value of USD 5,294.71 million, the lowest export value of USD 79 million and the average export value of USD 1,321.31 million per year, and the maximum import value of USD 6,164.04 million, the minimum import value of USD 165 million, and an average import value of USD 1,779.36 million per year. The maximum money supply in the economy was LAK 80,950.23 billion while the minimum money supply LAK 44.34 billion, with an average of 18,295.97 billion Kip. The highest and lowest interest rate was 19.21 percent and 5.36 percent, with an average of 10.54 percent. The highest and lowest inflation rate was 134 percent and 0.07 percent, and an average of 16.56 percent. The maximum and minimum national reserves were USD 1,161.65 million and USD 1.8 million, and an average of USD 379.45 million. The maximum and minimum exchange rate between Lao kip and US dollar was 10,790 kip per dollar and 702 kip per dollar, with an average of 6,572 kip per dollar. The maximum and minimum exchange rate between Lao kip and Thai baht was 278.8 kip per baht and 27.86 kip per baht, with an average of 183 kip per baht. Monetary policy variables affect the export and import models as follows:

Lao exports tended to increase with an average of at least 2.5% up to 2004 while exports began to decline compared to the average. There was a steady trend of export from 2010 to 2015, with the benchmark average of 0.8%. The export continuously rose until the end of 2018. There seemed to be some fluctuation in interest rates and moving into a long term benchmark adjustment from 2002. Inflation rate fluctuated with the downward trend up to 2004 and thus tended to increase and move towards a long-term average balance. There was fluctuation above the standard average of the national reserve. The volatility continuously increased until 2001 while decline sharply up to 2009. The exchange rate of Lao kip against the US dollar continuously rose up to 2009 and fluctuated reaching a long term average balance. The exchange rate between the Lao kip and the Thai baht is relatively stable compared to the standard average exchange rate. However, the exchange rate between the Lao kip and the Thai baht changed in an upward direction and was higher than the standard average from 2006 to 2011. The modest volatility of exports was 100% self-inflicted, but over time, exports had a declining self-efficacy as other variables gradually begun to fluctuate. The change in export variables was seen to be different from period to period, meaning that some periods tend to decrease while the other tend to increase, but in 2011, there was the share of exports by 58.31%, 7% money supply, 10.14% interest rate, 3.5% inflation rate, 10.73% national reserves, the exchange rate between Lao kip and US dollar was 6.36% and the exchange rate between Lao kip and Thai baht was 3.93%. Split volatility by increasing the amount of money supply led to a volatility of 77.67% and continuously fell below 10% in 2006, which made exports volatile at 38.42%, 10.66% interest rate, 4.86% inflation rate, 22.25% national reserves, the exchange rate between Lao kip and US dollar was 8.07% and the exchange rate between Lao kip and Thai baht was 6.25%. Fluctuations continuously declined until 2018, when the volatility of the currency was at 8.12%, seen as a continuation of the volatility of exports, interest rate, inflation rate, national reserves, the exchange rate between Lao kip and US dollar, and the exchange between Lao kip and Thai baht up to 42%, 10.55%, 4.61%, 19.78%, 8.43% and 6.47% respectively.

The modest fluctuations in interest rate policy changes affect the economy was as high as 95.29%. Of which, the fluctuation of interest rates declined from 1993 onwards. The interest rates tended to decline steadily until 2018. The rate of interest rate fluctuations was at 30.62%, resulting in export fluctuations, money supply, inflation rate, national reserves, the exchange rate between Lao kip and US dollar and the exchange rate

between Lao kip and Thai baht of 35%, 4.99%, 3.48%, 11.57%, 8.44% and 5% respectively.

The imports tended to increase over the average period of not less than 0.025 until 2005, then began to decline, but above the standard average and adjusted to the standard average until the end of 2018. Interest rates tended to rise steadily, but still below the standard average until 2010. Inflation rate also fluctuated in the direction below the standard equilibrium until 1998, so there was a tendency for it to increase and decrease in line with fluctuations and changes in economic policies. Since 2007, inflation rate stabilized and reached a long-term average. National reserves fluctuated, which tended to decrease from 0.06 to 0.03, but was still higher than the average, and was seen a reversal of the rate of increase and decrease in economic conditions until 2008, as a long-term equilibrium trend. The exchange rate between Lao kip and US dollar depreciated but remained above the standard level. From 1991 to 1998 it continuously fluctuated. Since then, the exchange rate of the kip against the US dollar had fluctuated steadily and reached a long-term equilibrium. The exchange rate between Lao kip and Thai baht depreciated to about 0.01, but was higher than the standard average. After that, the exchange rate continued to fluctuate until 1997, and the exchange rate began to fluctuate until the end of 1999.

The fragmentation of imports was 100% self-inflicted, but over time the import fluctuations were likely to decrease, specifically in 2000 to about 60.69%, while other variables began to play an increasing role, such as the amount of money supply in the system accounted for 6.26%, interest rate, 24.28%, inflation rate, 3.7%, national reserves, 1.67%, the exchange rate between Lao Kip and US dollar, 0.7%, and the exchange rate between Lao kip and Thai baht, 2.57%. Whereas, the change in imports was seen to be different from time to time, meaning that some periods tend to decrease while other periods tended to increase, but in 2018, the volatile component of imports, money supply, interest rate, inflation rate, national reserves, the exchange rate between Lao kip and US dollar, and the exchange rate between Lao kip and Thai baht were 52%, 9.7%, 23%, 3.6%, 4.5%, 2.42% and 4.48% respectively.

The modest fluctuations of interest rate policy changes have affected the economy as high as 72.25%. Of which, interest rate fluctuations changed at a slower pace, from 1999, interest rates tended to fall sharply to 49.4%, resulting in variables such as import fluctuations, money supply, inflation rate, national reserves, the exchange rate between Lao kip and US dollar, and the exchange rate between Lao kip and Thai baht of 16.36%, 17%, 4.14%, 6.2%, 2.93%, and 3.93% respectively. In addition, it was found that the fluctuation of interest rates continued to decrease until 2018. The interest rate fluctuations stood at 43.77%, with an effect of making imports fluctuation, money supply, inflation rate, national reserves, the exchange rate between Lao kip and US dollar, and the exchange rate between Lao kip and Thai baht of 21.72%, 13.33%, 4.45%, 6.45%, 3.77% and 6.53% respectively.

5.2 RECOMMENDATION

The application of monetary policy seems to affect foreign trade, such as imports and exports, both directly and indirectly, thus it suggests the following recommendations:

1. The average interest rate between deposit and loan interest rates is still very wide, which has a direct impact on the foreign trade sector due to the relatively high interest rates compared to ASEAN and international trading partners.

2. With regard to imports and exports, the government should be encouraged to achieve the goal, because throughout the past, exporters have often experienced the problem of price pressures from middlemen, producers and search for markets are still limited.

Imports should include imported goods as equipment, technology to increase domestic production capacity, and intermediate goods to be packed and packaged in Laos. The relationship between government expenditure and revenue is closely related to Lao exports and imports.

3. This research paper has limited its focus to the application of monetary policy, such as: interest rates on deposits, loans, trade credit, foreign payment methods, foreign exchange rates, domestic debt, foreign debts and, real gross domestic product. Further research would be needed by adding more variables such as the abolition of trade barrier, and the use of monetary policy should be further compared, to e.g. the amount of loans, the exchange rate of multiple currencies and the rate of public debt, and so on.

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